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ALL INDIA NETWORK PROJECT ON TOBACCO

Annual Report

2024-25

ICAR - NATIONAL INSTITUTE FOR RESEARCH ON COMMERCIAL AGRICULTURE

भाकृअनुप - राष्ट्रीय वाणिज्यिक कृषि अनुसंधान संस्थान

(FORMERLY ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE)

(An ISO 9001: 2015 Certified Institute)

RAJAHMUNDRY - 533 105, ANDHRA PRADESH, INDIA

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तम्बाकू पर अखिल भारतीय नेटवर्क परियोजना

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(Formerly ICAR-Central Tobacco Research Institute)
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I. INTRODUCTION

Tobacco is an important low volume- high value commercial crop, grown in an area of 0.425 M ha (0.30% of net cultivated area) and contributes about Rs. 84,000 crores to the national exchequer through foreign exchange earnings and excise revenue. India produces presently about 772 million kg of tobacco (FAO stat, 2024). Different tobacco types such as Flue Cured Virginia (FCV), Burley, Oriental, *Bidi, Natu/ Pikka, Chewing* and *Rustica* are grown under diverse agro-climatic conditions. To address the location specific needs of different tobacco types, the All India Coordinated Research Project on Tobacco was established by Indian Council of Agricultural Research during 1970-71 with the headquarters of the Coordinating unit at Anand (Gujarat). The headquarters was subsequently shifted to ICAR-CTRI, Rajahmundry, Andhra Pradesh on 16-08-1998. Further, the AICRP on Tobacco was renamed as All India Network Research Project on Tobacco and kept under the administrative control of the Director, ICAR-CTRI, Rajahmundry. A total of numbers of 14 centres (3 Main centres, 7 sub-centres and 4 voluntary centres) are functioning at present.

The three main network centres of AINPT are located at Rajahmundry, Shivamogga and Anand; the seven sub-centres at Nipani, Nandyal, Berhampur, Araul, Dinhata, Guntur and Hunsur. The four voluntary centres of AINPT are functioning at Ladol, Jeelugumilli, Kandukur and Vedasandur. The centres at Rajahmundry, Guntur, Hunsur and Dinhata are functioning under the administrative control of ICAR-Central Tobacco Research Institute (ICAR-CTRI), Rajahmundry. Anand, Shivamogga, Nipani, Nandyal, Berhampur and Araul centres are under the administrative control of respective Universities, *viz*., Anand Agricultural University, Anand; University of Horticulture and Agricultural Sciences, Shivamogga; University of Agricultural Sciences, Dharwad; Acharya NG Ranga Agricultural University, Guntur; Odisha University of Agriculture and Technology, Bhubaneswar and Chandra Sekhar Azad University of Agriculture and Technology, Kanpur, respectively (Table 1). The existing Scientific, Technical, Administrative and Supporting staff strength was 16, 21, 03 and 01, respectively. AINPT Co-ordination Unit at Rajahmundry co-ordinates activities of all the centres and monitors the research programmes through four Project Investigators located at ICAR-CTRI, Rajahmundry. It also co-ordinates resource activities of different centres and also with ICAR on all the administrative, financial and issues related to the coordinating centres and ensure implementation of all the mandated programmes as per the guidelines of ICAR.

Mandate

Tobacco improvement through co-ordinated multi-disciplinary and multi-location research on different tobacco types (FCV, *Bidi, Natu, Chewing* and *Hookah* etc.) grown in their respective niche areas in the country.

Research Programmes

- Coordinated testing and release of tobacco varieties
- Co-ordinated development and validation of agro-technology suitable to different tobacco types
- Evolving location specific, climate resilient and input responsive superior varieties/hybrids of different tobacco types
- Breeding tobacco varieties tolerant for biotic and abiotic stresses
- Developing improved varieties having better quality and low health risk factors

- Collection, maintenance, evaluation and utilization of *bidi* tobacco germplasm
- Development of suitable site specific agro-techniques for enhancing the production efficiency and produce quality
- Development of location specific and cost-effective IPM modules for pest and diseases management with low levels of pesticide residues
- Identification of genotypes having traits of commercial importance and non-conventional uses
- Development and validation of remunerative and sustainable tobacco and non-tobacco-based cropping systems
- Transfer of technology for increasing the technology adoption and capacity building through training
- Production of breeder seed and truthfully labelled seed of popular varieties

Table 1: Mandated tobacco research at different centres is given below

S. No.	Name of the Unit and location	Year of start	Type of tobacco
A.	**Main Centres**		
1.	ICAR-NIRCA (CTRI), Rajahmundry-533105 (Andhra Pradesh)	1970-71	FCV & Burley
2.	Zonal Agricultural Horticultural Research Station, Shivamogga-577225, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Naveli (Karnataka)	1970-71	FCV
3.	*Bidi* Tobacco Research Station TRS, Anand-388110, Anand Agricultural University (Gujarat)	1970-71	*Bidi*, Chewing & *Rustica*
B.	**Sub-Centres**		
4.	ICAR-NIRCA(CTRI)-RS, Dinhata-736135 (West Bengal)	1970-71	*Jati* & *Motihari* (*Rustica*)
5.	ICAR-NIRCA (CTRI)-RS, Hunsur -571105 (Karnataka)	1970-71	FCV
6.	ICAR-NIRCA (CTRI)-RS, Guntur-522004 (Andhra Pradesh)	1970-71	FCV, *Natu* & Burley
7.	Regional Agricultural Research Station, Nandyal-518503, Acharya N. G. Ranga Agricultural University (Andhra Pradesh)	1970-71	*Bidi* , *Natu* & Burley
8.	Agricultural Research Station, Nipani-591237, University of Agricultural Sciences, Dharward (Karnataka)	1970-71	*Bidi*
9.	All India Network Project on Tobacco, Nutri-Crops Research Station, Berhampur-761001, Odisha University of Agriculture and Technology (Odisha)	1987-88	*Pikka*
10.	Tobacco Research Station, Araul, Chandrashekhar Azad University of Agriculture and Technology, Kanpur Nagar district-209202 (Uttar Pradesh)	1987-88	*Rustica*

S. No.	Name of the Unit and location	Year of start	Type of tobacco
C.	**Voluntary centres**		
11.	Agricultural Research Station, Ladol, Sardarkrushinagar Dantiwada Agricultural University, Dantiwada-382840 (Gujarat)	2001	*Rustica*
12.	ICAR-NIRCA (CTRI)-RS, Kandukur - 523105 (Andhra Pradesh)	2001	FCV
13.	ICAR-NIRCA (CTRI)-RS, Jeelugumilli-534456 (Andhra Pradesh)	2001	FCV& Irrigated Natu
14.	ICAR-NIRCA (CTRI)-RS, Vedasandur-624710 (Tamil Nadu)	2001	Chewing, Cheroot,Cigar filler & Cigar Wrapper

The technical programme for all the AINPT centres is finalized during the Annual Group Meetings or Biennial Workshops and implemented by the different centres. The XIII Group Meeting of All India Network Project on Tobacco (AINPT) was held at ICAR-Central Tobacco Research Institute Research Station, Hunsur during 29-30th August, 2024 under the Chairmanship of Dr. T.R. Sharma, DDG (CS), ICAR, New Delhi. The experimental results of 2023-24 were reviewed and also formulated the future technical programme for 2024-25 was formulated.

Table 2: Centre-wise approved experiments in different disciplines

Centre	PB	AG	SS & AC	EN	PP	NE	Total
Rajahmundry	2	1	1				**4**
Jeelugumilli	3			1			**4**
Kandukur	3						**3**
Guntur	3			1			**4**
Hunsur	3						**3**
Shivamogga	6	1		3			**10**
Anand	8	3			5	1	**17**
Nandyal	15	3				1	**19**
Nipani	9	3				1	**13**
Berhampur	6						**6**
Araul	5	2					**7**
Dinhata	3						**3**
Ladol	6						**6**
Vedasandur	1	1					**2**
Total	**73**	**14**	**1**	**5**	**5**	**3**	**101**

PB: Plant Breeding; **AG:** Agronomy; **SS & AC:** Soil Science & Agricultural Chemistry; **EN:** Entomology; **PP:** Plant Pathology; **NE:** Nematology

II. METEOROLOGICAL DATA

RAJAHMUNDRY

An amount of 939.70 mm of rainfall was received during 2024-25 in 47 rainy days (Table R). The mean maximum temperature varied from 31.05°C to 39.19ºC, whereas, the minimum temperature ranged from 18.02°C to 26.03°C. The relative humidity in the early hours varied from 81.84% to 91.23% whereas relative humidity in the mid hours varied from 48.00% to 81.45%. The maximum Evaporation was observed in the month of Mar i.e. 5.77 mm. Maximum rainfall was received during the Pre Nursery and Transplanting stages.

Table R: Meteorological data at Rajahmundry centre (2024-25)

Month	Temperature(°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Evaporation (mm)
	Max.	Min.	7.25 Hrs	14.25 hrs			
2024							
Apr.	39.19	24.57	86.37	52.87	0.00	0.00	4.63
May	38.89	25.37	84.58	57.45	94.60	2.00	4.42
Jun.	35.82	25.11	88.30	64.77	163.30	9.00	3.27
Jul.	31.69	25.41	89.90	81.45	347.00	15.00	2.35
Aug.	33.06	26.03	91.23	74.35	117.80	6.00	2.84
Sep.	33.56	25.29	90.30	71.90	143.20	7.00	3.47
Oct.	34.97	24.86	90.68	65.26	37.20	6.00	3.26
Nov.	33.25	21.33	88.83	56.13	24.80	1.00	3.66
Dec.	31.95	20.87	86.90	59.94	11.80	1.00	2.86
2025							
Jan.	31.05	18.02	87.55	63.26	0.00	0.00	3.29
Feb.	33.21	20.72	84.43	48.14	0.00	0.00	4.69
Mar.	34.99	23.65	81.84	48.00	0.00	0.00	5.77
Total					**939.70**	**47.00**	

Table R-1: Rainfall received and rainy days during tobacco growth phases-2024-25

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	August to September	230.2	10
2	Nursery	September to November	92.8	10
3	Transplanting	November to December	11.8	1
4	Growth	January to February	0	0
5	Harvesting	February to April	0	0
		Total	**334.8**	**21**

JEELUGUMILLI

An amount of 808.3 mm of rainfall was received during 2024-25 in 77 rainy days (Table J). The mean maximum temperature varied from 29.58°C to 38.48°C, whereas the minimum temperature ranged from 18.45°C to 27.10°C. The relative humidity in the early hours varied from 83.74% to 93.29% whereas the relative humidity in the mid hours varied from 48.97% to 85.13%. The maximum Evaporation was observed in the month of Apr *i.e.* 8.16 mm. The highest Sunshine hours were observed during the month of Apr. Maximum rainfall is seen during the Pre Nursery and Growth stages.

Table J: Meteorological data at Jeelugumilli centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	38.48	24.82	88.9	48.97	Nill	Nill	8.74	8.16
May	37.20	27.10	89.97	65.19	68.50	04	6.83	7.79
Jun.	33.88	25.37	91.30	76.33	58.30	10	3.56	3.98
Jul.	29.68	23.60	92.60	83.32	262.20	25	1.22	1.41
Aug.	31.39	25.63	93.29	85.13	124.20	14	3.51	2.66
Sep.	30.86	22.42	89.67	74.90	201.10	16	2.69	1.92
Oct.	32.21	24.95	90.74	75.45	46.60	07	3.95	3.20
Nov.	31.40	19.68	90.40	65.27	47.40	01	5.60	2.64
Dec.	29.58	20.71	88.93	72.71	Nill	Nill	4.28	2.44
2025								
Jan.	30.82	18.45	87.22	58.68	Nill	Nill	5.4	
Feb.	34.39	20.48	84.21	57.32	Nill	Nill	7.06	
Mar.	37.26	22.79	83.74	52.32	Nill	Nill	7.07	
Total	**397.15**	**276.00**	**1071.00**	**815.59**	**808.3**	**77**	**59.91**	**47.25**

Table J-1: Rainfall received and rainy days during tobacco growth phases-2024-25

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	28.04.2024 to 14.08.2024	477.80	47
2	Nursery	15.08.2024 to 23.10.2024	278.10	28
3	Transplanting	24.10.2024 to 26.11.2024	52.40	02
4	Growth	27.11.2024 to 22.01.2025	Nill	Nill
5	Harvesting	25.01.2024 to 10.04.2024	Nill	Nill
		Total	**808.3**	**77**

GUNTUR

An amount of 1072.1 mm of rainfall was received during 2024-25 in 52 rainy days as against average rainfall of 991 mm (Table G). The mean maximum temperature varied from 31.1 to 43.7°C, whereas the mean minimum temperature ranged from 17.6 to 26.3°C. The relative humidity in the early hours varied from 57.9% to 66.9% whereas relative humidity in the mid hours varied from 50.2% to 53.9%. The highest Sunshine hours were observed during the month of Mar (8.2 hrs). The maximum evaporation was observed in the month of May *i.e.* 7.5 mm. Maximum rainfall was received during the pre-nursery, nursery and transplanting stages.

Table G: Meteorological data at Guntur centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	37.6	26.6	57.9	51.2	11.4	1	7.0	6.0
May	43.7	24.9	60.4	53.4	27.8	4	8.0	7.5
Jun.	39.6	22.0	62.0	52.8	105.1	7	6.0	8.5
Jul.	36.2	26.3	62.0	53.3	248.7	12	6.0	7.0
Aug.	33.8	24.5	62.3	53.6	97.2	5	7.5	6.0
Sep.	35.1	25.7	62.5	53.5	404.5	11	7.2	5.4
Oct.	33.3	24.8	63.5	53.3	165.0	10	7.5	4.5
Nov.	32.1	20.8	62.5	52.2	---	---	6.3	3.5
Dec.	31.8	20.0	61.9	50.2	12.4	2	7.5	7.0
2025								
Jan.	27.2	17.6	66.9	52.1	---	---	6.1	5.0
Feb.	27.7	19.6	59.8	50.8	---	---	7.5	5.7
Mar.	36.1	25.3	62.7	53.9	---	---	8.2	6.0
Total					**1072.1**	**52**		

Table G-1: Rainfall received and rainy days during tobacco growth phases-2024-25

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	April to August	490.2	29
2	Nursery	September to October	569.5	21
3	Transplanting	November to December	12.4	2
4	Growth	January to March	Nil	---
5	Harvesting	March to April	Nil	---
		Total	**1072.1**	**52**

KANDUKUR

An amount of 1119.8 mm of rainfall was received during 2024-25 in 42 rainy days (Table K). The highest Rainfall was observed during the month of October (439.8 mm). Mean maximum temperature varied from 27 to 33°C, whereas the minimum temperature ranged from 19 to 25°C. The relative humidity in the early hours varied from 58 to 86% whereas the relative humidity in the mid hours varied from 31 to 76%. The highest Sunshine hours were observed during the months of Feb and Mar (8 hours).

Table K: Meteorological data at Kandukur centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)
	Max.	Min.	7.25 hrs	14.25 hrs			
2024							
Apr.	29	25	66	32	0	2	7
May	29	24	78	57	10	2	7
Jun.	29	23	82	69	67	3	7
Jul.	28	22	86	76	71.8	3	6
Aug.	29	23	85	72	90.6	4	7
Sep.	30	22	74	65	105	5	7
Oct.	29	22	84	72	439.8	9	6
Nov.	28	21	82	67	201.6	6	6
Dec.	27	20	85	69	134	8	6
2025							
Jan.z	27	19	78	56	0	0	7
Feb.	31	17	58	34	0	0	8
Mar.	33	20	62	31	0	0	8
Total					**1119.8**	**42**	

Table K-1: Rainfall received and rainy days during tobacco growth phases 2024-25

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	25-10-2024 to 30-10-2024	439.8	9
2	Nursery	31-10-2024 to 10-01-2024	332.4	13
3	Transplanting	01-01-2025 to 10-01-2025	-	-
4	Growth	11-10-2025 to 28-04-2025	-	-
5	Harvesting	06-03-2025 to 28-04-2025	-	-
		Total	**772.2**	**22**

HUNSUR

An amount of 1007.9 mm of rainfall was received during 2024-25 in 103 rainy days (Table H). Mean maximum temperature varied from 29.3 to 34.2°C, whereas, the minimum temperature ranged from 6.1 to 12.2°C. The relative humidity in the early hours varied from 88.5% to 91.4% whereas relative humidity in the mid hours varied from 66.0% to 87.4%. The highest Sunshine hours were observed during the months of February (6.8 hrs). The maximum Evaporation was observed in the months of February and Mar, *i.e.* 3.6 mm. During the different crop growth stages 359.2 mm rainfall was received in 41 rainy days. Higher amount of rainfall received during the Nursery and Growth phase (Table H-1).

Table H: Meteorological data at Hunsur centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	34.2	12.0	88.5	65.8	18.0	1	6.7	3.2
May	33.5	12.2	89.2	66.6	237.8	13	6.2	3.0
Jun.	31.4	10.2	91.3	66.0	114.9	16	5.8	3.0
Jul.	28.3	9.7	90.9	67.3	244.3	25	4.4	3.0
Aug.	29.3	11.5	91.0	67.8	90.2	13	5.0	3.2
Sep.	30.4	9.7	91.4	75.0	19.2	9	4.0	2.8
Oct.	29.4	10.2	91.4	79.7	119.5	13	4.5	2.0
Nov.	30.2	9.2	91.2	87.4	62.7	5	4.7	2.0
Dec.	29.7	6.2	89.3	83.7	66.5	5	5.8	3.0
2025								
Jan.	32.2	6.2	89.7	73.2	0.0	0	6.2	3.5
Feb.	33.2	6.1	90.0	76.0	0.0	0	6.8	3.6
Mar.	33.8	11.9	89.8	74.8	34.8	3	6.0	3.6
Total/Average	**31.3**	**9.6**	**90.3**	**73.6**	**1007.9**	**103**	**5.5**	**3.0**

Table H-1: Rainfall received and rainy days during different FCV tobacco growth phase (2024-25)

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	01-02-2024 to 15-03-2024	0.0	0
2	Nursery	15-03-2024 to 15-05-2024	176.0	6
3	Transplanting	15-05-2024 to 01-06-2024	112.1	12
4	Growth	01-06-2024 to 30-07-2024	359.2	41
5	Harvesting	01-08-2024 to 15-09-2024	105.7	20
		Total	**753.0**	**79**

SHIVAMOGGA

Total rainfall of 1490.2 mm was received during the year 2024-25 in 91 rainy days. A maximum temperature of 37.3 °C was recorded during April, and a minimum temperature of 17.1°C was recorded during February. The relative humidity in the early hours varied from 77.1% to 91.5% whereas relative humidity in the mid hours varied from 31.7% to 87.0%. The maximum evaporation was observed in the month of March, *i.e.* 5.83 mm. The highest Sunshine hours were observed during the month of February (9.31 hrs). Maximum rainfall was received during the transplanting and harvesting stages.

Table S: Meteorological data at Shivamogga centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	37.3	22.3	70.7	31.7	51.8	2	8.9	7.1
May	34.2	22.4	75.4	55.4	227	9	6.9	5.6
Jun.	29.8	21.6	85.3	74.7	189.8	16	3.2	4.1
Jul.	27.0	21.1	90.5	87.0	361.8	24	1.0	3.2
Aug.	29.0	21.3	89.8	79.9	250.4	16	3.6	3.9
Sep.	29.4	20.6	88.7	77.2	53.6	9	5.2	4.5
Oct.	30.4	21.2	91.5	76.0	336	12	4.9	3.9
Nov.	30.1	18.9	88.7	68.5	4.2	1	7.3	4.6
Dec.	29.8	18.4	86.5	71.0	12	1	6.0	4.6
2025								
Jan.	31.2	15.1	77.1	50.9	0	0	8.86	5.37
Feb.	33.9	17.1	77.5	37.2	0	0	9.31	5.47
Mar.	35.6	20.2	77.6	38.3	3.6	1	8.48	5.83
Total/ Average	**31.5**	**20.0**	**83.3**	**62.3**	**1490.2**	**91.0**	**6.1**	**4.8**

Table S-1: Rainfall received and rainy days during different FCV tobacco growth phases (2024-25)

Tobacco growth stages	Period	Rainfall (mm)	Rainy days
Pre nursery	01-01-2024 to 22-04-2024	62.2	06
Nursery	20-03-2024 to 13-07-2024	545.0	42
Establishment	26-05-2024 to 26-07-2024	534.0	40
Transplanting	27-07-2024 to 16-08-2024	605.6	50
Growth	10-07-2024 to 29-08-2024	555.2	35
Harvesting	16-07-2024 to 25-11-2024	846.3	49

Pest and diseases: Rainfall received during the cropping period (July to October) was 1001.8 mm as against 706.2 mm normal rainfall. Rainfall received was 41.7% higher than the normal rainfall, with 61 actual numbers of rainy days as against 43 normal rainy days. This higher rainfall was highly congenial for incidence of diseases and sucking pest.

ANAND

The rainfall received during the year 2024-25 was 1175.2 mm in 44 rainy days (Table A) which was more than the normal rainfall (862 mm) of the middle Gujarat Agro-Climatic Zone. Mean maximum temperature varied from 28.1 to 40.8°C, whereas the minimum temperature ranged from 14.0 to 28.8°C. The relative humidity in the early hours varied from 61.6% to 92.1% whereas relative humidity in the mid hours varied from 21.8% to 76.1%. The highest Sunshine hours were observed during the month of May (10.6 hrs). The maximum Evaporation was observed in the month of May *i.e.*, 9.7 mm. The rainfall received during the pre-nursery stage was useful for land preparation. During transplanting, 65.4 mm of rainfall within 5 rainy days was received, which helped in the transplanting of tobacco seedlings. The temperature during the growth phase was normal, and a rainfall of 205 mm was received.

Table A: Meteorological data at Anand centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs/ day)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	37.9	24.3	61.6	27.4	0.6	0	10.4	8.1
May	40.8	27.6	64.0	29.7	0.0	0	10.6	9.7
Jun.	38.3	28.8	76.6	48.7	58.8	3	8.7	8.2
Jul.	32.5	27.0	91.5	74.6	207.0	11	2.4	3.1
Aug.	31.6	26.2	92.1	76.1	568.8	17	3.2	2.9
Sep.	32.1	25.9	91.9	69.7	266.8	10	5.6	3.7
Oct.	34.4	24.7	87.8	53.2	70.6	2	7.8	3.4
Nov.	33.1	17.8	84.9	34.0	0.0	0	9.6	3.1
Dec.	28.1	14.5	80.7	42.8	2.6	1	8.1	3.2
2025								
Jan.	28.5	14.0	85.2	42.6	0.0	0	9.2	3.2
Feb.	32.1	15.5	80.1	29.4	0.0	0	10.2	4.7
Mar.	36.5	18.6	66.2	21.8	0.0	0	10.2	6.9
Total	--	--	--	--	**1175.2**	**44**	--	

Table A-1: Meteorological data during different *bidi* tobacco growth phases (2024-25)

Crop phase		Rainfall (mm)	Rainy days	Temperature 0C	
				Maximum	**Minimum**
Hot weather (2 April to 3 June)	(63)*	0.6	0	39.4	26.1
Pre-nursery (4 June to 1 July)	(28)*	70.8	4	37.9	28.6
Nursery (2 July to 19 Aug)	(49)*	352.4	19	32.3	26.8
Transplanting (20 Aug to 16 Sept)	(28)*	545.6	11	31.6	26.0
Growth (17 Sept to 31 Dec)	(106)*	205.8	10	31.9	19.9
Harvesting (1 Jan to 1 April)	(91)*	0.0	0	32.5	16.1
Total	**365**	**1175.2**	**44**	---	---

** Figures in parentheses indicate the number of days*

NANDYAL

An amount of 839.4 mm of rainfall was received during 2024-25 in 61.3 rainy days (Table Ny). The mean maximum temperature varied from 30.5 to 42.7°C, whereas, the minimum temperature ranged from 18.6 to 27.6°C. The relative humidity in the early hours varied from 55.7% to 88.3% whereas relative humidity in the mid hours varied from 18.9% to 65.6%. The highest Sunshine hours were observed during the months of April (9.2 hrs). The maximum Evaporation was observed in the month of April *i.e.* 9.7 mm. Among the different crop growth stages pre-nursery stage received maximum amount of rainfall (327.8 mm).

Table Ny: Meteorological data at Nandyal centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	42.7	26.4	55.7	18.9	28	11.3	9.2	9.7
May	40.1	27.6	64.9	36.8	100.6	5.0	8.2	7.0
Jun.	34.9	25.6	81.1	53.7	205.4	10.0	4.3	3.2
Jul.	33.9	25.3	79.9	60.4	90.0	7.0	2.0	1.9
Aug.	34.2	25.4	84.1	59.8	173.6	11.0	4.9	3.1
Sep.	32.4	25.1	82.7	61.9	69.2	6.0	4.2	2.9
Oct.	33.0	24.4	84.4	65.6	137.4	8.0	6.2	3.0
Nov.	32.2	21.8	81.2	53.2	2.0	0.0	6.0	3.4
Dec.	30.5	21.8	88.3	61.5	33.2	3.0	4.4	2.0
2025								
Jan.	31.7	18.6	87.4	43.3	0.0	0.0	7.9	3.4
Feb.	35.8	20.0	83.2	28.9	0.0	0.0	5.6	9.5
Mar.	38.8	22.2	79.1	24.4	0.0	0.0	8.6	8.7
Total					**839.4**	**61.3**		

Table Ny-1: Rainfall received during different *bidi* tobacco growth phases (2024-25)

Crop Stage	Period	Rainfall (mm)	Rainy days
Pre nursery	31.03.24 to 20.06.24	327.8	14
Nursery	22.07.24 to 22.09.24	236.6	15
Transplanting	22.09.24 to 04.11.24	147.6	6
Growth	01.12.24 to 15.02.25	33.2	2
Harvesting	28.02.25 to 25.03.25	0.0	0
	Total	**745.2**	**37**

NIPANI

The total rainfall received during the year 2024-25 is 1431.9 mm in 89 rainy days as against the 32-year average of 912.5 mm in 43 rainy days. The excess rainfall received was to the extent of 56%. The rains during April (77.2 mm) and May (201.4 mm) helped for land preparation for *Kharif* sowing and nursery bed preparation for raising tobacco seedlings. The excess rains during June (186.2mm in 12 rainy days) and July (468.8 mm in 25 rainy days) severely affected the growth of *Kharif* crops (Groundnut and Soybean) as it led to ineffective weed control. Though weed management through pre- and post-emergent weedicides, inter cultivation and hand weeding were practiced, but was not effective because of continuous rains. Further, continuous rains during June-July and during first fortnight of August led to water logging, affecting *Kharif* crop growth and yield levels severely. The excess rains during the June-July months drastically affected the tobacco nursery raising as water stagnation and continuous rains favoured severe damping off. Through practicing raised beds, fungicide treatments (to beds and seeds) and repeated sowings (2-3 times) we could manage to raise sufficient seedlings timely to conduct the trials of AINP(T), demonstrations and tobacco seed production. Initially the crop growth in tobacco experiments and seed production was excellent, on account of planting on ridges. However, excess rains during transplanting and the growth period hindered weed management (Inter-cultivations), topping and de-suckering operations that led to poor dry matter accumulation causing early ripening of leaves. The yield level of tobacco was also average to below average in some trials. Overall, in spite of these extreme rainfall conditions the tobacco yields were average on account of planting on ridges, low incidence of sucking pests and tobacco leaf curl mosaic complex and their management practices (rouging and insecticide sprays). There was no rainfall during harvesting stage.

Table N: Meteorological data at Nipani centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Rainy days
	Max.	Min.	7.25 hrs	14.25 hrs		
2024						
Apr.	39.3	16.8	58.9	42.2	77.2	2
May	36.1	15.5	73.5	47.0	201.4	8
Jun.	31.7	15.6	81.4	72.4	186.2	12
Jul.	27.9	14.8	91.2	86.2	468.8	25
Aug.	29.7	14.8	89.8	83.2	201.2	16
Sep.	30.1	13.5	85.0	74.9	106.2	11
Oct.	32.3	13.4	89.7	66.1	171.1	12
Nov.	32.1	7.8	72.4	51.5	0.0	0
Dec.	31.6	8.4	78.4	49.3	9.8	2
2025						
Jan.	32.0	--	66.7	35.9	0.00	0
Feb.	33.8	--	63.7	31.0	0.00	0
Mar.	34.9	--	47.9	28.1	10.0	1
Total					**1431.9**	**89**

Table N-1: Rainfall received and rainy days during tobacco growth phases-2024-25

Crop Stage	Period	Rainfall (mm)	Rainy days
Pre-nursery	01-04-2024 to 24-06-2024	430.0	17
Nursery	25-06-2024 to 10-08-2024	555.6	37
Transplanting	01-08-2024 to 15-09-2024	181.8	16
Growth	16-09-2024 to 16-12-2024	254.5	18
Harvesting	16-12-2024 to 27-01-2025	0.0	0
	Total	**1421.9**	**88**

Rainfall received and number of rainy days in various tobacco growth stages during the year 2024-25 at Agricultural Research Station, Nipani is presented in Table N-1. The total rainfall of 1421.9 mm was received during various growth stages of tobacco as against 769.1 mm average rainfall (average of last 84 years). The total rainfall received during the year was 84.87% higher than average rainfall. The rainfall received during pre-nursery stage was 430.0 mm spread over 17 rainy days helped the land preparation both for nursery and main field. Almost double the average rainfall received during nursery stage (555.6 mm) that spread over 37 rainy days affected nursery seeds sowing and also number of transplantable tobacco seedlings both in research station and farmers field. The rainfall received during transplanting period (181.8 mm in 16 rainy days) was more than the average rainfall. Further, the rainfall of 254.5 mm in 18 rainy days was also higher than average rainfall during growth stage. Incidence of damping off disease in nursery and TMV, leaf curl and aphids in growth stages in main field was observed. There was no rainfall during harvesting stage which helped for easy harvesting and powdering of the tobacco in the main field.

Pest and diseases

Severe Incidence of damping off disease in nursery and low to moderate occurrence of TMV, leaf curl and aphids in growth stages in main field was observed. However excess rains during transplanting and growth period hindered weed management (inter-cultivations), topping and de-suckering operations that led to poor dry matter accumulation causing early ripening of leaves.

BERHAMPUR

Total rainfall of 1212 mm (Table B) was received during the year 2024-25 which was 99 mm less than the normal rainfall (1311 mm). Number of rainy days (74) was more as compared to normal (60). Maximum rainfall was received during the month of July (432.7 mm). More rainy days were observed in August 2024. Rainfall and rainy days received during different growth stages of tobacco in 2024-25 were presented in Table B-1. The maximum and minimum temperatures could not be recorded due to non-functioning of the weather station.

Table B: Meteorological data at Berhampur centre (2024-25)

Month	Received		Normal	
	Rainfall (mm)	Rainy days	Rainfall (mm)	Rainy days
2024				
Jun.	81.5	6	168.7	8.1
Jul.	432.7	13	236.8	11.5
Aug.	254	18	260.5	12.7
Sep.	155	13	221.4	10.7
Oct.	36	4	187.9	6.8
Nov.	22.8	2	62.5	2..2
Dec.	70.0	6	8.7	0.4
2025				
Jan.	0	0	9.4	0.5
Feb.	0	0	16.2	0.9
Mar.	31.0	2	21.5	1.3
Apr	37.0	3	34.8	2.2
May	92.0	7	82.6	3.6
Total	**1212**	**74**	**1311**	**60.9**

Source: Odisha Rain fall monitoring system (rainfall.nic.in /PubRainChartDtl.asp)

Table B-1: Rainfall received during different *pikka* tobacco growth phases (2024-25)

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	01.08.24 to 30.09.24	409	31
2	Nursery	01.10.24 to 30.11.24	58.8	06
3	Transplanting	01.12.24 to 02.01.25	70.0	06
4	Growth	03.01.25 to 03.04.25	68	04
5	Harvesting	04.04.25 to 28.05.25	129	09
		Total	**734.8**	**56**

ARAUL

An amount of 847.49 mm of rainfall was received during 2024-25 in 56 rainy days (Table Ar). The mean maximum temperature varied from 10.30 to 46.80 °C, whereas the minimum temperature ranged from 6.40 to 29.30 °C. The relative humidity in the early hours varied from 39.60% to 93.68% whereas relative humidity in the mid hours varied from 13.13% to 61.80%. The highest sunshine hours were observed during the month of May (8.80 hrs). The maximum evaporation was observed in the month of June *i.e.* 7.13 mm. Among the different crop growth stages, the pre-nursery stage received the maximum amount of rainfall.

Table Ar: Meteorological data at Araul centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.	19.10	38.25	40.60	13.13	22.30	6	3.80	4.09
May	29.30	45.50	73.23	50.10	8.60	2	8.80	5.12
Jun.	27.48	46.80	73.13	46.30	30.52	8	5.80	8.14
Jul.	20.95	36.65	88.76	60.60	285.61	11	2.35	7.13
Aug.	21.22	29.10	90.12	55.30	180.15	9	6.10	2.32
Sep.	19.15	29.40	74.13	61.16	190.13	11	2.10	2.13
Oct.	11.61	26.13	81.35	50.15	67.80	6	4.40	3.14
Nov.	10.60	20.60	88.73	42.43	-	-	-	2.36
Dec.	6.40	15.38	93.68	49.95	11.60	4	6.32	2.10
2025								
Jan.	2.20	10.30	93.47	61.80	3.20	1	2.97	1.09
Feb.	18.18	25.33	79.10	60.10	-	-	-	1.94
Mar.	20.10	34.22	61.33	32.80	28.30	4	6.38	2.75
Total	**17.66**	**31.08**	**75.17**	**46.00**	**847.49**	**66**	**4.30**	**3.57**

Table Ar-1: Rainfall during different *rustica* tobacco growth phases (2024-25)

Crop Stage	Period	Rainfall (mm)	Rainy days
Pre nursery	April to August 2024	527.18	36
Nursery	September to October 2024	257.93	17
Transplanting	November 2024	-	-
Growth	December 2024 to February 2025	14.80	5
Harvesting	March to April 2025	47.58	8
	Total	**847.49**	**66**

DINHATA

An amount of 2800.7 mm rainfall was received during 2024-25 in 77 rainy days (Table D). The mean maximum temperature varied from 28.1 to 35.4°C. The relative humidity in the early hours varied from 77.7% to 99.8% whereas relative humidity in the mid hours varied from 71.03% to 90.4%. The highest Sunshine hours were observed during November (8.10 hrs). Among the different crop growth stages Pre-Nursery and Nursery stages received the maximum amount of Rainfall.

Table D: Meteorological data at Dinhata centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Rainy days	Sun Shine (hrs)
	Max.	Min.	7.25 hrs	14.25 hrs			
2024							
Apr.	33.8	25.07	77.7	82.9	0	0	-
May	35.45	25.16	83.7	73.2	261	7	2.22
Jun.	31.60	24.23	92.7	83.06	1077.5	21	1.21
Jul.	33.78	-	99.8	90.4	589	13	3.58
Aug.	35.01	-	91.09	85.7	260.6	14	4.49
Sep.	34.36	-	90.2	84.5	383.8	11	5.35
Oct.	33.61	-	94.9	86.16	224.7	10	4.13
Nov.	30.83	-	94.9	78.7	0	0	8.10
Dec.	26.32	-	96.03	76.45	0	0	5.78
2025							
Jan.	24.70	-	97.7	80.8	0	0	3.87
Feb.	26.95	-	93.7	75.1	4.1	1	4.28
Mar.	27.90	-	88.86	71.03	0	0	4.89
Total/Avg.	**31.19**	**-**	**91.77**	**80.66**	**2800.7**	**77**	**4.35**

Table D-1: Rainfall received during different growth phases (2024-25)

S. No.	Crop Stage	Period	Rainfall (mm)	Rainy days
1	Pre nursery	15.08.2024 to 14.09.2024	240.8	10
2	Nursery	15.09.2024 to 15.11.2024	395.7	14
3	Transplanting	16.11.2024 to 15.12.2024	0	0
4	Growth	16.12.2024 to 19.02.2025	0	0
5	Harvesting	20.02.2025 to 20.03.2025	4.1	1
		Total	**640.6**	**25**

LADOL

Rabi season was noticed normal, and no severe damage was observed due to insects and pests. During the months of December, January and February minimum temperature was recorded from 13.1 to 16.6 °C, and the maximum temperature was from 27.0 to 30.9 °C, which was favourable for crop growth, cured leaf yield, and quality parameters. The relative humidity in the early hours varied from 36.5% to 91.3% whereas relative humidity in the mid hours varied from 13.9% to 80.8%. Among the different crop growth stages pre-nursery stage received the maximum amount of rainfall.

Table L: Meteorological data at Ladol centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)	Rainy days
	Max.	Min.	7.25 hrs	14.25 hrs		
2024						
Apr.	40.2	24.1	47.7	20.1	-	-
May	43.5	28.1	50.1	22.7	-	-
Jun.	40.2	29.1	67.9	41.8	10.0	2
Jul.	32.3	26.8	91.3	80.8	379.0	12
Aug.	34.1	26.3	86.4	79.2	431.0	9
Sep.	31.3	25.3	86.3	71.9	250.0	9
Oct.	34.4	23.8	68.3	44.7	-	-
Nov.	32.8	18.7	54.9	25.8	-	-
Dec.	27.1	13.1	59.2	30.1	-	-
2025						
Jan.	27.0	13.5	65.2	41.1		
Feb.	30.9	16.6	53.9	24.3		
Mar.	35.2	21.3	36.5	13.9		
Total					1070.0	32

Table L-1: Rainfall received and rainy days during tobacco growth phases 2024-25

Crop Stage	Period	Rainfall (mm)	Rainy days
Pre nursery	01-05-2024 to 31-09/2024	1070.0	32
Nursery	01-10-2024 to 05-11-2024	-	-
Transplanting	06-11-2024 to 20-11-2024	-	-
Growth	21-11-2024 to 05-04-2025	-	-
Harvesting	06-04-2025 to 30-04-2025	-	-
	Total	1070.0	32

VEDASANDUR

An amount of 1082.4 mm of rainfall was received during 2024-25 in 61.3 rainy days (Table V). The mean maximum temperature varied from 30.6 to 37.0°C, whereas, the minimum temperature ranged from 18.7 to 25.2°C. The relative humidity in the early hours varied from 62.7 to 97% whereas relative humidity in the mid hours varied from 30.0% to 64.0%. The highest Sunshine hours were observed during the months of Feb (9.2 hrs). The maximum Evaporation was observed in the month of Mar *i.e.* 6.52 mm. Among the different crop growth stages nursery stage received the maximum amount of rainfall (457.8 mm) (Table V-1).

Table V: Meteorological data at Vedasandur centre (2024-25)

Month	Temperature (°C)		Relative Humidity (%)		Rain fall (mm)	Rainy days	Sun Shine (hrs)	Evaporation (mm)
	Max.	Min.	7.25 hrs	14.25 hrs				
2024								
Apr.					0	0		
May					246.2	6		
Jun.	35.9	22.6	74	64	61.7	6	7	5.3
Jul.	35.8	23	66.7	54.3	12.4	1	5	4.5
Aug.	36.1	24	74	52	114.8	7	7.4	5.5
Sep.	36.7	25.2	62	31	1.8	0	8.22	7.41
Oct.	33.2	23.7	91.2	55.9	356.4	16	5.65	4.84
Nov.	30.6	23	93	64	99.6	7	4	2.93
Dec.	31.7	22.1	97	60	132.4	5	5.65	4.84
2025								
Jan.	30.6	19.9	97	53	42.9	3	5.26	3.07
Feb.	34.9	18.7	94	30	1	0	9.29	5.4
Mar.	37.0	21.7	85	41	13.2	2	8.43	6.52
Total					**1082.4**	**53**		

Table V-1: Rainfall received during different chewing tobacco growth phases (2024-25)

Crop Stage	Period	Rainfall (mm)	Rainy days
Pre-nursery	April to August 2024	435.1	20
Nursery	September to November 2024	457.8	23
Transplanting	December 2024	132.4	5
Growth	January to March 2025	57.1	5
Harvesting	March 2025		
	Total	**1082.4**	**53**

III. AREA, PRODUCTION AND PRODUCTIVITY

RAJAHMUNDRY

Table R: Year-wise area, production and productivity of FCV Tobacco Andhra Pradesh.

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2001-02	87754	120000	1368
2002-03	93209	128000	1370
2003-04	109373	148000	1353
2004-05	113334	153000	1350
2005-06	117242	145000	1240
2006-07	126889	172000	1355
2007-08	126700	165000	1305
2008-09	140875	204000	1448
2009-10	150233	208000	1382
2010-11	139240	173000	1244
2011-12	112792	163000	1445
2012-13	120105	177000	1470
2013-14	123615	214000	1731
2014-15	108737	190000	1748
2015-16	70122	118000	1686
2016-17	61821	105000	1719
2017-18	70317	133000	1892
2018-19	76950	124000	1613
2019-20	79294	128650	1622
2020-21	65142	112740	1731
2021-22	66265	120980	1826
2022-23	85756	181020	2111
2023-24	97127	215350	2217

Source: *Tobacco Board, Guntur*

HUNSUR (KARNATAKA LIGHT SOILS)

Table H: Area, production and productivity of FCV Tobacco in Karnataka

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2003-04	69158	73690	1066
2004-05	69700	90350	1296
2005-06	73980	82910	1121
2006-07	78162	96980	1241
2007-08	85755	87650	1022
2008-09	90427	114000	1261
2009-10	106601	115670	1085
2010-11	118989	127850	1074
2011-12	104393	104290	999
2012-13	93974	93860	999
2013-14	97770	102020	1043
2014-15	85934	103000	1203
2015-16	75837	71950	949
2016-17	76089	98720	1297
2017-18	81083	106890	1318
2018-19	83696	85080	1017
2019-20	80369	106180	1321
2020-21	73609	88420	1201
2021-22	71877	68140	948
2022-23	60782	59980	987
2023-24	63404	88850	1401
2024-25	69049	84850	1229

Source: Tobacco Board. APF63, Ramanathapura

SHIVAMOGGA

Table S: Area, production, productivity of tobacco in Davanagere and Shivamogga districts

Year	Davanagere			Shivamogga		
	Area (ha)	Production (tonnes)	Productivity (kg/ha)	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2015-16	282.7	33.6	1188	44.0	3.92	891
2016-17	304.0	43.5	1430	47.9	6.37	1329
2017-18	378.9	46.9	1237	49.1	6.71	1365
2018-19	276.9	38.6	1393	41.1	5.12	1246
2019-20	284.8	39.1	1373	40.7	5.66	1391
2020-21	284.0	33.7	1186	51.0	4.52	887
2021-22	241.0	4.6	190	48.0	0.23	47
2022-23	30.2	2.8	916	4.0	0.31	777
2023-24	29.5	8.2	2794	8.5	0.31	367
2024-25	94.0	12.3	1309	16.4	0.30	186

Source: Tobacco Board. APF63, Ramanathapura

ANAND

Table A: Year-wise area, production and productivity of tobacco in Gujarat

Year	Area (ha)	Production(tonnes)	Productivity(kg/ha)
2010-11	147900	280500	1897
2011-12	158000	278400	1762
2012-13	123800	212400	1716
2013-14	137000	240000	1752
2014-15	166000	236000	1422
2015-16	198000	326000	1646
2016-17	167000	375000	2246
2017-18	145000	274000	1889
2018-19	179500	378000	2106
2019-20	162400	345900	2130
2020-21	170400	396200	2325
2021-22	191600	452900	2363
2022-23	192800	438000	2271
2023-24	189400	421500	2225
2024-25	204800	459000	2241

Source: www.dag.gujarat.gov.in

NANDYAL

Table Ny: Area, Production, and Productivity of *BIDI* tobacco grown in Andhra Pradesh

Year	Area(ha)	Production (tonnes)	Productivity (kg/ha)	Market price (Rs/kg)
2007-08	5621	9747	1734	30-45
2008-09	9593	13411	1398	50-65
2009-10	15744	30228	1920	25-50
2010-11	12000	21156	1763	25-35
2011-12	8777	14482	1650	45-55
2012-13	6705	10403	1600	35-45
2013-14	7000	12509	1700	65-85
2014-15	7500	11608	1540	60-80
2015-16	9800	9776	967	60-80
2016-17	10250	15375	1500	75-85
2017-18	9250	11088	1200	75-85
2018-19	10500	16275	1550	70-80
2019-20	11250	18844	1750	70-80
2020-21	2500	4520	1700	
2021-22	3400	5120	1650	
2022-23	3424	5659	1623	
2023-24	58980			

Source: *Copyright © 2021. Directorate of Economics and Statistics (DES) from Deptt. of Agriculture.*

NIPANI

Bidi tobacco is mainly grown in Nipani, Chikodi, Hukkeri, Gokak and Raibag talukas of Belagavi district. At present, it occupies an area of 6000 hectares with the production of about 7200 tones and productivity of 1200 kg/ha. The *bidi* tobacco produced in this area is known for its quality throughout the country

Table N: Area and productivity trends of tobacco in a decade in Karnataka

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2003-04	21997	8379	381
2004-05	22000	18700	850
2005-06	21598	16771	776
2006-07	19826	7931	400
2007-08	25203	13162	522
2008-09	22104	13704	620
2009-10	20284	13793	680
2010-11	19680	12398	630
2011-12	18200	12922	710
2012-13	17680	11810	668
2013-14	11392	14240	1250
2014-15	15107	19770	1308
2015-16	13422	17449	1300
2016-17	10889	17422	1599
2017-18	11358	13750	1210
2018-19	11675	14250	1221
2019-20	7109	7484	1095
2020-21	7185	8026	1142
2021-22	6500	9815	1510
2022-23	6118	6654	1088
2023-24	6489	9458	1546
2024-25	6000	7200	1200

Source: *Department of Agriculture, Government of Karnataka*

BERHAMPUR

Table B: Tobacco area, production and productivity of Odisha 1987-88 to 2019-20

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
1987-88	14000	5000	357
1988-89	14000	6000	429
1989-90	15000	9000	600
1990-91	15000	9000	600
1991-92	15000	11000	733
1992-93	13000	10000	769
1993-94	10000	6000	600
1994-95	10000	6000	600
1995-96	9000	7000	778
1996-97	9000	5000	556
1997-98	9000	4000	444
1998-99	8000	4000	500
1999-00	7000	5000	714
2000-01	3000	2000	667
2001-02	6000	4000	667
2002-03	4000	3000	750
2003-04	5310	3490	657
2004-05	4760	3250	683
2005-06	3720	2710	728
2006-07	4130	3020	731
2007-08	3790	2790	736
2008-09	4030	3000	744
2009-10	3300	2480	752
2010-11	2160	1860	861
2011-12	1820	1520	835
2012-13	2030	1150	567
2013-14	1690	1010	598
2014-15	1590	950	597
2015-16	1600	950	594
2016-17	600	360	600
2017-18	310	180	581
2018-19	190	110	579
2019-20	130	90	692

Source: *Dept. of Agriculture & Food Production, Bhubaneswar, Odisha*

ARAUL

Table Ar: Year-wise area, production and productivity of *Rustica* tobacco in Uttar Pradesh

Year	Area (ha)	Production (tonnes)	Productivity(kg./ha)
2013-14	22455	24857	1107
2014-15	29115	32958	1132
2015-16	27650	32488	1175
2016-17	27352	32269	1180
2017-18	23112	28614	1238
2018-19	26352	36814	1397
2019-20	28550	39594	1387
2020-21	25155	30335	1206
2021-22	22817	27962	1225
2022-23	24332	35590	1380
2023-24	22267	32888	1477
2024-25	Data Not Available		

Source: *Statistical Department, Directorate of Agriculture, U.P*

DINHATA

Table D: Area, production and productivity of *Motihari* and *Jati* tobacco in West Bengal

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2010-11	13375	17388	1300
2011-12	16840	23576	1400
2012-13	16840	23576	1400
2013-14	18000	27000	1500
2014-15	18000	25200	1400
2015-16	18500	27750	1500
2016-17	18500	27750	1500
2017-18	18500	27750	1500
2018-19	18500	27750	1500
2019-20	15151	20457	1350
2020-21	15400	20697	1400
2021-22	12505	19732	1470
2022-23	11400	18240	1600
2023-24	12260	22068	1800

Source: *Evaluation wing, Directorate of Agriculture, Govt. of West Bengal, 2021*

LADOL

Table L: Year-wise area, production and productivity of *Rustica* tobacco in Gujarat

Year	Area (ha)	Production (tonnes)	Productivity (kg/ha)
2008-09	49200	70100	1425
2009-10	62800	101500	1616
2010-11	88000	176000	2000
2011-12	95400	160900	1687
2012-13	57800	98000	1696
2013-14	98000	165000	1684
2014-15	126000	186000	1476
2015-16	146500	218000	1488
2016-17	132000	210000	1591
2017-18	104000	200000	1923
2018-19	116300	242600	2086
2019-20	114200	240100	2102
2020-21	124700	279700	2243
2021-22	137700	339470	2465
2022-23	138400	327700	2368
2023-24*	135000	313200	2320
2024-25* (3rd Advance Estimate)	163700	380800	2325

VEDASANDUR

Table V: Area and Production of Tobacco in Tamil Nadu for the past 10 years

Year	Area (ha)	Production (tonnes)	Average Productivity (kg/ha)
2010-11	17000	43300	2547
2011-12	16000	40000	2500
2012-13	15000	37500	2500
2013-14	12000	28000	2333
2014-15	11000	27500	2500
2015-16	11000	27500	2500
2016-17	11000	27500	2500
2017-18	11000	27500	2500
2018-19	11000	27500	2500
2019-20	10500	23800	2500
2020-21	10000	24500	2450
2021-22	10000	25000	2500
2022-23	13000	25000	2500
2023-24	14000	25000	2500

IV. RECOMMENDATIONS TO THE FARMING COMMUNITY

SHIVAMOGGA

- Inter-cropping of groundnut in alternate rows of FCV tobacco for increased tobacco cured leaf yield, additional intercrop yield and monetary advantage over the sole crop of FCV tobacco

- Integrated Module comprising of Foliar spray of seedlings with Imidacloprid 17.8 SL @0.3 ml/l one day before planting, Maize as a barrier crop (sow maize 10 days before tobacco transplanting), Yellow sticky traps @ 10/acre, Two sprays of azadirachtin 1EC @ 2ml/l at 20 and 30 DAT, need based spray of Imidacloprid 17.8 SL @ 0.3 ml/lfor management of leaf curl vector whitefly *B. tabacia*

- The Integrated module (IPM) involving sowing of Castor as a trap crop 15 days before planting, collection & destruction of egg masses, installation of pheromone traps (Spodlure/Litlure) @ 4/acre at 15 DAP, erection of bird perches @ 20/acre , need based spraying of Azadirachtin 10000 ppm @ 2ml/L, *Bt. kurstaki* @ 1.5 g/L, Emamectin benzoate 5SG @0.5 g/l is recommended for control of *Spodoptera litura* in FCV tobacco

ANAND

- *Bidi* tobacco farmers are advised to grow *bidi* tobacco hybrid GABTH 2 with application of N: P_2O_5: K_2O @ 180-50-50 for getting higher cured leaf yield as well as nicotine and potash contents with maximum net return and BCR

- *Rustica* tobacco farmers are advised to grow variety GCT 3 with application of N: P_2O_5: K_2O @ 200-50-50 kg/ha for getting the highest contents of N, P, and K in leaves.

- *Bidi* tobacco farmers are advised to continue to utilize Metalaxyl MZ 68 WP @ 2.16 kg g.ai/ha (32 g/200 l water /100 m^2) or Bordeaux mixture 0.6% at initiation of disease and later as drench for the effective management of damping-off disease in *bidi* tobacco nursery as the pathogen has not developed resistance against fungicide at this dose

- *Bidi* tobacco farmers are advised to continue the practice of spray drenching Azoxystrobin 23 SC @ 0.023% (230 g a.i./ha i.e. 10 ml/10 l water / 100m2) or Azoxystrobin + Difenoconazole 29.6 SC (372 g a.i./ha i.e. 12.6 ml/10 l water/100 m^2) at initiation of disease and later for the effective management of damping-off disease in *bidi* tobacco nursery as the pathogen has not developed resistance against fungicide at this dose.

- *Bidi* tobacco farmers are advised to spray azoxystrobin 11% + tebuconazole 18.3% SC, (15 ml/10 l water) or zineb 68% + hexaconazole 4% WP (20 g/10 l water) first at initiation of disease and second at 15 days after first spray for effective management of *alternaria* leaf spot and frog-eye leaf spot disease in *bidi* tobacco field.

VEDASANDUR

- Tobacco planted succeeding sesame with neem cake application at 30 days after and hand weeding at 90 days recommended for Orobanche management

V. STATUS AND SCOPE FOR FARM MECHANIZATION

HUNSUR

- There is scope for evaluating power weeder/mini mechanically operated intercultural implements for weeding and intercultural purposes in the field crop situations. As labor is costly and not available, there is also a need for formulating and designing equipment that reduces dependency on labor at different crop stages.

SHIVAMOGGA

- At present tractor-drawn ridges are being used for making ridges and furrows for planting in heavy rainfall areas. All other operations are being carried out manually by laborers. However, if suitable tractor-drawn implements/machines are developed, there is an ample scope for mechanizing weedicide application, fertilizer application, and plant protection operations in the long run.

NANDYAL

- At present in RARS, Nandyal plant protection measures i.e. spraying operations were implemented with Drone and intercultural operations with a mini tractor tobacco crop.

NIPANI

- Tobacco is grown on small area of 2 to 5 acres by farmers. Hence, there is no scope for mechanisation. But some farmers are cultivating tobacco under drip irrigation system.

BERHAMPUR

- The need of farm machinery presently met in collaboration with other projects (AICRP) operating at the centre (NCRS, Berhampur)

VI. SALIENT RESEARCH FINDINGS

DISCIPLINE WISE ACHIEVEMENTS

VARITIES RELEASED AND NOTIFIED

FCV Tobacco varieties released: Three FCV tobacco varieties were released to different soil types/regions and brief details of released varieties mentioned below:

- **CTRI Navya (FCH 2):** A high yielding FCV tobacco variety (up to 3000 kg/ha), suitable for rainfed and irrigated, light soil region of Karnataka. It has field tolerance to black shank and withstands heavy rainfall.

- **Sahyadri Swarna (FCS-4):** A high yielding (2300 kg/ha) FCV tobacco variety suitable for light soil regions of Karnataka. It is moderately resistant to Black shank and Frogeye leaf spot diseases.

- **FCV hybrid FCRH 11 (LSTC-9):** High yielding FCV tobacco hybrid with yield >3500 kg/ha (normal conditions), 3813 to 4125 Kg/ha in NLS region. It has short internodes, good ripening leaves, oily with excellent ripeness characteristics and good aroma.

Non-FCV Tobacco variety released

- **DTV 9 (NBD-316):** High yielding (3000 kg/ha) *bidi* tobacco variety resistant to Frog eye leaf spot, Brown leaf spot, Leaf curl and TMV under field conditions is released and notified for rainfed/irrigated condition of bidi tobacco areas of Karnataka

VARITIES SUBMITTED FOR RELEASE AND NOTIFICATION

The following three tobacco variety proposals were submitted for release and notification by 94th CVRC

- **Nandyala Pogaku 2 (ABD 132):** High yielding (3100 kg/ha) bidi tobacco variety with excellent ripeness and sweet aroma having moderate to damping off and leaf curl diseases is released for rainfed vertisols of bidi tobacco areas of Andhra Pradesh.

- **Jati (DJ 1):** High yielding (2400 kg/ha) Jati tobacco variety suitable for early maturing Jati tobacco tract of Cooch Behar district in West Bengal

- **ArR-27 (Nath):** A high yielding (> 3385 kg/ha) Hookah tobacco variety, resistant to TMV disease, tolerance to tobacco aphids was identified for released for hookah tobacco growing areas of Uttar Pradesh.

CENTRE WISE ACHIEVEMENTS

RAJAHMUNDRY

CROP IMPROVEMENT

- In IVT, among the thirteen entries evaluated with checks, IET-124 and IET-128 has recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index over the better control CTRI Sulakshana. The entries IET-125 and IET-132 along with controls CTRI Sulakshana and CTRI Sreshta has recorded TMV resistant reaction.
- In AVT-I, among the ten entries evaluated with checks, FCR-71 and FCR-73 have recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index over the better control CTRI Sulakshana. The entries FCR-71, FCR-72, FCR-73, IET-101 and IET-102 along with controls CTRI Sulakshana and CTRI Sreshta has recorded TMV resistant reaction

CROP PRODUCTION

- Application of 100% RDF (50:50:50 kg ha-1) at 15 days before planting + soil application of Ghanajeevamrutha @ 1 l/ha at the time of planting + soil application of Jeevamrutha @ 500 l/ha for 03 times at an interval of 15 days starting from 15 DAP + KNO_3 @ 2% at 45 and 55 DAP found to perform significantly superior over other treatments

JEELUGUMILLI

CROP IMPROVEMENT

- In IVT on FCV tobacco, among the 13 entries (IET-124 to IET-136) evaluated the tested entries IET-126 & IET-127 recorded significantly higher leaf yields and grade index values than CTRI-Naveena and proposed for advancing to AVT trials.
- In advanced varietal/hybrid trial-i on FCV tobacco, the entry IET-107 recorded numerically higher green leaf (17139 kg/ha), cured leaf (2988 kg/ha) and grade index (1807) than control, CTRI Naveena and none of the entry found significantly superior to controls
- In AVT-I on *natu* tobacco, conducted with 3 entries (IET118, IET 119, IET 121), the entry IET-119 recorded significantly higher green leaf yield (9063 kg/ha), cured leaf yield (1529 kg/ha), Melimi (919 kg/ha) and Gulla (610 kg/ha) an improvement of 19%, 23%, 23% and 22% over better control, Kommugudem, respectively.

CROP PROTECTION

- Among the different modules evaluated against sucking pests, IPM module (Sorghum border crop + setting up of yellow sticky traps @ 25/ha + one spray of NSKE 2% at 30 DAP + one spray of *Lecanicillium lecanii* @ 3 x 1012 CFU/ha at 45 DAP + one spray of afidopyropen 50 DC @ 0.03% at 60 DAP) was found to be superior in aphid management (63.60 aphids/plant) compared to chemical module (One spray of imidacloprid 17.8 SL @ 0.03 % at 30 DAP + one spray of pymetrozine 50 WG @ 0.04 % at 45 DAP + one spray of flonicamid 50 WG @ 0.04 % at 60 DAP) which recorded 71.08 aphids/ plant in comparison with untreated control plots (182.84 aphids/plant)

- The IPM module recorded least whitefly population (3.80/ plant), and lowest TLCV incidence (6.08%) and highest cured leaf yield (1825 kg/ha) over chemical module and untreated control

GUNTUR

CROP IMPROVEMENT

- In the Initial Varietal Trial on FCV tobacco, four entries *viz*., IET-131, IET-133, IET-124 and IET-128 have performed better with significant high green leaf, cured leaf, bright leaf yields and also grade index over other test entries and checks.
- In advanced varietal trial-I on FCV tobacco, among ten lines evaluated, IET-103 and IET-109 were performed better than other test entries and four checks in respect of yield and quality
- In advanced trial-1 on *natu* tobacco, out of three lines tested, the performance of two lines, IET-119 and IET-121 was significantly superior to check, WAF in respect of yield and quality
- Chemical quality parameters *viz.,* nicotine, reducing sugars and chlorides were within the permissible limits in all the entries tested under AVT- FCV & AVT-*natu* tobacco including checks

CROP PROTECTION

- IPM module for sucking pests consisting of sowing two rows of sorghum as border/barrier crop one week before planting of tobacco; setting up of yellow sticky traps @ 25/ha; one spray of NSKE 2% at 30 days of planting (DAP); one spray of *Lecanicillium lecanii* @ 3×1012 CFU/ha at 45 DAP and one spray of afidopyropen 50 DC @ 0.03% at 60 DAP exhibited 79.78% reduction of infestation by tobacco whitefly (leaf curl), cent per cent reduction of aphid infestation with 13.24% increase of cured leaf yields over untreated control.

- Chemical control module consisting of one spray of imidacloprid 17.8 SL @ 0.03% at 30 DAP; one spray of pymetrozine 50 WG @ 0.04% at 45 DAP and one spray of flonicamid 50 WG @ 0.04% at 60 DAP reduced leaf curl infestation by 75.53%, aphid infestation by 100% and increased cured leaf yields by 10.29% over untreated control.

KANDUKUR

CROP IMPROVEMENT

- Entry, FCK-10 recorded significantly higher cured leaf yield and grade index compared to checks in AVT-II. FCK-10 recorded 11% higher cured leaf yield (2157 kg/ha) and 8% grade index (1578) over the check, Siri (1917 kg/ha cured leaf and 1458 grade index) respectively. FCK-10 is proposed for bulk trials in comparison to CTRI Shresta
- Under laboratory screening of KRB-3 entry for Aphid tolerance showed that, the least growth rate for aphids was recorded with KRB-3 (0.39) in comparison with CTRI-Sulakshana (0.47). The highest growth rate was observed in case of Lanka tobacco (0.52).

HUNSUR

CROP IMPROVEMENT

- In the IVT trial, four entries *viz.*, IET-129, IET-133, IET-134 and IET-136 were found promising under KLS conditions recording significant superior yields (cured leaf and bright leaf yield and TGE) over varietal checks Kanchan and FCH 222. However, none of the entries tested were superior over the hybrid check CH-3
- In AVT I, entries IET-107 and IET-109 recorded significantly higher cured leaf yield over all the three checks while the entry IET-110 recorded significantly high yield over check Kanchan only
- Leaf nicotine and total reducing sugars of all the entries were well within the limits while chlorides were on higher side

SHIVAMOGGA

CROP IMPROVEMENT

- In Initial Variety/ Hybrid Trial of FCV tobacco, out of thirteen test entries evaluated, IET-132 (1648 kg/ha, 24.6%), IET-134 (1632 kg/ha, 23.4%), IET-128 (1610 kg/ha, 21.7%), and IET-125 (1516 kg/ha, 14.6%) recorded higher cured leaf yield (CLY) over the best check Sahyadri (1323 kg/ha)
- In Advanced Variety Trial-I of FCV tobacco, out of five test entries evaluated, IET-104 (1986 kg/ha) recorded significantly superior CLY (kg/ha) (23.5% higher) compared to the best check FCS-4 (1608 kg/ha)
- In Observation Trial-II of FCV tobacco, out of five test entries evaluated, TB-100 × TB-102 (Sel-5) (1417 kg/ha, 37.8%), NLST-2 × FCH-221 (Sel-1) (1334 kg/ha, 29.8%), and TB-70 × TB-102 (Sel-2) (1197 kg/ha, 16.4%) recorded higher CLY over the best check FCS-4 (1028 kg/ha)
- In Observation Trial-I of FCV tobacco, out of ten test entries evaluated, FCS 23-6 (1801 kg/ha) recorded 8.9% higher CLY compared to best check FCS-4 (1653 kg/ha)
- In Multi-Location Trial of FCV tobacco, out of nine test entries evaluated, FCR-68 (1850 kg/ha, 57.7%), FCK-10 (1707 kg/ha, 45.5%), ST-8, (1581 kg/ha, 34.8%), FCK-9 (1494 kg/ha, 27.4%), ST-6 (1490 kg/ha, 27.0%), FCH-1 (1489 kg/ha, 26.9%), FCH-2 (1482 kg/ha, 26.3%), and ST-1 (1420 kg/ha, 21.1%) recorded higher CLY compared to best check Sahyadri (1173 kg/ha).
- Generation of new crosses and breeding material: Selections were made among F3 progenies of three crosses; eight new crosses were generated for development of new high yielding and stress-tolerant FCV tobacco varieties.

CROP PRODUCTION

- sowing of leafy and root vegetables viz., Amaranthus, Palak, Radish and flower crop Marigold on the ridge and in alternate rows of FCV tobacco recorded additional yield of these crops without affecting the main crop yield. However, yield obtained from intercrops was low (If calculated by converting to their 100% population) compared to yield recorded in the package of practices of the university (Solid planting of respective crops).

CROP PROTECTION

- Population dynamics of insect pest complex in tobacco crop ecosystem revealed that the aphid population observed was very high during the experiment due to high temperature and humidity. Natural enemies like *Nesidocoris* sp. and *Ischiodon* sp. were recorded more on aphid-infested plants.
- The Integrated module (IPM) involving sowing of Castor as a trap crop 15 days before planting, collection & destruction of egg masses, installation of pheromone traps (Spodlure/Litlure) @ 4/acre at 15 DAP, erection of bird perches @ 20/acre , need based spraying of Azadirachtin 10000 ppm @ 2ml/L, *Bt. kurstaki* @ 1.5 g/L, Emamectin benzoate 5SG @0.5 g/l is effective for control of *Spodoptera litura* in FCV tobacco
- Among the different insecticides evaluated, Flonicamid 50 WG was found to be most promising with lowest incidence of aphids and whiteflies and the highest percent reduction over control, followed by Afidopyropen 50 DC and Pymetrozine 50 WG. These insecticides can be used as alternatives for recommended insecticides to reduce the development of insecticide resistance.

ANAND

CROP IMPROVEMENT

- Out of six entries were tested in IVT on *bidi* tobacco, none of the entry was significantly superior over better check GABT11 (3723 kg/ha) for yield. None of the lines under testing was free from leaf curl and tobacco mosaic virus diseases.
- Out of three entries were tested in AVT-I on *bidi* tobacco, none of the entry was significantly superior over better check GABT11 (3744 kg/ha) for yield. The line IET-113 and checks A 119, GT 7, MRGTH 1 and GABT 11 were free from tobacco mosaic virus disease.
- Out of three entries were tested in AVT-II on *bidi* tobacco, none of the entry had significant superiority over better check GABT11 (4217 kg/ha) for yield. None of the lines ware free from tobacco mosaic virus diseases except MRGTH 1
- Among the three entries were evaluated in IVT on *rustica* tobacco, entries IET-143 (4004 kg/ha) and IET 144 (4648 kg/ha) had significant superiority over the best check GC 1 (3206 kg/ha) for cured leaf yield.
- Among the two entries were evaluated in AVT-I on *rustica* tobacco, the entry IET-116 (3647 kg/ha) was found significantly superior over the best check GC 1 (3103 kg/ha) for cured leaf yield.
- None of the three entries evaluated in AVT-II on *rustica* tobacco found to record significant higher yields than the checks
- AR-184 genotype tested under OFT recorded lower cured leaf yield (2918 kg/ha) over better checks GC-1 and GCT-3.
- None of the two entries were evaluated in IVT (R) on chewing tobacco recorded significantly higher yields than the better check GT 6 for *Chopadia* yield

CROP PRODUCTION & AGRIL. CHEM. & SOIL SCIENCE

- In middle Gujarat, the *bidi* tobacco variety GABTH 2 found superior over GT 7 with the highest yield attributes and cured leaf yield. Application of 180-50-50 kg NPK/ha gave numerically maximum cured leaf yield. The highest nicotine content was observed in variety GABTH 2 as compared to GT 7.
- The *rustica* tobacco variety GC 1 with application of 200-50-00 kg NPK/ha found superior over GCT 3 with the highest cured leaf yield in middle Gujarat.

- In a trial on evaluation of pre and post emergence herbicides for weed management in *bidi* tobacco, results revealed that significantly lower weed density and dry biomass of total weed at 30 & 60 DATP and at harvest and Weed control efficiency were observed but it was remained at par with treatment T_2 (Pre-plant application of sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha).

PLANT PATHOLOGY AND NEMATOLOGY

- Metalaxyl MZ @ 2.16 kg/ha, azoxystrobin 23 SC @ 230g a.i./ha and azoxystrobin + difenoconazole 29.6 SC @372 g a.i./ha was found effective in the management of damping-off in *bidi* tobacco nursery. In laboratory, cent per cent inhibition was observed in *Pythium aphanidermatum* isolated from diseased seedlings indicating absence of resistance in the pathogen to the chemical fungicide.
- Out of 20 lines/varieties, one, six, seven, four and two line showed highly resistant [ABT 10 (Check)], resistant, moderately resistant, moderately susceptible and susceptible reaction, respectively to root-knot disease in pots
- Under field condition, seventy-nine entries of advanced breeding materials /crosses of *bidi* tobacco, twenty-nine entries of *rustica* tobacco and two entries of chewing tobacco including respective checks were examined for leaf curl and *Cercospora* leaf spot diseases. Observations revealed that none of the entries were found free from leaf curl infection of *bidi*, *rustica* and chewing tobacco entries. Four entries/checks were found free from leaf curl but they were infected in the previous year. During the year very low incidence of frog-eye leaf spot disease was noticed.
- Amont the 47 entries of *bidi* tobacco evaluated for TMV through artificially inoculation, 37 entries including segregation materials showed resistance to the disease
- Variety ABT 10 gave 2437 kg/ha yield and 0.00 root-knot index (RKI) as compared to A 119 which gave 2010 kg/ha with 3.07 RKI. Maximum cured leaf yield was found in the treatment of poultry manure (2467 kg/ha), which were at par with farm yard manure (2382 kg/ha) and vermicompost (2317 kg/ha). The lowest root-knot index was recorded from the treatment with poultry manure (0.84 RKI), which was followed by tobacco spent (1.37 RKI).
- The maximum number of healthy transplantable seedlings (560/m^2) and minimum root-knot index (0.6) were obtained from the treatment of fluopyrum 0.05% in *bidi* tobacco nursery.
- The minimum root-knot index 0.68 was observed in the treatment T4 (Normal Seedlings + Fluopyrum @ 0.05% drenching at planting) and 0.96 in treatment T2 (Planting *Trichoderma viride*@ 30g/kg + *Paecilomyces lilacinus*@ 30g/kg coco-peat enriched seedlings + *T. viride* & *P. lilacinus* enriched coco-peat @ 10g/plant at planting and at 30 DAP) and both remain at par with each other. The nematode population was gradually decrease in the treatment fluopyrum 0.05% both in nursery and field condition
- *Bidi* tobacco farmers are advised to spray azoxystrobin 11% + tebuconazole 18.3% SC, (15 ml/10 l water) or zineb 68% + hexaconazole 4% WP (20 g/10 l water) first at initiation of disease and second at 15 days after first spray for effective management of *alternaria* leaf spot and frog-eye leaf spot disease in bidi tobacco field.

NIPANI

Crop Improvement

- In AVT-II the test entry ABD-239 (1099 kg/ha) registered numerically higher leaf yield over the popular check A-119 (1091 kg/ha)
- In AVT-I the test entry IET-113 (1796 kg/ha) registered significantly higher leaf yield compared to best check NBD-316 (1514 kg/ha)
- The test entries, IET-137, IET-138, IET-139, IET-140 & IET-141 recorded statistically on par cured leaf yield compared to the best check NBD-209 (1249 kg/ha)
- In the Station Trial the test entry KS-15 (633 kg/ha) has registered higher leaf yield followed by KS-13 (610 kg/ha) and KS-1 (547 kg/ha)
- In the SVT the test entry NBD-407 (2491 kg/ha) has registered significantly higher leaf yield than the check Vedaganga-1 (1479 kg/ha) and proposed for IVT 2025-26
- In SVT (R) the test entry NBD-360 (1563 kg/ha) has registered significantly higher leaf yield than the best check NBD 209 (1018 kg/ha) and proposed for IVT 2025-26
- PVT: NBD-430 (3747 kg/ha), NBD-415 (2832 kg/ha) and NBD 426 (2675 kg/ha) have recorded significant superiority for the leaf yield over the best check NBD 209 (2347 kg/ha)
- PHT: The test hybrid, NBTH-1121 (MS GT-5 X NBD-343) has recorded highest leaf yield (1967 kg/ha) over the best check NBD 209 (1167 kg/ha)
- F_1's: Out of 45 F_1s, the five cross combinations A-119 x NBD 344, A-2 x NBD-344, Vedaganga-1 x A-428, NBD 209 x A-428 and NBD 316 x A-428 were found to be potential heterotic cross combinations and will be advanced to F_2 generation during 2025-26
- F_2 Populations: Total 99 plants were selected from eight populations and finally 42 plants selected based on yield performance and advanced to next generation (F_3)

CROP PRODUCTION

- Pre-plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.28 kg +0.30 ai/ha (Authority NXT) a.i/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha recorded significantly highest *bidi* tobacco yield and less number of weed population .
- the treatment integrated management of *Orobanche* in *bidi* tobacco where Sunnhemp was used as a green manure before planting tobacco with neem cake application to tobacco at 30 DAP followed by hand removal of *Orobanche* produced maximum leaf yield of 1602 kg/ha as compared to fallow tobacco + Non removal of *Orobanche* (1127 kg/ha)
- Water logging of tobacco continuously for 6 days recorded lower yield and quality than 2 days or 4 days. Among foliar sprays, KNO_3 foliar spray @1% after water stagnation and S4: KNO_3 spray @ 2% after water stagnation significantly recorded more yield as compared to control
- The *bidi* tobacco planted during II fortnight of August produced a maximum leaf yield of 1710 kg/ha as compared to *bidi* tobacco planted during I fortnight of October (1430 kg/ha), II fort night of October (1310 kg/ha) and I fort night of November (900 kg/ha). Delayed planting of tobacco reduces the yield and increased the disease incidences

NANDYAL

CROP IMPROVEMENT

- ♦ Only one *bidi* tobacco entry, IET-142 (2026 kg/ha) was contributed for testing under IVT on *bidi* tobacco coordinated trials
- ♦ Pooled (2023-24 and 2024-25) analysis of AVT-II on *bidi* tobacco cured leaf yield performance of the entry ABD-239 (1724 kg/ha) has recorded significantly higher cured leaf yield, showing a 14.7% improvement compared to the best check, Nandyal Pogaku-2 (1503 kg/ha)
- ♦ On-farm trial on *bidi* tobacco: NyBTH-152 recorded higher mean cured leaf yield (2594 kg/ha), showing 20.4% increase over the best check, Nandyal Pogaku-2 (2154 kg/ha). NyBTH 157 (2409 kg/ha) and NyBTH-171 (2400 kg/ha) also performed well, with yield advantages of 11.8% and 11.4%, respectively, over Nandyal Pogaku-2 (2154 kg/ha)
- ♦ OVT-II on *bidi* tobacco: The entry NyBD-91 (1793 kg/ha) recorded significantly higher cured leaf yield over the check, Nandyal Pogaku-1 (1619 kg/ha), showing an improvement of 10.7%
- ♦ OVT II on *natu* tobacco: The entry NyNT-103 (1430 kg/ha) recorded significantly higher cured leaf yield, while NyNT-98 (1317 kg/ha) recorded on-par cured leaf yield, showing an improvement of 17.4% and 8.1%, respectively, compared to the best check, Bhairavi (1218 kg/ha)

CROP PRODUCTION

- ♦ Analysis of soil samples collected from five locations of major *bidi* tobacco growing areas of Nandyal district revealed that all the soil samples were alkaline, non-saline in nature, low in organic carbon, low in available Nitrogen, medium to high in available Phosphorous and hence, apply 1/4th Phosphorous less than the recommended dose of Phosphatic fertilizers, high in available Potassium and hence apply 1/4th Potassium less than the recommended dose of Potassic fertilizers. Except Gadivemula remaining locations of soil samples were sufficient in Iron content. To correct the iron deficiencies, apply 25 kg/ha as soil application and except Atmakur remaining locations of soil samples were sufficient in zinc content. To correct the zinc deficiencies, apply 50 kg/ha as soil application. at all locations of the soil samples were above the critical level. Nandikotkur recorded more cured leaf yield compared to other villages, and which is more or less equal to Kothapalli.
- ♦ *Kharif* cultivation of sorghum as a sequence crop with tobacco along with Neem cake application at 30 DAT and hand removal of *Orobanche* recorded higher green leaf yield (12688 kg/ha), cured leaf yield (2425 kg/ha), net returns (Rs.161650/ha) and B:C ratio (2.14) which was significantly on par with Green manuring of black sesame- tobacco, neem cake application at 30 DAT and Hand removal of *Orobanche*
- ♦ Weed free check recorded higher cured leaf yield (3523 kg/ha) and lower weed density. Among the herbicidal treatments Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha recorded highest cured leaf yield (3156 kg/ha) whereas net returns (Rs.304625/ha) and B: C ratio (3.38)

BERHAMPUR

CROP IMPROVEMENT

- In Advance Varietal Trial-I, two test entries, IET-119 (2711 kg/ha) and IET-121 (3250 kg/ha) produced significantly higher cured leaf yield than check variety Gajapati with a yield advantage of 3.2 and 23.12% respectively
- In exploratory trial on *rustica* tobacco the three years, pooled data revealed that variety, DCT-5 emerges as the most consistent and high-yielding variety with the highest overall mean yield (1972 kg/ha) and stable high % IOC values across all years, indicating strong adaptability and resilience.
- In Exploratory trial on *jati* tobacco, pooled data revealed that the variety, Chama emerged as the most consistent performer with the highest mean cured leaf yield (2977 Kg/ha) and a strong % IOC in both years (38.5% in 2023 and 25.4% in 2024)
- In the Burley tobacco exploratory trial conducted with genotypes, YB-22 and Banket A1 maximum cured leaf yield was produced by YB-22 (3587 kg/ha) followed by Banket A1 (2787 kg/ha)

ARAUL

CROP IMPROVEMENT

- In IVT the entries IET-144 and IET-145 showed significant superiority for cured leaf yield over the best check variety Azad Kanchan
- In AVT-I, entries IET-116 and IET-117 showed significant superiority over check Azad Kanchan for cured leaf yield with yield improvement of 20.85% AND 14.13% respectively
- In the pooled leaf analysis over two season (*rabi* 2023-24, 2024-25), entry ArR-105 found significantly superior over the check. Azad Kanchan and SK-417 in AVT-II with yield superiority of 20.88% and 25.27% respectively.
- The entries ArR-129 & ArR-131 showed significant superiority over check Azad Kanchan in PYT-II trial with yield improvement of 23.60% and 17.08% respectively and nominated for IVT conducting during *Rabi*2025-26.

CROP PRODUCTION

- The higher tobacco equivalent yield recorded by Wheat (2995 kg/ha) followed by Mustard *(*1610 kg/ha). wheat crop recorded highest monitory returns of (Rs. 68,310) with benefit cost ratio of 1.50
- The various vegetables grown along with tobacco showed that Potato (2010 kg/ha), Onion (2020 kg/ha) and garlic (2065 kg/ha) recorded maximum vegetable yield and suppressed growth and yield of tobacco (3620 kg/ha)

DINHATA

CROP IMPROVEMENT

- Among the entries tested in IVT on *rustica* tobacco, entry IET-143 was found superior in respect of cured leaf yield, first-grade leaf. The quality leaf was found to be highest in DD-437
- Test entry IET-116 tested in AVT-I on *rustica* tobacco, was found superior in respect of cured leaf yield, first grade leaf and quality leaf
- Among the 3 entries tested in AVT-II on *rustica* tobacco, AR-182 was found superior in terms of yield. AR-184 and ArR 105 were found superior to the check DD 437 and Dharla in terms of cured leaf yield
- Among the 2 entries, in IVT on chewing tobacco, IET-122 was found best in respect of cured leaf yield, first-grade leaf. The highest quality leaf was obtained in IET-123

LADOL

CROP IMPROVEMENT

- In the three state trials, IET (ST-1), PYT (ST-2) and LSVT conducted involving 32 genotypes, LR 22-5, LR 24-10, LR 24-6 and LR 24-4 were found promising with significantly higher cured leaf yield
- In the IVT on *rustica* tobacco, the entry IET-144 was found promising with significantly higher cured leaf yield.
- Germplasm involving the 295 genotypes/varieties comprising both indigenous and exotic materials were regenerated and six single and two multiple crosses were made.

VEDASANDUR

CROP IMPROVEMENT

- In the IVT(R) IET-122 and IET-123 had significantly higher total and first-grade cured leaves than the check varieties
- Application of farm yard manure 15 days before planting + RDF (125:50:50 kg NPK/ha) + KCl sprayed at concentration of 2% at 45 and 60 DAP over the control (FYM 12.5 t/ha 15 days before planting + RDF) increased total cured leaf yield by 6.2%. Higher net return of Rs.1,25,766/ha was recorded with RDF (125:50:50 kg NPK /ha) + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @ 500 l/ha (Soil application for 3 times at an interval of 15 days from 15 DAP

VII. IMPORTANT EVENTS

SHIVAMOGGA

- Jointly organized XIII AINPT Group Meeting was held at ICAR-NIRCA Regional Station Hunsur on 28th & 29th August 2024 in collaboration with ICAR-NIRCA, Rajahmundry.

ANAND

- Scientists of the project attended 21st meeting of AGRESCO, AAU, Anand
- Scientists of the project attended XIII Group meeting of AINPT on Tobacco during 29th -30th August 2024
- Dr. M. Sheshu Madhav, Director, ICAR-NIRCA (CTRI), Rajahmundry, AP visited *Bidi* Tobacco Research Station, AAU, Anand during 11th February, 2025

NANDYAL

- From 12.03.24 to 15.03.24 participated in Pre-ZREAC meeting and presented
- AINPT Breeding work done report for the year 2023-24 and Tentative Technical Programme of work for 2024-24.
- From 15.05.23 to 18.05.23 participating in SLTP 2024 Meetings at Lam, Guntur presented work done report of AINPT, Agronomy for the year 2023-24 and Tentative Technical Programme for 2024-25.
- Participated in kharif seed day conducted by RARS, Nandyal on 05.06.2024.
- On 15.08.24 attended flag hoisting at RARS, Nandyal
- Participated in Andhra kesari Tanguturi prakasam panthulu birth anniversary celebrations on 23.08.2024 at RARS, Nandyal.
- Participated in Teachers day celebrations on 05.09.2024 at RARS, Nandyal
- Participated in village adoption programme on 24.09.2024
- Participated in review meeting with UHOD (Agronomy) and presented list of experiments and status of ongoing experiments pertaining to Tobacco (Agronomy) on 21.09.2024
- Participated in Mahatma Gandhi jayanthi celebrations at RARS, Nandyal on 02.10.2024.
- Participated in Maharshi Valmiki Jayanthi celebrations at RARS, Nandyal on 17.10.2024.
- Attended invigilation duty for final theory examinations of II year I semester 2024-25 PoA, Nandyal on 29.10.2024.
- Participated in Zoom meeting on Organic and Natural farming: Research status and Agro-ecological benefits conducted by APCISOA, Agronomy on 30.10.2024.
- Participated in celebration of 124th Birth anniversary of Acharya N.G. Ranga on 07.11.2024 at RARS, Nandyal
- UHOD (Agronomy) Dr. M. Bharatha Lakshmi visited RARS, Nandyal on 13.11.2024 14.11.2024 to review the progress of research work (Agronomy)
- Attended invigilation duty for one time special examinations for backlog students of 2019 to 2022 of Diploma in Agriculture at RARS, Nandyal on 23.11.2024.
- Participated in celebration of Constitution Day on 26.11.2024 at RARS, Nandyal
- Participated in world soil day on 05.12.2024 at RARS, Nandyal
- Participated in Dr. B.R. Ambdekar death anniversary on 06.12.2024 at RARS, Nandyal
- Participated in Review meeting on preparedness for organizing Kisan Mela at RARS, Nandyal conducted by the Director of Research, ANGRAU, Lam, Guntur.

- Participated in sri potti sriramulu death anniversary on 15.12.2024 at RARS, Nandyal
- Participated in Kisan Mela and involved in various committees on 18.12.2024 at RARS, Nandyal
- Participated in Sri Tripuraneni Ramaswamy Chowdary death anniversary celebrations on 16.01.2025 at RARS, Nandyal
- Participated in National voter's day pledge inview of National voter's day at RARS, Nandyal on 25.01.2025
- On 31.01.2025 Dr. K. Sarala, PI Crop Improvement and Nodal Officer, ICAR-NIRCA, Rajahmundry has visited and monitored AINPT experiments at RARS, Nandyal.
- Participated in Sri Damodara Sanjeevaiah Birth anniversary celebrations on 14.02.2025 at RARS, Nandyal
- Participated in swachhtha hi seva programme on 15.02.2025 at RARS, Nandyal
- Participated in Virtual review meeting of ICAR – NIRCA, Rajahmundry and presented the status of ongoing experiments on 20.02.2025
- Participated in Sri Uyyalawada Narasimha Reddy death anniversary celebrations on 22.02.2025 at RARS, Nandyal.
- On 27-02-2025 and 01.03.2025 participated in Station level technical programme, presented the work done report for the year 2024-25 and Tentative Technical Programme for the year 2025-26.
- Participated in Pre-ZREAC meetings on 12-15.03 to 15.03.25, presented work done report for the year 2024-25 and Tentative Technical Programme for the year 2025-26 at RARS, Nandyal.
- Observed Birth Anniversary of Sri Potti Sriramulu on 15th March 2025
- On 11.03.2025 participated in monthly seed production review meeting by virtual mode.
- On 15.03.2025 participated in Swachh Andhra Programme at RARS, Nandyal.
- On 22.03.25 participated in Worlds Water Day meeting.
- Participated in BabuJagjivan Rams Bithday on 05-04-2025 at meeting hall of RARS, Nandyal
- Participated in Dr. B.R Ambedkars Bithday on 14-04-2025 at meeting hall of RARS, Nandyal
- Participated in Swachh Andhra programme on 19-04-2025 at RARS Nandyal
- On 07.05.25 and 08.05.25 participated in ZREAC, 2025 meeting at ARS, Rekulakunta, Ananthapuram
- From 19.05.25 to 21.05.25 participated and presented work done report for 2024-25 and tentative technical programme for the year 2025-26 pertaining to AINPT, Breeding at Lam, Guntur

NIPANI

- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in training programme jointly organized by ARS, Nipani and DATC, Arabhavi for tobacco growers on "Alternative crops and alternative uses of *bidi* tobacco" during 28th to 30th January, 2025 (Gokak and Hukkeri taluka tobacco growers)
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in training programme jointly organized by ARS, Nipani and DATC, Arabhavi for tobacco growers on "Alternative crops and alternative uses of *bidi* tobacco" during 5th to 7th February, 2025 (Nippani and Chikodi taluka tobacco growers)
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in 8th International Conference "CRISEA-2025" held at Goa University, Goa during 24th to 26th February, 2025.

- ✦ Staff and students of B.Sc., Botany of Devachand Collage, Arjunnagar Tq: Kagal (Maharashtra) visited ARS, Nippani for discussion on current tobacco and sugarcane research on the occasion of “World Climate Day” (23rd March, 2025).
- ✦ Dr. Sanjay B. Patil attended and conducted qualifying Viva-voce examination on master’s degree students of Genetics and Plant Breeding at Collage of Agriculture, KSNUAHS, Shivamogga on 3rd to 4th April, 2024.
- ✦ Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in XXVII Annual Workshop of Tobacco held at ICAR-CTRI-FCV, Centre, Hunsur, on 29th to 30th August, 2024.
- ✦ Dr. Shivamurthy, D., participated and presented tobacco research highlights in Agronomists Meet (Rabi) held at UAS, Dharwad on 2nd August, 2024.
- ✦ Dr. Sanjay B. Patil participated and presented tobacco research highlights in Annual Plant Scientist Meet (Rabi) held at UAS, Dharwad on 12th to 14th August, 2024.
- ✦ Dr.P.L.Patil, H’able. Vice-Chancellor, University of Agricultural Sciences, Dharwad visited the research station to review the activities on 29th November, 2024.
- ✦ Research monitoring team of UAS, Dharwad visited tobacco research trials of ARS, Nippani on 14th December, 2024.
- ✦ Sponsored trials monitoring team of UAS, Dharwad visited tobacco and maize trials plots of ARS, Nippani on 6th November, 2024.
- ✦ Seed production monitoring team of UAS, Dharwad visited tobacco and other crops seed production activities/ plots of ARS, Nippani on 1st August, 2024.
- ✦ Staff of Agriculture Department of Maharashtra and farmer’s visited ARS, Nippani to know the research activities and technologies available in tobacco and sugarcane cultivation on 30th January, 2025
- ✦ Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in training programme jointly organized by ARS, Nipani and DATC, Arabhavi for tobacco growers on “Alternative crops and alternative uses of *bidi* tobacco” during 28th to 30th January, 2025 (Gokak and Hukkeri taluka tobacco growers).
- ✦ Dr. Sanjay B. Patil and Dr. Shivamurthy, D., participated in training programme jointly organized by ARS, Nipani and DATC, Arabhavi for tobacco growers on “Alternative crops and alternative uses of *bidi* tobacco” during 5th to 7th February, 2025 (Nippani and Chikodi taluka tobacco growers).

ARAUL

- ✦ Participated in XIII Group Meeting of All India Network Project on Tobacco (AINPT) held during 29 -30 August 2024 at CTRI, Research Station Hunsur
- ✦ Attended virtual review meeting regarding status of group stand in the experimental field and constraints regarding on dated 20.02.2025
- ✦ Attended zoom meeting regarding awareness programme on PPVFR registration of tobacco varieties on dated 19.03.2025
- ✦ Attended virtual meeting with AINPT centers regarding changes required for improving performance on dated 24.06.2025

LADOL

- ✦ Dr. D. R. Chaudhari, Assistant Professor attended 21th AGRESCO Sub-Committee Meeting of Crop Improvement, Plant Physiology and Bio-Technology on February 27-28, 2025 at SDAU, S.K. Nagar.

VIII. STATUS OF GERMPLASM MAINTAINTED & SEED PRODUCED

Centre	Tobacco Type	Number of Germplasm
NIRCA & its Research Stations	All types	3386
Shivamogga	FCV	113
Anand	*Bidi*	202
	Rustica	250
Araul	*Rustica*	310
Ladol	*Rustica*	295
Nipani	*Bidi*	244
Nandyal	*Bidi*	222
	Natu	104
Berhampur	*Pikka*	112

SEED PRODUCED AT DIFFERENT CENTRES

HUNSUR

Variety	Breeder seeds produced (kg)	Area occupied by the varieties released (%)
Kanchan	5	35%
FCH 222	5	10%
CH3	-	55%

SHIVAMOGGA

Variety	Breeder seeds produced (kg)	Area occupied by the varieties released (%)
Thrupthi	1	2%
Sahyadri	1	10%
Sahyadri Swarna	1	1%

NANDYAL

S.No.	Variety	Breeder seeds produced (kg)	Area occupied by the varieties released (ac)
1	Nandyal pogaku 1	24	3000 ac
2	Nandyal pogaku 2	7	1500 ac (A.P). and 500 ac (Gujarat)

NIPANI

S. No.	Variety	Breeder seeds produced (kg)	Area occupied by the varieties released (%)
1	A-119	13	41
2	A-2	0.5	13
3	NBD 209	4	33
4	NBD 316	5	8
5	Bhagyashree	0.75	1.5
6	Bhavyashree	0.75	1.5
7	Vedaganga-1	0.5	1
8	PL-5	0.5	1
	Total	**25**	

BERHAHAMPUR

Variety	Breeder seeds produced (kg)	Area occupied by the varieties released (%)
Gajapati	1	15-20%

LADOL

Crop	***Rustica* Tobacco**		
Variety	GCT 3	DCT 4	Total
Production	1092.0	604.0	1696.0

ANAND

The details of seed & seedlings produced at *Bidi* Tobacco Research Station, A.A.U., Anand Gujarat 2024-25

S. No.	Name of variety	Area occupied (%)	Seedlings (No)			Truthful /labelled Seed			Breeder seed produced (kg)
			Produced (Nos)	Sold (Nos)	Amount realised (Rs)	Produced (kg)	Sold (kg)	Amount realised (Rs)	
***(A) Bidi* Tobacco**									
1	A2	1.20	3600	2000	600/-	72	*60	72,000	0.100
2	A145	3.50	-	-	-	322	230	2,72,400	0.250
3	A 119	57.60	223300	12800	3840/-	4500	4200	50,40,000	1.750
4	GT 4	8.79	54600	40000	12000/-	475	422	5,06,400	0.350
5	GT 5	8.00	26200	6000	1800/-	410	380	4,56,000	0.850
6	GT 7	18.60	63900	38500	11550/-	925	870	10,44,000	1.650
7	GT 9	-	-	-	-	-	-	-	0.050
8	ABT 10	0.004	36270	29000	8700/-	21	20	24,000	0.350
9	GABT 11	2.20	27900	25000	7500/-	115	110	1,32,000	1.350
10	MRGTH 1	0.001	19500	18000	6300/-	4	4**	96,000	(Male) 0.075 g (Female) 0.100 g
11	GABTH 2	0.001	68200	56700	19845/-	4	4	96,000	(Male) 0.080 g (Female) 0.120 g
Total(A)		**99.9 %**	**5,23,470**	**2,28,000**	**72135/-**	**6848**	**6300**	**77,38,800**	**6.700**
***(B) Rustica* Tobacco**									
	GC1	40.0	10500	10000	3000/-	995	$ 980	14,70,000	2.250
	GCT 2	5.30	3900	-	-	2147	2130	31,95,000	0.750
	GCT 3	54.70	113500	3000	900/-	97	90	1,35,000	2.500
Total (B)		**100 %**	**127900**	**13000**	**3900/-**	**3239**	**3200**	**48,00000**	**5.500**
Grand Total A+B			**651370**	**241000**	**72300/-**	**10087**	**9500**	**1,25,38,800**	**12.200**

**Bidi* tobacco seed price =1200 Rs/kg, $ *Rustica* tobacco seed price = 1500 Rs/kg and **Hybrid seed price= 24000 Rs./kg
Bidi and *Rustica* tobacco seedling price =300 Rs/1000 nos, *Bidi* tobacco hybrid seedling price =350 Rs/1000 nos

IX. VARIETY RELEASE PROPOSALS

HUNSUR

- Proposal for identification of FCHH-2 hybrid for KLS region

X. EXTENSION ACTIVITIES

HUNSUR

- On farm trials with promising line FCHH-2 and CH 3 were successfully conducted at three villages of KLS region.
- Four village level training programmes on Nursery management, Field crop management, Varieties, mineral nutrition, Diseases and pests, PHPM, Plant position grading etc., were conducted
- Workshop on "alternative crops to FCV tobacco in KLS" was conducted in collaboration with Tobacco board on 04.06.2024 at Kattemalavadi, Hunsur

SHIVAMOGGA

On-farm trials/ Demonstrations

- Sowing of groundnut as an intercrop in alternate rows of FCV tobacco on the day of planting or next day of planting.
- Management of Whitefly, *Bemisia tabaci a* vector of Tobacco Leaf Curl Virus
- Validation of IPM modules against *Spodoptera litura* in FCV tobacco FCS-4 a high yielding FCV tobacco variety.

Field visits

- Dr. Prashantha C visited Ramanathapura tobacco experimental site and also farmer fields around Basavapattana on 28.05.2024.
- Dr. T.M. Soumya, Dr. Shashikala S Kolakar and Dr. Prashantha C. visited tobacco farmer's fields at Jeenalli and Kattige villages.
- Dr. Prashantha C. visited Ramanthpura tobacco experimental plots and farm trial fields in Hassan district.
- Visited farmers field and surveyed in and around Jeenahalli and Kattige villages of Davanagere district (09.08.2024).
- Dr. Santosh Pattanashetti and Dr. Prashantha C. visited AINPT farm trial fields at Kodagu, Hassan, Mysuru districts and also visited Kodagu university campus and WVR, Veterinary university campus for selection of land to conduct AINPT experiments (17-09-2024)

Training programs:

- Dr. T. M. Soumya and Dr. Prashantha C. organized training programme on nutrient and pest management in FCV tobacco at Jeenahalli, Nyamati taluk, Davanagere district on 09.08.2024 (15 farmers).
- Dr. Prashantha C. conducted training on pest and diseases of tobacco and their management at Mulehosalli, Arakalgudu taluk, Hassan district on 17-09-2024 (20 farmers).

- Dr. Prashantha C. organized training programme on nursery management in FCV tobacco at Basavapattana 28.05.2024 (20 farmers).
- Dr. Prashantha C. conducted training programme on Tobacco production technologies: Cultivation, Grading and Marketing of FCV tobacco at Ramanthpura, Arakalagud taluk, Hassan district on 17-09-2024 (20 farmers).

Guest Lectures

- Dr. Pradeep Gopakkali took class on visit to progressive farmer's field to acquaint with drip and sprinkler systems for DAESI diploma students at OFRC, Shivamogga on 20.04.2024.
- Dr. Pradeep Gopakkali took class on Acquaint with irrigation techniques and their management for DAESI diploma students at OFRC, Shivamogga on 20.04.2024.
- Dr. Pradeep Gopakkali delivered lecture on Importance of water management in crop production, water use efficiency system and methods of irrigation for DAESI diploma students at AHRS, Bavikere, Chikkamagaluru on 24.05.2024.
- Dr. Pradeep Gopakkali delivered lecture on Land preparation and water management in Agricultural crops for Krishi Sakhi students at KVK, Shivamogga on 01.01.2025.
- Dr. Prashantha C. delivered lecture on Use of biocontrol agents in Krishi Sakhi training at ICAR-KVK, Shivamogga on 07.02.2025.
- Dr Santosh Pattanashetti served as resource person on workshop organized for farmers of Shivamogga district on Traditional farmers' varieties awareness program organized by Department of Agriculture, Shivamogga and presented on 'Traditional farmers varieties conservation and Community Seed banks' at SARA (NGO), Dombekoppa, Hosanagar Tq, Shivamogga on 11th Feb., 2025.

ANAND

- Examined more than 40 diseased samples of *bidi* and *rustica* tobacco and advised the farmers during 2024-25.
- Scientists of the project visited 10 FLD's of *bidi* tobacco hybrid and variety allotted at different villages of middle Gujarat.
- Organized two Farmer's training programme on scientific cultivation of tobacco.

NANDYAL

Transfer of technology

- Explain the Research Activities and progress of AINPT, RARS, Nandyal to RAWEP students of B.Sc. (Hons.) Horticultural students of N.S. Horticultural College affiliated to Dr. Y.S.R. Horticultural University on 07.05.2024.
- Participated in Farmers-scientist interaction meeting organized at KVK, Banavasi in collaboration with ATMA on 06.08.2024
- Explain the rained agriculture under dry land conditions and contingent crops to B.Sc.(Ag.) to IIIrd year students of Agricultural College, Mahanandi on 08.08.2024.
- Explain the research activities of AINPT, RARS, Nandyal and modern agricultural practices to Z.P. High school students of 9th and 10th, N. Kothapalli, Nandyal dist.
- Explain the research activities of RARS, Nandyal to first year B.Sc. (Hons) Ag students of Agricultural College, Mahanandi as part of Deeksharabh programme on 29.10.2024

- Orientation on Agri meterology and AINPT ongoing research programmes in RARS, Nandyal on 07.11.2024 to DAESI input dealers of Kurnool Dist.
- Participated in monthly T&V meetings at RARS, Nandyal on the following dates: 30.01.24, 20.02.24, 23.03.24, 21.06.24, 31.07.24, 17.08.24, 06.09.24, 19.10.24, 02.11.24, and 06.12.24, where we discussed seasonal and crop conditions with DAOs and ADAs and addressed control measures for current pests and diseases.

On-farm trials

- The on-farm trial (2024-25) conducted across five farmer fields in Midthur and JP Bunglow mandals. Three hybrids along with three checks were evaluated. Among the hybrids, NyBTH-152 recorded higher mean cured leaf yield (2594 kg/ha) showing 20.4% increase over the best check Nandyal Pogaku 2 (2154 kg/ha).NyBTH-157(2409 kg/ha) and NyBTH-171(2400 kg/ha) also performed well, with yield advantages of 11.8% and 11.4%, respectively, over Nandyal Pogaku-2 (2154 kg/ha). Farmers opined the NyBTH-152 having more price Rs.158/kg of cured leaf with good quality.

Field visits

- On 25.07.2024 attended diagnostic visit at Atmakur of Nandyal district along with department officials
- On 08.08.24 attended village adoption programme at Pulimaddi village along with RARS scientists and suggested control measures to the prevailing diseases in KFC tobacco nurseries
- On 14.08.2024 attended diagnostic visit at Chagalamarri & Brahamanapalli villages of Nandyal district along with department officials
- On 18.08.2024 attended diagnostic visit at Atmakur of Nandyal district along with department officials.
- On 17.09.24 visited tobacco fields at Nandikotkur and Atmakur divisions of Midthur, Jupadubunglow, Pamulapadu & Kothapallimandals. Due to receipt of heavy rains on 2nd September2024, nutrient deficiency symptoms were noticedin tobacco crop and suggested correction measures.
- On 29.08.2024 attended diagnostic visit at pulimaddi village of Nandyal district along with department officials.
- On 02.09.2024 attended diagnostic visit at Veepunagandla (V), Midthur (M), Parumanchala (V), Jupadubunglow (M), sathanakota, mallayala (V), Nnadikotkur (M) of Nandikotkur division of Nandyal district along with department officials.
- On 03.10.24 visited tobacco fields at Allagadda division and discussed about prevailing seasonal and crop condition
- On 23.10.24 visited tobacco fields at Pulimaddi village along with RARS scientists and suggested control measures to the prevailing diseases in KFC tobacco fields.
- On 22.01.25 visited tobacco fields at Midthur, JupaduBunglow, Parumanchala & Kadumur villages, noticed Orobanchae and terminal moisture stress suggested control measures.

Training programmes

- On 24.09.24 conducted training programme at adopted village, suggested control measures to the prevailing pests and diseases
- On 3.10.24 conducted training programme at adopted village, interacted with farmers about fertilizer usage in KFC tobacco
- On 9.10.24 conducted training programme at adopted village, suggested precautionary measures to overcome the burley tobacco after water logging conditions
- On 23.10.24 conducted training programme at adopted village, discussed recommended package of practices in tobacco crop.

Publication of Technical bulletin /information material

- P. Pulli Bai, K. Sathish Babu, Dr. K. Sarala & M. Sheshu Madhav.2024. Published '*Bidi* tobacco variety Nandyal Pogaku-2'.1-2.
- P. Pulli Bai, K. Sathish Babu, K.Sarala ' Nandyala Pogaku Rakalu', pp.1-4.
- P. Pulli Bai, K. Sathish Babu, CH. Chaitanya, K. Sarala & & M.Sheshu Madhav.2024. Published *Bidi* Pogaku-Sasyarakshana'. pp. 1-6

Popular articles

- P. Pullibai, K. Sathish Babu, M. Jayalakshmi, M. Jyostna Kiranmai, K. Sarala, M. Sheshu Madhav, S. Kasturi krishna, S. Saralamma. Pogaku Narumalla pempakam lo melukuvalu. Rythuvani. July, 2024.Pg. no.41-42.
- K. Sathish Babu, P. Pulli Bai, M. Johnson, K. Sarala, M. Sheshu Madhav. *Bidi* pogaku sagu lo hehhu digubadiki yajamanyam. Rythuvani. October, 2024.Pg. no.43-44.
- P. Pullibai, K. Sathish Babu, B.H. Chaitanaya, M.Johnson, K. Sarala, M. Sheshu Madhav. *Bidi* pogaku sassyarakshna charayalu. Rythuvani. January

NIPANI

Field visits

- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., visited FLD's on new *bidi* tobacco variety NBD-316 V/s NBD-209 and A-119 on 1st January, 2025 around Akkatangiyarhal and Yaragatti villages of Gokak taluka.
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., visited FLD's on new *bidi* tobacco variety NBD-316 V/s NBD-209 and A-119 on 4th January, 2025 around Hukkeri taluka.
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., visited FLD's on new *bidi* tobacco variety NBD-316 V/s NBD-209 and A-119 on 7th January, 2025 around Athani and Jamakhandi taluka.
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., visited FLD's on new *bidi* tobacco variety NBD-316 V/s NBD-209 and A-119 on 29th January, 2025 around Nesargi village.
- Dr. Sanjay B. Patil and Dr. Shivamurthy, D., visited FLD's on new *bidi* tobacco variety NBD-316 V/s NBD-209 and A-119 on 31st January, 2025 around Shivapur village and Gokak taluka.

DINHATA

- Conducted Training on Improved production technology of *Jati* and *Motihari* tobacco on 19/09/2024.
- Conducted training on Good Agricultural Practices (GAP) on 03/12/2024
- Conducted training cum awareness programme on soil testing on 20/09/2024.

LADOL

Efforts on transfer of technology

- Mera Gauv Mera Gaurav: Scientist-Farmers direct talks aimed under 'Mera Gauv Mera Gaurav' programme have been initiated in Mandali, Rampur (Kot), Hirpura, Pundhra and Madhi villages and FLDs of *rustica* tobacco varieties GCT 3, DCT 4 and GCT 5 have been allotted to 25 farmers in those villages.

- Training programme: During season, provide information about 1200-1400 farmers regarding agricultural practices in *rustica* tobacco and seed production techniques.

VEDASANDUR

- August 27, 2024: One-day training on Nursery techniques for tobacco crop held at ICAR-CTRI, RS, Vedasandur - Total Participants: 29 farmers

- November 27, 2024: One-day training on Integrated nutrient management in tobacco cultivation held at ICAR-CTRI, RS, Vedasandur - Total Participants: 25 farmers

- Front line demonstration (FLD) was conducted on 03.03.2025 at ramanathapuram muthunayakanpatty ravikumar farmer field

- Frontline demonstration (FLD) was conducted on 04.03.2025 at sathyanathapuram thirumalaisamy farmer field visit

XI. INFRASTRUCTURE DEVELOPMENT AND ANY OTHER DEVELOPMENTAL ACTIVITIES

SHIVAMOGGA

- Established new AINP(T) experimental plot at Kodagu University, Kushalnagar (2.0 ha)

ANAND

- Set up micro sprinkler irrigation facility for nursery.
- A new pump house and borewell have been constructed to ensure a reliable water supply for the nursery's irrigation needs

LADOL

- Made compound wall surrounding D block of farm.

XII. ALTERNATIVE CROPPING SYSTEMS

SHIVAMOGGA

- Among the commercial crops chilli is prevailing in the area. However, much of the tobacco area is being now under maize crop. Among the different alternative cropping systems tried from the station paired row of hybrid cotton + chilli + French bean (3 rows) recorded highest net returns followed by hybrid cotton + chilli + groundnut (3 rows). No single crop cultivation can equate the income generated by tobacco.

ANAND

- Castor and cotton grown as an alternate crop to *bidi* tobacco.
- Tobacco – Pearl millet (summer) crop sequence for *bidi* tobacco growing area of middle Gujarat Agro climatic zone

HUNSUR

- Crops like ginger and maize are extensively cultivated in the tobacco growing areas of KLS. Field bean, Ragi and Paddy are being grown as second crop after *kharif* tobacco in the tobacco based cropping system

NANDYAL

- Studies on alternative cropping systems to tobacco during 2012-13 revealed that maize-Chickpea sequence has recorded significantly higher tobacco equivalent yields (3.401kg/ha) and higher net returns (Rs 1,00,833 per ha). In the year 2013-14, maize-sunflower has recorded significantly higher tobacco equivalent yields (3,429 kg/ha) and higher net returns (Rs 69,813 per ha). Therefore, these cropping systems can constitute alternative to tobacco.
- Onion – *bidi* tobacco and sweet corn – *bidi* tobacco cropping systems are recommended as a crop intensification strategy for enhancing the farmers income in *bidi* tobacco growing areas of Andhra Pradesh.

ARAUL

- (i) Summer Maize-Cauliflower - *Hookah* Tobacco.
- (ii) Spring Moongbean - Maize-Tobacco

LADOL

- Castor and cotton have been recommended as alternate crops to tobacco. It is followed to some extent depending on market value of the crops.
- Tobacco – Pulses / (*Kharif*) crop sequence for *rustica* tobacco growing area of north Gujarat Agro climatic zone found economical.

XIII. PUBLICATIONS/ SYMPOSIA/ WORKSHOP/ SEMINARS

SHIVAMOGGA

Abstracts/technical bulletins/popular bulletins

- Prashantha C, T.M. Soumya, Shreeshail Sonyal and Santosh Pattanashetti 2024. Tobacco diseases and their control.
- Dushyanth Kumar B. M., Veeranna H. K. Pradeep Gopakkali, Divya M. and Mallikarjuna M. C. (2024), Compendium of varieties released by Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga. Published by Directorate of Research, KSNUAHS, Shivamogga.
- Prashantha, C., Soumya, T. M., Shrishail S, and Pattanashetti S. 2024, Virgenia thambakina rogagalu matthu Nirvahane (KSNUAHA2024F020)
- Prashantha, C., Pradeep S., Deshmukh S. S., and Soumya, T. M. 2024, Hippuneraleyalli ele suruli keetada jaivika nirvahane(KSNUAHA2024F015)
- Prashantha, C. 2024, Balasiri mohaka bale, beleyiri keeta rahitha bele. Negila miditha, (Sept-Oct) 10 (5): 32p.
- Pradeep Gopakkali (2024), Contingent crop plan for aberrant weather. Negila Miditha, 10(3), May-June, 2024

Symposia / Workshop /Annual meetings / Technical meeting/Field days:

- Dr. Prashantha C. attended national level workshop on Comprehensive scientific writing skill development programme organised by ATPBR from 29.07.2024 to 02.08.2024.
- Dr Santosh Pattanashetti and Dr Prashantha C. participated in 5 days' online workshop on "Comprehensive scientific writing skill development program" from, July 29 to 2 August, 2024, organized by Foundation for Advanced Training in Plant Breeding (ATPBR) in virtual mode.
- Dr T.M. Sowmya, Dr Santosh Pattanashetti and Dr Prashantha C. attended the XIII Annual Group Meeting of AINP (T) Centers held at CTRI-RS Hunsur during 29-30 August 2024 and presented experimental results of 2023-24. Dr Prashantha C. served as a rapporteur for technical session III and member for transportation & programme committee.
- Dr. Santosh Pattanashetti attended '7th Integrated State Level Variety Evaluation Committee meeting' at UAS Dharwad and presented variety release proposal of FCV Tobacco variety 'Sahyadri Swarna (FCS-4)' (22 Oct. 2024).
- Dr. Santosh Pattanashetti attended '42nd meeting of State Seeds Sub-Committee' at Commissionerate of Agriculture, Bangalore and presented variety release proposal of FCV Tobacco variety 'Sahyadri Swarna (FCS-4)' (3 Dec., 2024).
- Dr. Santosh Pattanashetti attended 'CTRI Online meeting - Revising of guidelines for testing of tobacco varieties committee under AINP(T)' (8 Jan., 2025).
- Dr. Santosh Pattanashetti attended Annual Plant Scientists Meeting at Shivamogga from 13-15 Feb. 2025.
- Dr. Santosh Pattanashetti and Dr Prashantha attended virtual meeting of AINP (T) called by Nodal Officer and presented progress of Plant breeding and Entomology trials of *Kharif* 2024 on 20th February, 2025.
- Dr. Pradeep Gopakkali attended Annual technical meeting of Agronomy at AHRS, Madikere on 20 to 23rd February 2025.

- Dr. Pradeep Gopakkali, participated one-day training program on use of Sathi portal in seed registration and certification at Seed Unit, KSNUAHS, Shivamogga on 04.03.2025.
- Dr. Pradeep Gopakkali attended Zonal Research and Extension program (ZREP) at ZAHRS, Hiriyur on 07 to 09th April 2025.

ANAND

Research Papers

National level

- Desai, S. G., Rojasara, Y. M. and Bhimani, P. C. (2024) Non-pathogenic fusarium strains as a biocontrol agent. Agriculture & food e-Newsletter, 6(1): 373-375.
- Desai, S. G., Rojasara, Y. M., Dabhi M. V. and Suthar Y. M. (2024). Study on cultural, morphological and pathogenic variability among the isolates of *Pythium aphanidermatum*. Plant Archives, 24 (2):1163-1168.

International level

- Sakariya Prachi, Sakure A. A., Sushil Kumar, Rojasara, Y. M. and Vaja M. B. (2024). Identification of candidate genes through comparative proteomics profiling under root-knot nematode infection in *Nicotiana tabacum* L. South African Journal of Botany 169: 155-163.
- Thomas T., Sakure A. A., Sushil Kumar, Mishra Ankita, Ahmad Suhali, Rojasara, Y. M., Vaja, M. B. and Patel, D. A. (2025). The Mi-1 gene is a key regulator of defense mechanisms and cellular gene dynamics in response to root-knot nematodes. *Plant Cell Reports* 44: 96.

NANDYAL

Publications

- P. PulliBai, K. Sathish Babu, S.Jaffar Basha, K. Prabhakar, K. Sarala, M. Sheshu Madhav and M. Johnson. 2024. Evaluation of newly developed *bidi* tobacco (*Nicotiana tabacum* L.) Genotypes for Seed Oil. *Annual Research & Review in Biology.* Volume 39: Issue 12, Page 72-77, Article no. ARRB.127936, ISSN: 2347-565X, NLM ID: 101632869.

Abstracts

- P. Pulli Bai, V. Jayalakshmi, M. Shanthi Priya, K. Sarala, K. Gangadhara, K. Prabhakara Rao and Shaik Nafeez Umar.2024. Genetic diversity and association studies for drought tolerance in *bidi* tobacco (*Nicotiana tabacum* L.). *Annual Post Graduate Students National Conference on APGSNC-2024: Next Gen - Agriculture: Cross Disciplinary Approaches for Augmenting Farm Productivity and Farmers' Prosperity 2nd& 3rd April,* pp.68
- K. Sathish Babu, P. Pullibai, S Kasturi Krishna, K. Sarala, M. Sheshu Madhav and N.C. Venkateswarlu. Response of *bidi* tobacco to methods of planting and drought mitigation measures. National Conference on Nurturing Agricultural Technologies for Uplifting Rural Economy on 26-28th, July, 2024 organized by Mohan Babu University, Tirupati.

Trainings and webinars attended by the staff
P. Pulli Bai, Scientist (GPBR)

- On 24.06.24 participated in SC sub plan meeting as a resource person to deliver a lecture on released *bidi* tobacco varieties and package of practices in *bidi* tobacco at Orvakal mandal.
- On 16th November, 2024 participated in the International Webinar on Speed Breeding of Crops organized by Horticulture Technology in collaboration with Saveer Biotech Limited at Greater Noida, U.P, India.
- On 19.03.2025 participated in training on Awareness program on PPVFRA registration of Tobacco Varieties and Sensitization programme on latest developments in AINPT by virtual mode.

K. Sathish Babu, Scientist (Agro.)

- Attended training programme on *Trichoderma* preparation and demonstration at Balapnur village, Nandyal district on 10.07.2024.
- Participated in parthenium awareness week from 16.08.2024 to 22.08.2024 at RARS, Nandyal
- Participated in Zoom meeting on updates on conduct and communication of Research conducted by APCISOA, Agronomy on 25.09.2024.
- Attended online webinar on launching Agriadapt climate risk tool at RARS, Nandyal on 28.01.2025
- Participated in online lecture on Agri Tourism-For livelihoods: policy insights on 17.02.2025.

NIPANI

Popular articles/ Book chapters

- Naveen A, Rana V. B., Saha S., Sangavi B. and Polara A. M., 2024, Genetics and plant breeding: Roles in climate resilience, nutritional security, and sustainable development goals. In: Plant breeding: from traditional selection to modern biotechnology (Ed. P. K. Mallikarjun, Sanjay B. Patil, C. D. Soregaon and H. G. Manojkumar) Stella International Publication, Kurukshetra, Haryana, India, pp. 1-34.
- Shivamurthy, D., P.S. Matiwade, S. B. Patil, Geeta Dandin and S. Kasturi Krishna, 2025, Integrated management of *Orobanche* in *bidi* tobacco (*Nicotiana tabacum* L.). 8th International Conference: Cutting-edge Research Innovation in Sustainable Education, Environment, and Agriculture (CRISEA - 2025), 24-26, February, 2025, Goa University, Goa, pp: 441-442.

XIV. STAFF POSITION

CENTRE – WISE DETAILS OF SANCTIONED POSTS 2018-19 ONWARDS

Name of the Centre	Scientific	Technical	Administrative	Supporting	Total
Anand	5	6	1	1	13
Shivamogga	3	5	1	-	9
Nipani	2	3	1	-	6
Nandyal	2	3	-	-	5
Araul	2	2	-	-	4
Berhampur	2	2	-	-	4
Total	**16**	**21**	**3**	**1**	**41**

Staff in position

S. No.	Centre	Cadre	Name of Sanctioned Post	Name of the Person working
1.	Shivamogga	Scientific	Scientist (Plant Breeding)	Dr. Dhanalakshmi T.N (05.08.2025 onwards) Dr. Santosh Pattanshetti (upto 04.08.2025)
2.	Shivamogga	Scientific	Scientist (Agronomy)	Dr. Pradeep Gopakkali
3.	Shivamogga	Scientific	Scientist (Ento./Pathology)	Dr. Imran Khan,H. S (27.06.2025 onwards) Dr. Prashantha C (upto 26.06.2025)
4.	Shivamogga	Technical	Field Assistant	Rajappa K
5.	Shivamogga	Technical	Curer	Nagaraja
6.	Shivamogga	Administrative	Assistant	Akshay Patil
7.	Nipani	Scientific	Principal Scientist (Plant Breeding)	Dr. S. B. Patil
8.	Nipani	Scientific	Scientist (Agronomy)	Dr. Shivashenkaramurthy (joined 21-04-2025) Dr. Shivamurthy D. (upto 20-04-2025)
9.	Nipani	Technical	Research Assistant	Dr. Geeta H Dandin
10.	Nipani	Technical	Field Assistant	Mr. I. S. Koshti
11.	Nandyal	Scientific	Scientist (Plant Breeding)	P. Pulli Bai
12.	Nandyal	Scientific	Scientist (Agronomy)	Dr. A. Malliswara Reddy (21-08-2025 onwards) K. Sathish Babu (upto 20.08.2025)
13.	Araul	Scientific	Scientist (Agronomy)	Dr. K. C. Arya
14.	Araul	Technical	Technical Assistant	Dr. N. B. Singh
15.	Anand	Scientific	Scientist (Plant Breeding)	Dr. Jyotindra N Patel
16.	Anand	Scientific	Scientist (Nematology)	Dr. Y. M. Rojasara
17.	Anand	Technical	Senior Research Assistant	Mrs. Jalpa P Panchal
18.	Anand	Technical	Senior Research Assistant	Mr. Vekariya K J
19.	Anand	Technical	Lab. Technician	Mrs. Hiral Upadhyay
20.	Anand	Technical	Curer	Mr. R. K. Rathava
21.	Anand	Low Division Clerk	Junior Clerk	Mr. Viralkumar U. Makwana

XV. BUDGET

Revised Estimates for the year 2024-25: AINPT (ICAR Share)

Head	**Amount (Rs. in Lakhs)**
Grant in aid Salaries	388.00
Grant in aid Capital	0.00
Grant in aid General	123.20
Total	**511.20**

Budget details at SAU centres

(Rs. in Lakhs) ICAR Share: 75%

S. No.	**PARTICULARS**	**Opening Balance**	**Allocation**	**Expenditure**
SHIVAMOGGA				
1	Salary of Research Staff & Est.	00	86.99	84.74
2	Travelling allowance	00	0.50	0.138
3	Recurring contingencies	00	14.79	14.75
	Total	**00**	**102.28**	**99.63**
ANAND				
1	Salary of Research Staff & Est.	(-) 30.69	103.37	101.64
2	Travelling allowance	0.00	1.30	0.89
3	Recurring contingencies	0.00	18.35	18.33
	Total	**(-) 30.69**	**123.02**	**120.86**
ARAUL				
1	Salary of Research Staff & Est.	00	43.75	38.40
2	Travelling allowance	00	0.37	0.33
3	Recurring contingencies	00	9.80	10.33
	Total	**00**	**53.92**	**49.07**
NIPANI				
1	Salary of Research Staff & Est.	00	65.92	59.55
2	Travelling allowance	00	1.10	1.01
3	Recurring contingencies	00	12.38	12.37
	Total	**00**	**79.40**	**72.93**
NANDYAL				
1	Salary of Research Staff & Est.	00	27.64	27.46
2	Travelling allowance	00	0.55	0.47
3	Recurring contingencies	00	9.90	9.89
	Total	**00**	**38.09**	**37.83**
BERHAMPUR				
1	Salary of Research Staff & Est.	0.00	0.00	0.00
2	Travelling allowance	0.04	0.04	0.14
3	Recurring contingencies	5.50	5.00	5.00
	Total	**11.76**	**5.50**	**5.14**

XVI. CO-ORDINATION UNIT, RAJAHMUNDRY

The activities under taken by the co-ordination unit, since last XIII Group Meeting is briefed here

Research Co-ordination

- Forwarded the notification proposals of four tobacco cultivars *viz*., FCS-4 (Sahyadri Swarna), FCH-2 (CTRI Navya), FCRH-11 (LSTC-9) and NBD-316 (DTV 9) to 93rd CVRC along with recommendations and presented the proposals before 93rd CVRC meeting held on 13-03-2025
- The four proposals of tobacco cultivars *viz*., FCS-4 (Sahyadri Swarna), FCH-2 (CTRI Navya), FCRH-11 (LSTC-9) and NBD-316 (DTV 9) were notified by 93rd CVRC vide notification No. 3-88/2024-SD. IV (161658) dated 7th April 2025
- Forwarded the notification proposals of three tobacco cultivars *viz*., Nandyal Pogaku-2, DJ-1 and ArR-27 (Nath) to 94th CVRC along with recommendations
- Collected the IVT proposals of different tobacco types and arranged virtual meetings with the committee for consideration of IVT/IHT and AVT-I/AHT-I proposals, constituted the Technical Programme for Initial Varietal/ Hybrid trials and
  AVT-I/AHT-I of FCV and Non-FCV tobacco types as suggested by the IVT Committee and approved by the Competent Authority. The required seed of IVT/IHT and AVT-I/AHT-I entries collected from respective centres were supplied to all the concerned centres for conducting IVT
- A total number of 24 lines were evaluated in IVT/IHT, 24 in AVT/AHT, 8 in Bulk/ On-farm trials during 2024-25
- A total of 7 crop production and protection experiments were concluded and the recommendations were proposed to the farming community
- Compiled and submitted the quarterly information for output-outcome framework related to AINPT
- Varieties released through AINPT are updated from time to time in the Varietal Information System of ICAR Krishi Portal

Monitoring of AINPT experiments

- Dr. K. Sarala, Nodal Officer AINPT and PI, Crop Improvement Dr. K. Prabhakar Rao, Sr. Scientist, Dr. T. Kiran Kumar, Sr. Scientist and Mrs. B. Krishna Kumari, ACTO visited Kushalnagar area and the Hunsur centre on 31st August, 2024 and monitored the AINPT experiments
- Dr. K. Sarala, Nodal Officer AINPT and PI, Crop Improvement, visited Guntur on 30-01-2025, Nandyal on 31-01-2025 and Kandukur on 01-02-2025 centres and monitored the AINPT experiments
- Dr. M. Sheshu Madhav, Project Co-ordinator visited ICAR-NIRCA RS, Guntur – inspected and monitored the experiments of the Institute and AINPT Experiments of Res. Station, Guntur on 03.02.2025
- Dr. M. Sheshu Madhav, Director, ICAR-NIRCA (CTRI), Rajahmundry, Andhra Pradesh visited Bidi Tobacco Research Station, AAU, Anand on 11th February, 2025, monitored the experimental plots and visited farmers' fields near Anand
- Dr. M. Sheshu Madhav, Project Co-ordinator visited AINPT Centre, Nandyal inspected and monitored the ongoing experiments on 15.02.2025
- The AINPT experiments were monitored at Jeelugumilli centre during field IRC on 25-02-2025 by Director and Principal Investigators

Meetings organized

- The XIII Group Meeting of All India Network Project on Tobacco (AINPT) was held at ICAR-Central Tobacco Research Institute Research Station, Hunsur during 29-30th August, 2024 under the Chairmanship of Dr. T.R. Sharma, DDG (CS), ICAR, New Delhi. The experimental results of 2023-24 were reviewed and also formulated the future technical programme. A total of 113 experiments in different disciplines were conducted and monitored. A total of six publications were released by the Chief Guest, Dr. T.R. Sharma, DDG (Crop Science), New Delhi
- All the scientists associated with AINPT were participated in the XIII AINPT Group Meeting held at ICAR-NIRCA Regional Station, Hunsur on 28th & 29th August 2024 in collaboration with ICAR-NIRCA, Rajahmundry.
- Meeting of the Variety Identification Committee (VIC) for Tobacco was conducted on 29th August, 2024 and the three proposals *viz.*, FCH-2 (CTRI Navya), FCRH-11 (LSTC-9) and NBD-316 were identified for release
- Organized a meeting on revised guidelines for testing tobacco crop varieties under the AINPT on 8th January 2025 under the Chairmanship of Dr. B. C. Viraktamath, Former Project Director, Directorate of Rice Research, Hyderabad at ICAR-NIRCA (CTRI), Rajahmundry

- **Organized virtual meetings in hybrid mode with all the AINPT centres during 2024-25**

S. No.	Date	Topic
1.	20-02-2025	To monitor the crop situation and progress of experiments at different AINPT centres
2.	19-03-2025	Awareness program on PPVFRA registration of Tobacco Varieties
3.	19-03-2025	Sensitization program on latest developments in AINPT.
4.	08-05-2025	Finalization of IVT/IHT and AVT-I/AHT-I entries for FCV tobacco
5.	24-06-2025	Awareness on guideline given by DDG (CS) for conductance of Annual Group Meetings and Workshops of AICRPs/AINPTs
6.	30-07-2025	Finalization of IVT/IHT and AVT-I/AHT-I entries for FCV tobacco

Finance Management

- Prepared and submitted budget proposals (Budget Estimates/ Revised Estimates), for the year 2024-25 and statement on allocation of funds to SAU centres. Also prepared the output-outcome outlay (Annual Plans) of the AINPT and submitted to ICAR
- Created Google sheets for collection and maintenance of information on ‘Budget estimates, demand of funds, expenditure details’ from all the AINPT centres for ready reference
- Fund allocation was made to all the SAU centres on regular intervals as per the remittances by the Council
- Revised EFC Memo for 2021-26 was prepared and submitted to the Council.
- An amount of Rs. 4.95 Lakhs resource was generated through evaluation of entries under IVT/IHT & AVT/AHT of FCV tobacco trials from M/s ITC Limited, ABD –ILTD

Compilation

- A compendium on ‘Golden Jubilee Journey of Indian Network Project on Golden Leaf’ and it was released during XIII Group Meeting
- The proceedings of XIII Group Meeting of AINPT and obtained the Council Approval
- The revised guidelines ‘Compilation of Guidelines for testing tobacco crop varieties under the AINPT’ obtained the approval from the Council
- Compiled the Annual Report of 2024-25

Publications

Sarala, K., S. Kasturi Krishna, L.K. Prasad, K. Rajasekhara Rao, B. Krishna Kumari, S. Flora and M. Sheshu Madhav. 2024. Golden Jubilee Journey of Indian Network Project on Golden Leaf. All India Network Project on Tobacco. ISBN 978-81-968708-0-5. pp 114.

Sheshu Madhav, M., K. Sarala, S. Kasturi Krishna and K. Rajasekhara Rao, L. K. Prasad, B. Krishna Kumari, S. Flora. 2024. All India Network Project on Tobacco Annual Report 2023-24. ICAR-CTRI, Rajahmundry. pp 380.

Sarala, K., J.J. Rajappa, K. Prabhakara Rao and M. Sheshu Madhav. 2024. Genealogy of Indian Flue-cured Virginia and *Bidi* Tobacco Varieties. Technical Bulletin No. 07/2024. ICAR-CTRI, Rajahmundry. pp 43.

Sarala, K., B. Krishna Kumari, S. Flora and M. Sheshu Madhav. 2025. Technical Bulletin 02/2025 – Compilation of Guidelines for Testing Tobacco Crop Varieties under the AINPT. ICAR-NIRCA, Rajahmundry pp 68.

ANNUAL PROGRESS REPORT
(2024-25)

CROP IMPROVEMENT

CROP IMPROVEMENT

A. VFC TOBACCO

COORDINATED EVALUATION OF FCV TOBACCO GENOTYPES

IVT ON VFC TOBACCO

VFRBRC/VFJBRC/ VFGBRC/VFKBRC/ VFHBRC/ VFSBRC 2: INITIAL VARIETAL TRIAL ON FCV TOBACCO

Objectives: To evaluate the FCV tobacco entries for yield and quality at Six centres *viz.,* Rajahmundry, Guntur, Jeelugumilli, Kandukur, Hunsur and Shivamogga along with respective checks.

Year of start **:** 2025-26

Year of Completion **:** 2025-26

FCV tobacco Centres and Investigators

Centres	**:**	**Investigators**
Rajahmundry	:	K. Prabhakara Rao and K. Sarala
Jeelugumilli	:	K. Sarala and K. Prabhakara Rao
Guntur	:	K. Sarala, P. Venkateswarlu and M. V. Jaya Krishna
Kandukur	:	Gangadhara K
Hunsur	:	Nanda C
Shivamogga	:	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.

Design : RBD
Total treatments : 13 + checks as given below
Replications : Three

Entries: 13 (Twelve)

IET-124	IET-127	IET-130	IET-133	IET-136
IET-125	IET-128	IET-131	IET-134	
IET-126	IET-129	IET-132	IET-135	

Checks at different Centres:

Rajahmundry	:	1. Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Jeelugumilli	:	1. Kanchan	2. LT-Kanchan	3.CTRI Naveena	4. CH-3
Kandukur	:	1.Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Guntur	:	1.Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Hunsur	:	1. Kanchan	2. FCH-222	3. CH 3	
Shivamogga	:	1. Thrupthi	2. Kanchan	3. Sahyadri	

Plot size and spacing at the respective centres

Centre	Plot size	Spacing
Rajahmundry	2.8 x 6.3 m	0.7 x 0.7m
Jeelugumilli	2.0 x 12.0 m	1.0 x 0.6 m
Guntur	2.8 x 4.0 m	0.7 x 0.7 m
Kandukur	2.6 x 5.85 m	0.65 x 0.65 m
Hunsur	2.0 × 6.6 m	1.0 × 0.55 m
Shivamogga	6.0 x 3.6 m	0.9 x 0.6 m

RESULTS

In the Initial varietal trial (IVT), twelve entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Tables 1 to 13 IVTVFC TOBACCO. The results are discussed here under centre-wise.

RAJAHMUNDRY

Yield: During the year 2024-25, a total of thirteen entries IET-124, IET-125, IET-126, IET-127, IET-128, IET-129, IET-130, IET-131, IET-132, IET-133, IET-134, IET-135 and IET-136 along with four checks *viz*., Siri, Kanchan, CTRI Sulakshana and CTRI Sreshta were evaluated in IVT trial. Two entries IET-128 (11608 kg/ha, 1905 kg/ha, 1238 kg/ha & 1351 kg/ha) and IET-124 (11340 kg/ha, 1877 kg/ha, 1220 kg/ha & 1332 kg/ha) recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index respectively over the better control CTRI Sulakshana. The two entries showed a percentage increase of 8-10% over the better control CTRI Sulakshana.

Disease /Pest incidence: Incidence of diseases (leaf curl & CMV) was observed under *Natu*ral condition among the entries and checks. Leaf curl incidence was observed in all the entries, with the highest incidence in IET-132 (5.67), followed by IET-131 (4.67) and IET-130 (4.00). Lower leaf curl incidence was observed in IET-124, IET-128 and IET-133 (0.67). CMV incidence was nil in all the entries. Under artificial inoculation with TMV, two entries IET-125 and IET-132 were recorded a resistant reaction, while all remaining entries were susceptible to TMV.

Salient Findings/Achievements:

- Among the thirteen entries evaluated with checks, IET-124 and IET-128 has recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index over the better control CTRI Sulakshana
- Among the thirteen entries with checks, IET-125 and IET-132 along with controls CTRI Sulakshana and CTRI Sreshta has recorded TMV resistant reaction

Conclusion: Based on the results, the entries IET-124 and IET-128 may be promoted to AVT-I for further testing.

JEELUGUMILLI

Yield: The differences among the entries tested for all the three characters viz., green leaf, cured leaf and grade index found to be significant. The tested entries IET-126 & IET-127 recorded significantly higher leaf yields and grade index values than CTRI-Naveena. The entry IET-126 recorded the green leaf yield of15431 kg/ha, cured leaf yield of 2753 kg/ha and grade index values 1730 an improvement of 15%, 18% and 27% over better control, CTRI-Naveena. The entry IET-127 recorded the green leaf yield of 15181 kg/ha, cured leaf yield of 2719 kg/ha and grade index values 1725 an improvement of 13%, 17% and 26% over better control, CTRI-Naveena.

Morphological characterization: The plant height in the tested entries ranged from 127 (IET-133) to 183 (IET -124), internodal length lies between 5-7 cm, total no. of leaves ranges from 23 (IET-124 & IET-128) to 35 (IET-132), leaf length values ranged from 54-74 cm and width from 23-37 cm in various entries. CTRI-Naveena recorded higher leaf length (74 cm) and IET-124 higher leaf width (37 cm) the increasing in yield in IET-125 may be due to increase in leaf number and leaf length and in IET-127 may be due to increase in leaf length.

Disease /Pest incidence: *Natu*ral infestation of insect pests on the genotypes/entries was recorded during 2024-25 (Table-3). The genotype, IET-130 recorded the lowest number of tobacco aphids, *Myzus nicotianae* (2.56 aphids/plant) and the highest in CH-3 (10.22 aphids /plant). The incidence of budworm, *H. armigera*, was recorded highest in CH-3, CTRI-Naveena and IET-128 (3.0 larvae/plant). There was negligible or zero incidence of whitefly *Bemisia tabaci* and *S. litura* on all the genotypes.

Salient findings/Achievements

- Among the 13 entries (IET-124 to IET-136) evaluated along with four control varieties *viz*., Kanchan, LT-Kanchan, CH-3 and CTRI-Naveena, the differences for all the three characters *viz*., green leaf, cured leaf and grade index found to be significant.
- The tested entries IET-126 & IET-127 recorded significantly higher leaf yields and grade index values than CTRI-Naveena and proposed for advancing to AVT trials.

Conclusion: Entries IET-126 & IET-127 are proposed for advancing to AVT trials.

GUNTUR

A Replicated trial was conducted with thirteen entries starting from IET-124 to IET-136 and four local checks *viz*., Siri, Sulakshana, Shresta and Kanchan. The data revealed that treatments differ significantly among them and also with controls. Maximum green leaf (20756 kg/ha), cured leaf (2620 kg/ha), bright leaf (1231 kg/ha) and grade index (2206 kg/ha) were recorded in IET-131 followed by IET-133 (20180, 2501, 1150 & 2089 Kg/ha), IET-124 (19194, 2473, 1116 & 2081 kg/ha) and IET-128 (18932, 2467, 1079 & 2008 Kg/ha). All these four entries were significantly superior over two checks *i.e.,* Siri and Kanchan. However, two entries, IET-131 and IET-133 were significantly superior to all four checks. The remaining nine entries were inferior to above mentioned four entries. There was an increase of 19.06, 31.13, 43.47 and 27.95% in respect of green leaf, cured leaf, bright leaf and grade index, respectively due to IET-131 entry over the standard check, Siri.

Conclusion: Entries IET-131 and IET-133 are promoted to AVT trials.

KANDUKUR

During the year 2024-25, IVT was conducted with the thirteen test entries viz., IET-124, IET-125, IET-126, IET-127, IET-128, IET-129, IET-130, IET-131, IET-132, IET-133, IET-134, IET-135, IET-136 along with four checks viz., SIRI, Kanchan, CTRI Sulakshana and CTRI-Shrestha. None of the tested entries were found significantly superior over the checks with respect to green leaf, cured leaf, bright leaf and grade index. Among the test entries, IET-124 recorded higher plant height followed by IET-132 and IET-136 recorded lowest plant height. No major diseases incidence was noticed in the trial.

Conclusion: None of the tested entries were found significantly superior over the checks

HUNSUR

In the Initial varietal trial (IVT), thirteen entries were evaluated for their yield potential against three checks. Morphological characters like plant height, number of leaves, intermodal length, leaf length and width of 5th, 7th and 9th leaf were recorded. Observations on the *Natu*ral incidence of pest and diseases were recorded. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha.

Yield: Data analysis indicated that four entries *viz*., entries IET-129, IET-133, IET-134 and IET-136 recorded significant superior yields (cured leaf and bright leaf yield and TGE) over varietal checks Kanchan and FCH-222. Entry IET-127 showed significant superiority over the both the varietal checks for cured leaf only while entry IET-124 and IET-135 were significantly superior over check Kanchan for cured leaf yield. However none of the entries tested were superior over the hybrid check CH=3. Percent improvement in cured leaf ranged from 21% (IET-127 & 129) to 27% (IET-134) over better check FCH-222.

Morphological characterization: Observations recorded on plant morphological traits are presented in the Table 8 IVT VFC TOBACCO. Wide variation was observed for most of the traits as depicted in range values.

Salient findings/Achievements

- Entries IET-110 & IET-109 recorded significantly higher cured leaf yield, bright leaf yield and TGE over all the three checks
- Entry IET-107 was found superior to checks Kanchan and FCH 222 in terms of cured leaf yield and TGE
- Three promising entries IET-107, IET-110 & IET-109 were promoted for further evaluation under AVTI
- All the leaf quality parameters *viz*., Nicotine and Reducing sugars were well within the prescribed limits in all the entries tested

Conclusion: The promising entries IET-127 & IET-129 were promoted for further evaluation under AVT

SHIVAMOGGA

Yield: Thirteen test entries were evaluated for green leaf yield (GLY), cured leaf yield (CLY) and top-grade equivalent (TGE) in a replicated trial along with four checks *viz*., Sahyadri, Kanchan, Thrupthi, and CH-3. The test entries, IET-132 (12703, 1648 kg/ha), IET-134 (12567, 1632 kg/ha), IET-128 (12395, 1610 kg/ha), and IET-125 (11676, 1516 kg/ha) were found significantly superior for GLY (kg/ha) and CLY (kg/ha) over the best check variety Sahyadri (10198, 1323 kg/ha), respectively, but none for TGE (kg/ha). Further, IET-132 (24.6%), IET-134 (23.4%), IET-128 (21.7%), and IET-125 (14.6%) recorded increased CLY over the best check Sahyadri. However, other test entries such as IET-127 (11324, 1479 kg/ha), IET-126 (11101, 1436 kg/ha), and IET-124 (10302, 1348 kg/ha) were numerically superior for GLY (kg/ha) and CLY (kg/ha) over best check variety Sahyadri.

Disease /Pest incidence: Under *Natu*ral epiphytotic conditions, the entries were also scored for their response to major diseases like frog-eye leaf spot, black shank, TMV and TLV, and insect pests like *Spodoptera litura* and *Helicoverpa armigera*. The incidence was within comparable limits against checks.

Salient Findings/Achievements:

- Among the thirteen entries and four checks, IET-132, IET-134, IET-128, IET-125, IET-127, IET-126, and IET-124 recorded higher GLY, CLY and TGE over the checks
- IET-132 (1648 kg/ha, 24.6%), IET-134 (1632 kg/ha, 23.4%), IET-128 (1610 kg/ha, 21.7%), and IET-125 (1516 kg/ha, 14.6%) recorded higher CLY over the best check Sahyadri (1323 kg/ha)

Conclusion: Entries *viz*., IET-125, IET-128, IET-132, IET-134 may be promoted to Advanced Varietal Trial.

Recommendation for AVT-I: The entrires IET-124, IET-125, IET-126, IET-127, IET-128, IET-131, IET-132 & IET-134 will be assessed in Advanced Varietal Trial-I.

Table 1 IVT VFC TOBACCO: Green leaf yield (kg/ha) in IVT at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
IET-124	11340 (10.6)*	10292	19194	13898	12543*	10302
IET-125	9090	11069	17523	9282	9255	11676*
IET-126	9249	15431*(15)	16590	12450	10645	11101
IET-127	10244	15181* (13)	17302	14281	15159*	11324
IET-128	11608 (13.2)*	8764	18932	12834	6548	12395*
IET-129	9008	9708	17225	11732	13116*	6599
IET-130	10688	10917	18303	11873	9028	9556
IET-131	9462	9083	20756	10006	8212	9161
IET-132	9078	10792	18176	13978	7578	12703*
IET-133	9337	8972	20180	12448	12391*	6431
IET-134	9273	12347	18913	12781	15697*#	12567*
IET-135	9950	12375	17387	11041	15550*#	9335
IET-136	9342	10236	16111	11583	14323*	9336
Siri (C)	10226	-	16798	14000	-	-
CTRI Shresta (C)	10174	-	17791	15118	-	-
CTRI Sulakshana (C)	10254	-	17691	16672	-	-
Sahyadri (C)	-	-	-	-	-	10198
Kanchan (C)	9843	10736	16090	9837	10015	7659
CH-3 (C)	-	12292	-	-	14028	7444
Thrupthi (C)	-	-	-	-		6703
FCH 222 (C)	-	-	-	-	13088	-
LT-Kanchan (C)	-	10056	-	-	-	-
CH-1 (C)	-		-	-	-	-
CTRI Naveena (C)	-	13389	-	-	-	-
G. Mean	9892	11273	-	12577	-	-
S. Em±	376	508	635	581	722	394.7
C.D. at 5%	1068	1409	1761	1653	2085	1137
C.V. (%)	6.6	7.81	6.14	9	10.69	7.06

**Significant at 5%*

Table 2 IVT VFC TOBACCO: Cured Leaf yield (kg/ha) in IVT at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
IET-124	1877 (8.9)*	1722	2473	1938	1667*	1348
IET-125	1485	1951	2274	2087	1389	1516* (14.6%)
IET-126	1508	2753* (18)	2130	2289	1447	1436
IET-127	1737	2719* (17)	2210	2779	1932*$ (21)	1479
IET-128	1905 (10.5)*	1438	2467	2496	1328	1610* (21.7%)
IET-129	1495	1700	2151	2155	1927*$ (21)	857
IET-130	1781	1896	2280	1901	1311	1246
IET-131	1586	1689	2620	1991	1384	1186
IET-132	1485	1975	2262	2314	1051	1648* (24.6%)
IET-133	1491	1510	2501	2263	1972*$ (24)	835
IET-134	1524	1899	2346	2223	2028*$ (27)	1632* (23.4%)
IET-135	1518	2299	2171	1856	1796*	1210
IET-136	1460	2088	2090	2085	1990*$ (25)	1217
Siri (C)	1704	-	1998	2435	-	-
CTRI Shresta (C)	1696	-	2203	2433	-	-
CTRI Sulakshana (C)	1724	-	2008	2352	-	-
Sahyadri (C)	-	-	-	-	-	1323
Kanchan (C)	1617	2138	1952	1604	1237	1004
Thrupthi (C)	-	-	-	-		966
CH-3 (C)	-	2231	-	-	1871	871
FCH 222 (C)	-	-	-	-	1593	-
LT-Kanchan (C)	-	1926	-	-	-	-
CTRI Naveena (C)	-	2325	-	-	-	-
CH-1 (C)	-	-	-	-	-	-
G. Mean	1623	2015	-	2188	-	-
S. Em±	52.8	141	127	130	99	64.99
C.D. at 5%	149.8	390	352	370	287	187
C.V. (%)	5.6	12.10	9.83	12	10.62	8.95

**Significant at 5%*

Table 3 IVT VFC TOBACCO: Bright Leaf yield (kg/ha) in IVT at different centres (2024-25)

Entries	Rajahmundry	Guntur	Kandukur	Hunsur
IET-124	1220 (9.5)*	1116	1152	368
IET-125	965	712	1094	260
IET-126	980	833	1028	489
IET-127	1121	788	1102	559
IET-128	1238 (11.1)*	1079	1418	215
IET-129	972	694	1142	731*$
IET-130	1158	688	1147	260
IET-131	1031	1231	1203	208
IET-132	965	1008	1426	225
IET-133	948	1150	1191	634*$
IET-134	966	1046	1146	825*$
IET-135	987	729	948	790*$
IET-136	904	734	980	1164*$#
Siri (C)	1097	858	1470	-
CTRI Shresta (C)	1097	1034	1360	-
CTRI Sulakshana (C)	1114	900	1257	-
Kanchan (C)	1040	801	775	450
FCH 222 (C)	-	-	-	516
CH-3 (C)	-	-	-	766
G. Mean	1047.0	-	1167	-
S. Em±	35.3	77	75.4	42
C.D. at 5%	100.3	214	214	120
C.V. (%)	5.8	14.78	13	13.67

**Significant at 5%*

Table 4 IVT VFC TOBACCO: Grade index/ TGE (kg/ha) in IVT at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
IET-124	1332 (10.1)*	972	2081	1291	591	1128
IET-125	1040	1114	1896	1318	429	1231
IET-126	1056	1730* (27)	1736	1429	761	1139
IET-127	1198	1725* (26)	1783	1622	935*	1142
IET-128	1351 (11.7)*	858	2008	1696	468	1292
IET-129	1196	1130	1721	1446	1067*$	683
IET-130	1158	1163	1815	1319	401	1001
IET-131	1198	999	2206	1367	440	955
IET-132	1163	1201	1864	1654	418	1319
IET-133	894	1046	2089	1488	956*	617
IET-134	914	1263	1938	1433	1143*$	1274
IET-135	911	1365	1743	1210	1109*$	992
IET-136	876	1101	1670	1305	1127*$	960
Siri (C)	1191	-	1724	1673	-	-
CTRI Shresta (C)	1202	-	1794	1597	-	-
CTRI Sulakshana (C)	1210	-	1590	1492	-	-
Sahyadri (C)	-	-	-	-	-	1106
Kanchan (C)	970	1148	1579	1000	690	724
CH-3 (C)	-	1370	-	-	1106	740
Thrupthi (C)	-	-	-	-	-	718
FCH 222 (C)	-	-	-	-	877	-
LT-Kanchan (C)	-	1115	-	-	-	-
CTRI-Naveena (C)	-	1367	-	-	-	-
CH-1 (C)	-	-	-	-	-	-
G. Mean	1109.5	1216	-	1432	-	-
S. Em±	42.1	66	117	77.2	62	84.4
C.D. at 5%	119.7	183	325	220	180	243
C.V. (%)	6.5	9.38	11.07	11	13.78	14.6

**Significant at 5%*

Table 5 IVT VFC TOBACCO: Morphological characters of the entries of IVT at Rajahmundry (2024-25)

Entries	Plant Height (cm)	Internodal length (cm)	Number of leaves	Leaf Length (cm)	Leaf Width (cm)
IET-124	154.6	4.2	32.0	58.2	27.6
IET-125	146.8	4.1	28.0	54.0	28.6
IET-126	179.0	3.9	35.0	56.2	28.0
IET-127	125.6	3.7	25.0	58.4	26.0
IET-128	172.0	5.0	33.0	54.6	26.8
IET-129	123.4	3.5	27.0	51.6	27.0
IET-130	150.6	3.3	29.0	55.2	27.6
IET-131	173.8	5.7	31.0	59.0	25.0
IET-132	164.4	3.9	31.0	54.0	25.6
IET-133	136.8	3.7	28.0	49.4	24.2
IET-134	137.4	2.8	26.0	52.2	24.8
IET-135	137.0	3.7	34.0	54.0	24.2
IET-136	149.0	4.2	25.0	56.2	30.0
Siri (C)	179.0	3.9	36.0	53.4	30.0
CTRI Sulakshana (C)	186.4	5.6	36.0	60.2	38.0
CTRI Sreshta (C)	180.6	4.5	39.0	55.8	26.4
Kanchan (C)	140.4	3.4	32.0	58.0	25.8

Table 6 IVT VFC TOBACCO: Morphological characters of the entries of IVT at Jeelugumilli (2024-25)

Entries	Plant height (cm)	Inter-nodal length (cm)	Number of leaves	Leaf length(cm)	Leaf width (cm)
IET-124	183	5	23	72	37
IET-125	161	7	25	63	36
IET-126	130	5	34	68	23
IET-127	148	6	29	68	25
IET-128	158	7	23	62	33
IET-129	133	6	25	61	30
IET-130	158	7	29	65	23
IET-131	143	6	25	54	25
IET-132	158	7	35	65	28
IET-133	127	5	29	55	23
IET-134	155	6	31	66	29
IET-135	152	7	26	67	32
IET-136	156	6	28	64	32
Kanchan (C)	146	6	30	62	25
LT-Kanchan (C)	152	5	31	66	23.5
CH-3 (C)	151	6	25	66	29
CTRI Naveena (C)	159	7	28	74	33

Table 7 IVT VFC TOBACCO: Morphological characters of the entries of IVT at Kandukur (2024-25)

Entries	Plant height (cm)	No. of leaves	Internodal length (cm)	Leaf length (cm)	Leaf width (cm)
IET-124	157.5	28.5	4.3	34.4	14.5
IET-125	138.0	27.3	3.0	35.3	18.0
IET-126	140.5	42.8	2.3	43.3	15.5
IET-127	131.8	36.3	2.6	42.6	16.3
IET-128	137.0	29.8	3.5	34.8	15.6
IET-129	121.0	24.8	2.3	45.1	21.9
IET-130	143.8	32.5	3.3	42.6	17.6
IET-131	146.5	32.5	4.3	37.8	16.4
IET-132	152.5	36.0	3.0	46.0	18.3
IET-133	126.5	30.0	2.6	31.3	26.6
IET-134	114.3	31.5	2.5	32.0	30.8
IET-135	110.0	27.0	2.8	29.6	28.6
IET-136	106.5	28.3	3.0	31.4	29.6
Siri (C)	145.8	31.5	3.8	36.9	16.8
CTRI Shresta (C)	142.0	28.3	4.3	28.1	26.5
CTRI Sulakshana (C)	137.0	30.5	4.0	36.3	15.0
Kanchan (C)	113.8	29.8	3.0	42.8	19.6
Min	106.5	24.8	2.3	28.1	14.5
Max	157.5	42.8	4.3	46.0	30.8
Mean	133.1	31.3	3.2	37.1	20.7

Table 8 IVT VFC TOBACCO: Morphological characters of the entries of IVT at Hunsur (2024-25)

Entries	Plant height (cm)	No. of leaves	Internodal length (cm)	5th leaf length (cm)	5th leaf width (cm)	7th leaf length (cm)	7th leaf width (cm)	9th leaf length (cm)	9th leaf width (cm)
IET 124	70.0	21.4	3.3	36.8	25.1	41.3	25.9	40.7	26.8
IET 125	112.4	28.6	3.9	51.9	33.0	53.2	34.2	58.0	36.6
IET 126	48.6	17.0	2.9	39.2	18.6	47.6	41.1	48.6	25.9
IET 127	59.9	20.0	3.0	38.3	26.3	45.1	28.9	50.1	30.4
IET 128	44.6	15.8	2.8	43.3	25.8	43.2	26.8	44.6	26.3
IET 129	95.4	28.0	3.4	46.8	29.9	49.9	31.9	51.1	31.4
IET 130	30.0	12.6	2.4	40.8	24.1	46.0	26.9	50.2	27.0
IET 131	50.0	11.0	4.5	43.8	29.4	47.4	30.9	52.4	31.9
IET 132	65.4	19.0	3.4	52.8	28.0	52.9	30.7	55.5	27.4
IET 133	85.3	28.0	3.0	42.9	26.9	50.3	30.4	50.1	31.3
IET 134	78.2	24.8	3.2	51.6	31.2	56.8	34.9	56.5	32.0
IET 135	61.9	20.6	3.0	44.1	29.4	42.3	28.9	48.5	33.4
IET 136	89.3	26.4	3.4	40.7	31.4	46.4	29.2	53.8	28.0
Kanchan (C)	55.4	22.0	2.5	48.1	30.2	56.6	35.3	51.8	31.5
FCH 222 (C)	75.9	19.8	3.8	46.6	31.4	46.5	30.2	56.0	32.8
CH-3 (C)	86.6	27.4	3.2	42.5	27.2	49.1	26.8	49.1	30.0
S. Em±	5.37	1.38	0.13	1.22	0.89	1.17	1.00	1.12	0.75
Minimum	30.00	11.00	2.38	36.78	18.64	41.28	25.86	40.74	25.92
Maximum	112.40	28.60	4.55	52.84	32.98	56.84	41.14	58.00	36.56

Table 9 IVT VFC TOBACCO: Incidence of pest and diseases in the entries of IVT at Rajahmundry (2024-25)

Entries	*Natu*ral Condition (Mean No. of plants infected / plot (36 plants)		Artificial Inoculation With TMV (Reaction*)
	Leaf Curl	CMV	
IET-124	0.67	0.00	S
IET-125	4.00	0.00	R
IET-126	1.67	0.00	S
IET-127	1.67	0.00	S
IET-128	0.67	0.00	S
IET-129	1.33	0.00	S
IET-130	4.00	0.00	S
IET-131	4.67	0.00	S
IET-132	5.67	0.00	R
IET-133	0.67	0.00	S
IET-134	2.33	0.00	S
IET-135	2.33	0.00	S
IET-136	4.33	0.00	S
Kanchan (C)	4.67	0.00	S
Siri (C)	2.33	0.00	S
CTRI Sulakshana (C)	2.33	0.00	R
CTRI Sreshta (C)	1.00	0.00	R

** R: Resistance;* *S: Susceptible*

Table 10 IVT VFC TOBACCO: *Natu*ral incidence of diseases and pests in IVT entries at Jeelugumilli ((2024-25)

Entries	Pest (Av. No. /plant)			
	Aphids	Whiteflies	*S. litura*	*H. armigera*
IET-124	4.56	0	0	0
IET-125	3.78	0	0	1
IET-126	3.78	0	0	0
IET-127	5.33	0	1	0
IET-128	9.56	0	0	3
IET-129	4.56	0	0	0
IET-130	2.56	0	0	2
IET-131	4.56	0	0	0
IET-132	3.11	0	0	0
IET-133	4.44	0	0	1
IET-134	6.78	0	0	0
IET-135	9.89	0	0	0
IET-136	4.66	0	0	2
Kanchan (C)	5.78	0	0	1
LT-Kanchan (C)	3.11	0	0	0
CH-3 (C)	10.22	0	0	3
CTRI-Naveena (C)	3.00	0	0	3

Table 11 IVT VFC TOBACCO: Incidence of pest and diseases in the entries of IVT at Hunsur (2024-25)

Entries	Disease data			
	TMV	Black shank	LC	RKI
IET 124	-	10	1	1.0
IET 125	6	10	-	1.0
IET 126	1	1	-	1.0
IET 127	2	6	-	1.0
IET 128	-	12	-	1.0
IET 129	-	-	-	1.3
IET 130	-	13	-	1.3
IET 131	9	4	1	1.0
IET 132	6	7	-	1.0
IET 133	1	-	1	1.3
IET 134	1	-	1	3.0
IET 135	-	2	-	1.3
IET 136	-	-	2	1.3
Kanchan (C)	1	4	-	1.3
FCH 222 (C)	-	1	1	1.0
CH-3 (C)	-	-	1	1.0

Table 12 IVT VFC TOBACCO: Incidence of pest and diseases in the entries of IVT at Shivamogga (2024-25)

Entries	Diseases				Insect pests	
	FLS	BS	TMV	ToLV	SPOD	HEL
IET-124	0.67	0.00	0.00	4.84	0.00	1.00
IET-125	1.33	2.56	0.00	6.41	1.67	3.00
IET-126	1.00	0.00	0.00	2.22	0.67	2.33
IET-127	0.67	0.00	0.00	7.69	1.00	0.00
IET-128	1.00	0.00	0.00	4.84	1.00	3.00
IET-129	1.00	0.00	0.00	1.18	1.33	4.67
IET-130	1.00	0.00	2.17	6.52	1.00	4.67
IET-131	1.00	2.50	0.00	5.00	2.67	4.00
IET-132	0.67	0.00	1.23	4.94	0.67	2.00
IET-133	1.00	0.00	0.00	4.71	0.67	4.00
IET-134	1.00	0.00	1.22	4.88	0.33	2.33
IET-135	1.00	0.00	0.00	2.02	0.33	5.67
IET-136	1.00	0.00	0.00	2.78	3.00	5.67
Sahyadri (C)	1.00	0.00	0.00	13.33	0.33	3.00
Kanchan (C)	1.00	0.00	0.00	2.91	0.00	8.67
CH-3 (C)	1.00	0.00	0.00	7.32	0.00	5.67
Thrupthi (C)	1.00	0.96	0.00	0.96	1.33	4.33

Table 13 IVT VFC TOBACCO: Quality parameters of the entries of IVT at Hunsur (2024-25)

Entries	Nicotine		R. Sugars	
	X	L	X	L
IET-124	1.23	1.13	8.18	10.06
IET-125	1.66	0.86	8.69	9.44
IET-126	1.31	0.96	8.05	7.23
IET-127	0.96	0.89	10.00	12.89
IET-128	1.26	1.09	9.40	7.46
IET-129	1.24	0.85	3.93	8.53
IET-130	1.34	0.77	8.87	9.64
IET-131	1.31	0.97	8.23	9.47
IET-132	1.41	0.99	7.82	9.23
IET-133	1.24	0.76	10.13	9.18
IET-134	1.29	0.80	10.74	10.46
IET-135	1.25	0.93	10.48	10.66
IET-136	1.27	0.62	11.65	10.47
Kanchan (C)	1.36	0.96	11.07	11.41
FCH 222 (C)	1.05	0.94	9.84	9.91
CH-3 (C)	1.48	0.93	8.46	10.01

COORDINATED EVALUATION OF FCV TOBACCO GENOTYPES

AVT-I ON VFC TOBACCO

VFRBRC/VFJBRC/ VFGBRC/VFKBRC/ VFHBRC/ VFSBRC 1.1: ADVANCED VARIETAL TRIAL-I ON FCV TOBACCO

Objectives: To evaluate the FCV tobacco entries for yield and quality at Six centres *viz.,* Rajahmundry, Guntur, Jeelugumilli, Kandukur, Hunsur and Shivamogga along with respective checks.

Year of start : 2025-26
Year of Completion : 2025-26

FCV tobacco Centres and Investigators

Centres	:	Investigators
Rajahmundry	:	K. Prabhakara Rao and K. Sarala
Jeelugumilli	:	K. Sarala and K. Prabhakara Rao
Guntur	:	K. Sarala, P. Venkateswarlu and M. V. Jaya Krishna
Kandukur	:	Gangadhara K
Hunsur	:	Nanda C
Shivamogga	:	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.

Design : RBD
Replications : Three

Entries: 13 (Twelve)

FCR-71	IET-101	IET-104	IET-110
FCR-72	IET-102	IET-107	
FCR-73	IET-103	IET-109	

Checks at different Centres:

Rajahmundry	:	1. Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Jeelugumilli	:	1. Kanchan	2. LT-Kanchan	3.CTRI Naveena	4. CH-3
Kandukur	:	1.Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Guntur	:	1.Siri	2. CTRI Sulakshana	3. CTRI Sreshta	4. Kanchan
Hunsur	:	1. Kanchan	2. FCH-222	3. CH-3	
Shivamogga	:	1. Thrupthi	2. Kanchan	3. Sahyadri	4. CH-3

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Rajahmundry	2.8 x 6.3 m	0.7 x 0.7m
Jeelugumilli	2.0 x 12.0 m	1.0 x 0.6 m
Guntur	2.8 x 5.6 m	0.7 x 0.7 m
Kandukur	2.6 x 5.85 m	0.65 x 0.65 m
Hunsur	2.0 × 6.6 m	1.0 × 0.55 m
Shivamogga	6.0 x 3.6 m	0.9 x 0.6 m

RESULTS

In the Advanced varietal trial-I (AVT-I), ten entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Tables 1 to 16 IVTVFC TOBACCO. The results are discussed here under centre-wise.

RAJAHMUNDRY

Yield: Ten entries FCR-71, FCR-72, FCR-73, IET-101, IET-102, IET-103, IET-104, IET-107, IET-109 and IET-110 along with four checks *viz.*, Siri, Kanchan, CTRI-Sulakshana and CTRI-Sreshta were evaluated in AVT-I trial. Two entries FCR-71 (11145 kg/ha, 1855 kg/ha, 1296 kg/ha &1294 kg/ha) and FCR-73 (11211 kg/ha, 1863 kg/ha, 1306 kg/ha &1298 kg/ha) recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index respectively over the better control CTRI Sulakshana. The three entries showed a percentage increase of 8-10 % over the better control CTRI Sulakshana.

Disease /Pest incidence: Incidence of diseases (leaf curl & CMV) was observed under *Natu*ral condition among the entries and checks. Leaf curl incidence was recorded in all the entries, with the highest incidence observed in IET-101, IET-102 and IET-109 (3.00). Lower leaf curl incidence was observed in FCR-72 (0.67). CMV incidence was nil in all the entries. Under artificial inoculation with TMV, five entries FCR-71, FCR-72, FCR-73, IET-101 and IET-102 recorded a resistant reaction, while all remaining entries were susceptible to TMV.

Salient Findings/Achievements

- Among the ten entries with checks, FCR-71 and FCR-73 has recorded significantly superior green leaf yield, cured leaf yield, bright leaf yield and grade index over the better control CTRI Sulakshana
- Among the ten entries with checks, FCR-71, FCR-72, FCR-73, IET-101 and IET-102 along with controls CTRI Sulakshana and CTRI Sreshta has recorded TMV resistant reaction

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

JEELUGUMILLI

Yield: A trial was conducted with 10 entries FCR-71,FCR-72, FCR-73, IET-101, IET-102, IET-103, IET-104, IET-107, IET-109, IET-110 along with four control varieties viz., Kanchan, LT-Kanchan, CH-3 and CTRI-Naveena. The differences among the entries tested for all the three characters viz., green leaf, cured leaf and grade index found to be significant. None of the entries recorded significantly higher leaf yields and grade index values than the better control, CTRI Naveena. The entry IET- 107 recorded numerically higher green leaf (17139 kg/ha), cured leaf (2988 kg/ha) and grade index (1807) thancontrol, CTRI Naveena.

Morphological characterization: The plant height in the tested entries ranged from 103 (LT-Kanchan) to 209 (FCR -71), internodal length lies between 4-8 cm, total no. of leaves ranges from 23 (IET-110) to 32 (CTRI Naveena), leaf length values ranged from 58-69 cm and width from 22-38 cm in various entries. LT- Kanchan and FCR-71 recorded higher leaf length (69 cm) and FCR-71 higher leaf width (38 cm).

Disease/Pest incidence: *Natu*ral infestation of insect pests on the genotypes/entries was recorded during 2024-25. The genotype IET-102 recorded the lowest number of tobacco aphids *Myzus nicotianae* (2.44 aphids/plant) and the highest in IET-104 (10.11 aphids/plant). The incidence of budworm, *H. armigera*, however, was recorded highest in IET-109 (3.0 larvae/plant). There was no incidence of *S. litura* or *B. tabaci* on all these genotypes.

Chemical quality: The chemical quality parameters viz., nicotine and reducing sugars and chlorides of tested entries in both 'X' and 'L' positions are comparable to controls and are in acceptable limits.

Salient findings/Achievements

- The differences among the entries tested for all the three characters viz., green leaf, cured leaf and grade index found to be significant
- The entry IET- 107 recorded numerically higher green leaf (17139 kg/ha), cured leaf (2988 kg/ha) and grade index (1807) than control, CTRI Naveena and none of the entry found significantly superior to controls

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

GUNTUR

Yield: Ten entries *viz*., IET-101, 102, 103, 104, 107, 109, 110, FCR-71, 72 & 73 were evaluated in replicated trial for their yield and quality. Among these, the performance of IET-103 and IET-109 was significantly superior to three checks viz, Siri, Sulakshana and Kanchan. Although these two lines gave more yields than the better check, Shresta but, statistically non significant. Maximum green leaf of 19275 kg/ha, cured leaf of 2616 kg/ha, bright leaf of 1675 kg/ha and grade index of 2385 kg/ha was recorded in IET-103. There was an increase of 10.99, 33.94, 36.40 and 25.52% in respect of green leaf, cured leaf, bright leaf and grade index, respectively due to IET-103 entry over the check, Siri.

Chemical quality: The data on chemical quality parameters nicotine, reducing sugars and chlorides were within the acceptable limits in all the lines including four checks. Nicotine ranged from 1.08 to 2.91%, reducing sugars ranged from 6.12 to 14.63% and chlorides ranged from 0.31 to 0.90% in these ten lines and checks.

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

KANDUKUR

A total of ten test entries *viz*., FCR-71, FCR-73, FCR-72, IET-101, IET-102, IET-103, IET-104, IET-107, IET-109 and IET-110 were evaluated along with four checks *viz*., siri, Kanchan, CTRI-Sulakshana and CTRI-Shrestha during 2024-25. None of the tested entries were found significantly superior over the checks with respect to green leaf, cured leaf, bright leaf and grade index. CTRI-Shrestha recorded highest plant highest and Kanchan recorded lowest plant height. Entry IET-109 recorded highest leaf length and leaf width.

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

HUNSUR

In Advanced Varietal Trial-I, three entries IET-107, IET-109 and IET-110 were evaluated against checks (Kanchan, FCH-222 and CH3) in a RBD trial with four replications. Morphological characters like plant height, number of leaves, intermodal length, leaf length and width of 5th, 7th and 9th leaf were recorded. Observations on the *Natur*al incidence of pest and diseases were recorded. Cured leaf quality parameters (Nicotine, Reducing sugars and Chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha.

Yield: Data analysis indicated that the IET 109 recorded significantly high yield and was superior to all the three checks in terms of all the four yield parameters with 24% increment in cured leaf yield and 44% increment in bright leaf yield. Entry IET 107 was superior to all the three checks for cured leaf yield while the entry IET 110 recorded significant yield over check Kanchan only.

Morphological characterization: Observations recorded on plant morphological traits are presented in the Table 8 AVT-I VFC TOBACCO. Variation was observed for plant height, number of leaves and internode length among the entries tested. No major incidence of pest and diseases during the season

Salient Findings/Achievements

- Entries IET-107 and IET-109 recorded significant higher cured leaf yield over all the three checks
- Leaf quality parameters such as Nicotine and Reducing sugars were well within the prescribed limits in all the entries tested

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

SHIVAMOGGA

Yield: Five test entries were evaluated for green leaf yield (GLY), cured leaf yield (CLY) and top-grade equivalent (TGE) in a replicated trial along with five checks *viz*., FCS-4, Sahyadri, Kanchan, Thrupthi, and CH-3. The test entries IET-104 (15037 kg/ha) and IET-103 (14091 kg/ha) were found significantly superior for GLY (kg/ha) over the best check FCS-4 (12412 kg/ha). Only IET-104 (1986 kg/ha) recorded significantly superior CLY (kg/ha) (23.5% higher) compared to best check FCS-4 (1608 kg/ha). However, none of the test entries were significantly superior for TGE (kg/ha) compared to best check FCS-4. IET-104 (15037, 1986, 1588 kg/ha), IET-103 (14091, 1807, 1440 kg/ha), and IET-102 (13470, 1730, 1383 kg/ha) recorded numerically superior GLY, CLY and TGE compared to best check FCS-4 (12412, 1608, 1287 kg/ha) and can be promoted to AVT/AHT-II for further testing.

Disease /Pest incidence: Under *Natur*al epiphytotic conditions, the entries were also scored for their response to major diseases like frog-eye leaf spot, black shank, TMV and ToLV, and insect pests like *S.litura* and *H.armigera*. The incidence was within comparable limits against checks.

Salient Findings/Achievements:

- Among the five entries and five checks, IET-104, IET-103, and IET-102 recorded higher GLY, CLY and TGE over the checks
- IET-104 (1986 kg/ha) recorded significantly superior CLY (kg/ha) (23.5% higher) compared to best check FCS-4 (1608 kg/ha)

Conclusion: All the entries evaluated under AVT-I will be assessed in AVT-II.

Recommendation for AVT-II: The AVT-I trial will be evaluated under AVT-II at all the centres.

Table 1 AVT-I VFC TOBACCO: Green leaf yield (kg/ha) in AVT-I at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
FCR-71	11145 (9.6)*	11847	17213	13408	-	
FCR-72	9077	10958	18628	9447	-	11945
FCR-73	11211 (10.3)*	13389	18642	9157	-	10746
IET-101	9155	13450	17385	12025	-	-
IET-102	9786	10722	17295	10567	-	13470
IET-103	9757	10806	19275	10905	-	14091*
IET-104	10612	12444	18579	12153	-	15037*
IET-107	9474	17139	17557	10261	17038*	-
IET-109	10287	15278	19148	11621	17531*	-
IET-110	9214	12375	17181	10713	14079*	-
FCS-4	-	-	-	-	-	12412
Siri (C)	9958	-	17365	12338	-	-
CTRI Shresta (C)	10035	-	18354	14786	-	-
CTRI Sulakshana (C)	10167	-	15920	14803	-	-
Kanchan (C)	9485	13250	17013	10813	10538	10537
Sahyadri (C)	-	-	-	-		8989
CH-3 (C)	-	11944	-	-	14403	7444
Thrupthi (C)	-	-	-	-		11921
FCH 222 (C)	-	-	-	-	15382	-
LT-Kanchan (C)	-	13194	-	-	-	-
CH-1 (C)	-	-	-	-	-	-
CTRI Naveena (C)	-	16417	-	-	-	-
G. Mean	9954.5	13090	-	11643	-	-
S. Em±	332.1	798	620	560	650	484.2
C.D. at 5%	948.5	2320	1803	1604	1960	1439
C.V. (%)	5.78	10.56	7.03	9.6	8.77	7.19

**Significant at 5%*

Table 2 AVT-I VFC TOBACCO: Cured Leaf yield (kg/ha) in AVT-I at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
FCR-71	1855 (9.0)*	1811	1981	2221	-	-
FCR-72	1502	1897	2491	1462	-	1580
FCR-73	1863 (9.5)*	2278	2417	1898	-	1381
IET-101	1520	2343	2363	1900	-	-
IET-102	1581	1901	2270	1938	-	1730
IET-103	1614	1819	2616	1630	-	1807
IET-104	1769	2083	2401	1801	-	1986* (23.5%)
IET-107	1551	2988	2142	1692	2114* (15)	-
IET-109	1704	2582	2514	2287	2270* (24)	-
IET-110	1477	2163	2134	1810	1732*	-
FCS-4	-	-	-	-	-	-
Siri (C)	1663	-	1953	2155	-	-
CTRI Shresta (C)	1681	-	2370	2298	-	-
CTRI Sulakshana (C)	1701	-	1666	2357	-	-
Kanchan (C)	1586	2356	1837	1822	1439	1367
Sahyadri (C)	-	-	-	-		1237
CH-3 (C)	-	2118	-	-	1835	966
Thrupthi (C)	-	-	-	-		1581
FCH 222 (C)	-		-	-	1836	-
LT-Kanchan (C)	-	2354	-	-	-	-
CH-1 (C)	-	-	-	-	-	-
CTRI Naveena (C)	-	2867	-	-	-	-
G. Mean	1647.7	2254	-	1948	-	-
S. Em±	52.9	142	136	104	86	101.6
C.D. at 5%	151.1	413	395	298	259	302
C.V. (%)	5.56	10.92	10.59	10.7	358	11.55

**Significant at 5%*

Table 3 AVT-I VFC TOBACCO: Bright Leaf yield (kg/ha) in AVT-I at different centres (2024-25)

Entries	**Rajahmundry**	**Guntur**	**Kandukur**	**Hunsur**
FCR-71	1296 (9.0)*	1183	1404	-
FCR-72	1008	**1420**	1104	-
FCR-73	1306 (9.9)*	**1375**	1097	-
IET-101	1064	1305	1279	-
IET-102	1104	1241	1237	-
IET-103	1130	**1675**	1210	-
IET-104	1238	1341	1084	-
IET-107	1017	1239	969	634*
IET-109	1175	**1479**	1121	814* (44)
IET-110	972	1179	772	569*
Siri (C)	1164	1228	1384	-
CTRI Shresta (C)	1177	1364	1379	-
CTRI Sulakshana (C)	1188	1112	1357	-
Kanchan (C)	1110	1060	710	429
Sahyadri (C)	-	-	-	-
CH-3 (C)	-	-	-	565
Thrupthi (C)	-	-	-	-
FCH 222 (C)	-	-	-	550
LT-Kanchan (C)	-	-	-	-
CH-1 (C)	-	-	-	-
CTRI Naveena (C)	-	-	-	-
G. Mean	1139.7	-	1151	-
S. Em±	33.7	78	80	35
C.D. at 5%	96.3	227	230	105
C.V. (%)	5.10	10.48	14.0	11.78

**Significant at 5%*

Table 4 AVT-I VFC TOBACCO: Grade index/ TGE (kg/ha) in AVT-I at different centres (2024-25)

Entries	Rajahmundry	Jeelugumilli	Guntur	Kandukur	Hunsur	Shivamogga
FCR-71	1294 (8.6)*	1177	1885	1579	-	-
FCR-72	1003	1173	2232	1118	-	1269
FCR-73	1298 (8.9)*	1647	2183	1230	-	1105
IET-101	991	1433	2164	1340	-	-
IET-102	1028	1308	1996	1394	-	1383
IET-103	1049	1000	2385	1279	-	1440
IET-104	1150	1234	1979	1249	-	1588
IET-107	1008	1807	1998	1167	1108*	-
IET-109	1121	1475	2329	1500	1236*(26)	-
IET-110	981	1252	1877	1039	961*	-
FCS-4	-	-	-	-	-	1287
Siri (C)	1152	-	1900	1555	-	-
CTRI Shresta (C)	1156	-	2172	1580	-	-
CTRI Sulakshana (C)	1191	-	1613	1585	-	-
Kanchan (C)	967	1395	1843	1036	718	1095
Sahyadri (C)	-	-	-	-		972
CH-3 (C)	-	1249	-	-	950	740
Thrupthi (C)	-	-	-	-		1256
FCH 222 (C)	-	-	-	-	984	-
LT-Kanchan (C)	-	1400	-	-	-	-
CTRI Naveena (C)	-	1694	-	-	-	-
G. Mean	1099.2	1375	-	1332	-	-
S. Em±	35.7	87	141	83	57	102.3
C.D. at 5%	102.0	254	411	237	172	304
C.V. (%)	5.63	11.00	12.00	12.4	11.53	14.61

**Significant at 5%*

Table 5 AVT-I VFC TOBACCO: Morphological characters of the entries of AVT-I at Rajahmundry (2024-25)

Entries	Plant Height (cm)	Internodal length (cm)	Number of leaves	Leaf Length (cm)	Leaf Width (cm)
FCR-71	184.0	3.9	33.0	61.4	32.8
FCR-72	192.4	4.9	32.0	56.4	29.0
FCR-73	167.4	4.5	32.0	52.8	28.0
IET-101	177.0	5.1	30.0	62.6	31.4
IET-102	176.0	5.0	31.0	55.2	30.0
IET-103	196.4	5.4	33.0	56.6	27.4
IET-104	166.6	5.7	30.0	60.0	32.8
IET-107	161.2	4.6	33.0	59.2	26.8
IET-109	172.2	5.3	31.0	60.2	29.6
IET-110	133.6	3.4	28.0	52.4	23.2
Siri (C)	166.9	5.1	30.0	56.0	30.0
CTRI Sulakshana (C)	164.0	4.0	31.0	70.4	33.8
CTRI Sreshta (C)	183.0	3.9	30.0	67.6	30.8
Kanchan (C)	144.0	4.9	31.0	52.0	22.2

Table 6 AVT-I VFC TOBACCO: Morphological characters of the entries of AVT-I at Jeelugumilli (2024-25)

Entries	Plant height (cm)	Inter-nodal length (cm)	Number of leaves	Leaf length (cm)	Leaf width (cm)
FCR-71	209	8	28	69	38
FCR-72	197	8	29	67	33
FCR-73	176	7	28	65	29
IET-101	183	6	28	64	31
IET-102	163	7	29	62	32
IET-103	180	7	26	65	32
IET-104	187	8	30	62	29
IET-107	156	5	29	65	26
IET-109	188	5	27	59	29
IET-110	114	4	23	58	25
Kanchan (C)	122	6	27	61	22
LT-Kanchan (C)	103	6	30	69	27
CH-3 (C)	151	6	29	63	25
CTRI Naveena (C)	169	5	32	68	26

Table 7 AVT-I VFC TOBACCO: Morphological characters of the entries of AVT-I at Kandukur (2024-25)

Entries	Plant height (cm)	No. of leaves	Internodal length (cm)	Leaf length (cm)	Leaf width (cm)
FCR-71	133.5	27.0	3.4	35.3	14.4
FCR-72	152.0	27.0	3.9	39.9	17.6
FCR-73	132.3	25.8	3.3	36.4	15.0
IET-101	146.5	28.3	3.3	39.8	16.9
IET-102	133.0	27.0	3.0	33.6	15.6
IET-103	138.5	27.5	3.5	33.4	14.8
IET-104	146.8	27.5	3.8	36.0	15.6
IET-107	138.0	24.5	2.8	40.4	17.0
IET-109	146.0	28.8	3.5	46.1	22.3
IET 110	140.0	27.8	3.0	42.2	23.5
Siri	142.3	28.8	3.3	41.0	18.9
CTRI Shresta	156.0	30.5	3.5	38.5	16.7
Sulakshana	140.5	28.0	3.5	38.4	16.6
Kanchan	113.0	23.5	2.0	40.1	16.6
Min	113.0	23.5	2.0	33.4	14.4
Max	156.0	30.5	3.9	46.1	22.3
Mean	139.2	27.2	3.2	38.6	17.0

Table 8 AVT-I VFC TOBACCO: Morphological characters of the entries of AVT-I at Hunsur (2024-25)

Entries	Plant height (cm)	No. of leaves	Internodal length (cm)	5th leaf length (cm)	5th leaf width (cm)	7th leaf length (cm)	7th leaf width (cm)	9th leaf length (cm)	9th leaf width (cm)
IET 107	100.5	27.2	3.7	57.4	31.7	55.5	33.1	55.1	30.5
IET 109	100.7	28.6	3.5	47.5	30.6	52.5	33.8	54.0	30.6
IET 110	84.3	26.8	3.1	41.7	27.0	45.5	29.7	47.5	29.1
Kanchan	72.4	23.4	3.1	42.3	28.1	47.1	25.9	43.0	28.8
FCH222	99.8	32.9	3.0	52.0	29.0	55.4	31.8	58.7	35.6
CH3	76.9	27.7	2.8	46.0	25.8	50.8	28.2	49.9	29.2
S. Em±	5.26	1.26	0.14	2.46	0.90	1.71	1.25	2.32	1.04
Minimum	72.36	23.40	2.78	41.70	25.79	45.52	25.92	43.00	28.82
Maximum	100.70	32.93	3.69	57.44	31.70	55.52	33.82	58.71	35.62

Table 9 AVT-I VFC TOBACCO: Incidence of pest and diseases in the entries of AVT-I at Rajahmundry (2024-25)

Entries	*Natu*ral Condition (Mean No. of plants infected / plot (36 plants)		Artificial Inoculation With TMV (Reaction*)
	Leaf Curl	CMV	
FCR-71	2.33	0.00	R
FCR-72	0.67	0.00	R
FCR-73	2.00	0.00	R
IET-101	3.00	0.00	R
IET-102	3.00	0.00	R
IET-103	2.33	0.00	S
IET-104	1.33	0.00	S
IET-107	2.33	0.00	S
IET-109	3.00	0.00	S
IET-110	1.33	0.00	S
Kanchan (C)	1.33	0.00	S
Siri (C)	2.33	0.00	S
CTRI Sulakshana (C)	1.00	0.00	R
CTRI Sreshta (C)	1.33	0.00	R

** R: Resistance; S: Susceptible*

Table 10 AVT-I VFC TOBACCO: *Natu*ral incidence of diseases and pests in AVT-I entries at Jeelugumilli (2024-25)

Entries	Pest (Av. No. /plant)			
	Aphids	Whiteflies	*S. litura*	*H. armigera*
FCV-71	6.78	0	0	1
FCV-72	5.56	0	0	1
FCV-73	5.89	0	0	0
IET-101	3.00	0	0	1
IET-102	2.44	0	0	2
IET-103	4.33	0	0	2
IET-104	10.11	0	0	0
IET-107	5.00	0	0	0
IET-109	3.78	0	0	3
IET-110	3.44	0	0	0
Kanchan (C)	3.44	0	0	2
LT-Kanchan (C)	5.56	0	0	0
CH-3 (C)	4.11	0	0	1
CTRI Naveena (C)	4.67	0	0	0

Table 11 AVT-I VFC TOBACCO: Incidence of pest and diseases in the entries of AVT-I at Hunsur (2024-25)

Entries	Disease data		
	TMV	Black shank	RKI
IET 107	-	4	1.33
IET 109	-	2	1.33
IET 110	-	1	1.67
Kanchan	7	4	1.33
FCH222	-	4	1.00
CH3	-	1	1.67

Table 12 AVT-I VFC TOBACCO: Incidence of pest and diseases in the entries of AVT-I at Shivamogga (2024-25)

Entries	Diseases				Insect pests	
	FLS	BS	TMV	TLCV	SPOD	HEL
IET-102	1.00	0.00	0.00	7.14	0.67	3.67
IET-103	1.00	0.00	0.00	3.28	0.00	5.00
IET-104	1.00	5.97	0.00	1.49	1.33	3.33
FCR-72	1.00	1.25	0.00	2.50	0.33	4.33
FCR-73	1.00	1.28	0.00	5.13	3.00	1.67
FCS-4	1.00	1.64	0.00	11.48	0.00	4.00
Thrupthi	1.00	3.57	1.19	9.52	1.67	4.33
Kanchan	1.00	1.54	0.00	15.38	1.67	4.67
Sahyadri	1.00	0.00	0.00	3.85	0.00	4.33
CH-3	1.00	0.00	0.00	7.30	0.00	5.67

Table 13 AVT-I VFC TOBACCO: Quality parameters of the entries of AVT-I at Jeelugumilli (2024-25)

Entries	Nicotine		Reducing Sugars		Chlorides	
	'X' position	'L' position	'X' position	'L' position	'X' position	'L' position
FCR-71	1.97	3.68	7.66	12.43	2.26	2.33
FCR-72	1.47	1.61	2.41	10.65	3.46	1.70
FCR-73	1.90	2.40	3.12	10.61	3.28	2.53
IET-101	2.48	3.95	5.14	7.20	2.68	2.38
IET-102	2.31	3.48	5.28	8.37	2.39	1.89
IET-103	2.48	1.61	7.69	6.67	2.33	1.38
IET-104	1.95	2.83	1.78	1.02	3.14	1.91
IET-107	1.04	2.46	9.00	5.96	2.67	2.23
IET-109	1.73	2.34	3.62	10.86	3.16	2.17
IET-110	2.00	2.00	5.71	9.09	2.54	1.99
Kanchan (C)	1.37	3.07	9.61	6.22	1.82	1.77
LT-Kanchan (C)	1.43	2.88	2.23	6.34	2.86	1.97
CH-3 (C)	3.29	1.98	8.74	7.15	2.02	1.93
CTRI Naveena (C)	1.48	2.48	7.41	11.04	1.28	1.68

Table 14 AVT-I VFC TOBACCO: Quality parameters of the entries of AVT-I at Guntur (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
FCR-71	2.34	10.85	0.44
FCR-72	2.31	6.12	0.43
FCR-73	2.57	6.60	0.38
IET-101	1.08	14.63	0.47
IET-102	2.90	6.57	0.31
IET-103	2.91	10.31	0.34
IET-104	2.80	8.82	0.31
IET-107	1.95	11.81	0.46
IET-109	1.59	9.42	0.49
IET-110	2.41	6.65	0.35
Siri (C)	1.94	9.29	0.90
CTRI Sreshta (C)	2.57	8.07	0.42
CTRI Sulakshana (C)	1.39	6.90	0.40
Kanchan (C)	2.09	6.73	0.44

Table 15 AVT-I VFC TOBACCO: Quality parameters of the entries of AVT-I at Kandukur (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
FCR 71	1.46	7.34	0.64
FCR 72	1.15	5.90	0.66
FC R 73	1.61	5.25	0.72
IET 101	1.33	8.33	0.20
IET 102	1.57	7.91	0.75
IET 103	1.50	12.10	0.43
IET 104	1.28	5.63	0.49
IET 107	1.21	8.11	0.68
IET 109	1.19	7.04	0.68
IET 110	0.95	7.61	0.76
Siri (C)	1.08	4.33	0.30
CTRI Sreshta (C)	1.40	6.70	1.25
CTRI Sulakshana (C)	1.06	7.68	1.31
Kanchan (C)	1.20	6.48	0.77
Min	0.95	4.33	0.20
Max	1.61	12.10	1.31
Mean	1.28	7.30	0.69

Table 16 IVT VFC TOBACCO: Quality parameters of the entries of AVT-I at Hunsur (2024-25)

Entries	Nicotine		R. Sugars	
	X	L	X	L
IET 107	1.47	1.11	7.64	10.32
IET 109	1.42	1.76	12.39	8.09
IET 110	1.35	1.11	12.09	10.21
Kanchan (C)	1.73	0.80	7.04	11.49
FCH 222 (C)	1.42	0.86	10.73	8.77
CH-3 (C)	1.30	1.02	9.35	12.11

KANDUKUR

Project No.: VFKBRC 1.2

Research project title	**Advanced Varietal Trial-II on FCV tobacco**
Objectives	▪ To evaluate the lines advanced from the IVT ▪ To select suitable lines for a bulk evaluation
Investigators	Gangadhara K
Year of start	2024-25
Year of completion	2024-25
Location	ICAR-NIRCA-Research Station, Kandukur

Entries : 1 + 4 (Checks)
Design : RBD
Plot size : 2.6 × 5.85 m

Replications : Four
Spacing : 0.65 × 0.65 m

RESULTS

During the year 2024-25, AVT-II, was conducted with one test entry *viz.*, FCK-10 along with four checks viz., Siri, Kanchan, CTRI-Sulakshana and CTRI-Shrestha. Combined analysis of leaf yield parameter data of 2022 and 2024 reveled significant genotype variation. FCK-10 recorded significant higher cured leaf yield and grade index compared to checks. FCK 10 recorded 11% higher cured leaf yield (2157 kg/ha) and 8% grade index (1578) over the check Siri (1917 kg/ha cured leaf and 1458 grade index). FCK 10 is proposed for bulk trials in comparison to CTRI-Shresta.

Table 1 VFKBRC 1.2: Green leaf and cured leaf yield (2024-25)

	Green Leaf (kg/ha)				Cured Leaf (kg/ha)		
Entries	**2022**	**2024**	**Mean**	**Entries**	**2022**	**2024**	**Mean**
FCK-10	14219	11102	12661	FCK 10	1956	2358	2157*
N 98 (C)	10538	11510	11024	N 98	1722	1845	1783
Siri (C)	12637	12544	12591	Siri	1730	2104	1917
VT-1158 (C)	12265	13380	12823	VT-1158	1777	1896	1837
GM	12415	12134	12275	GM	1797	2051	1924
SEm±			229.5	SEM±			44.3
CD (0.05)			681.8	CD (0.05)			131.8
CV (%)			5.3	CV (%)			6.5

Table 2 VFKBRC 1.2: Bright leaf yield (kg/ha) and grade index (2024-25)

	Bright Leaf				Grade Index		
Entries	2022	2024	**Mean**	**Entries**	2022	2024	**Mean**
FCK-10	1494	1474	1484	FCK-10	1559	1597	1578*
N 98 (C)	1213	1365	1289	N 98	1328	1367	1347
Siri (C)	1214	1522	1368	Siri	1332	1583	1458
VT-1158 (C)	1128	1227	1178	VT 1158	1284	1318	1301
GM	1262	1397	1330	GM	1376	1466	1421
SEm±			42.5	SEM±			40.2
CD (0.05)			126.2	CD (0.05)			119.5
CV (%)			9.0	CV (%)			8.0

Table 3 VFKBRC 1.2: Morphological CHARACTERs (2024-25)

Entries	**Height (cm)**	**No. of leaves**	**Internodal length (cm)**	**Leaf length (cm)**	**Leaf width (cm)**
FCK-10	124	25	3	40.5	18
N 98 (C)	152	26	4.2	45.2	20
Siri (C)	174	38	5	39.5	16.5
VT-1158 (C)	150	28.5	5	43.5	18
Min	122	25	3	35	15.5
Max	174	38	5	45.25	20
Mean	145.4	29.6	4.3	40.6	17.6

Table 4 VFKBRC 1.2: Chemical quality parameters (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
FCK 10	1.50	10.09	0.72
N 98 (C)	1.61	6.28	0.78
Siri (C)	1.38	11.25	0.88
VT-1158 (C)	1.40	8.63	0.79
Min	1.38	6.28	0.57
Max	1.61	11.25	0.88
Mean	1.48	9.02	0.74

Laboratory screening of the germplasm line KRB-3 for tobacco Aphid

Genotype KRB-3 was planted at Rajahmundry, Jeelugumilli and Kandukur for evaluation for Aphid tolerance, however due to insufficient pest population in field conditions, laboratory screening was done at NIRCA Rajahmundry. Tobacco germplasm line KRB-3 was screened in the laboratory for the suitability to the tobacco aphid *Myzus nicotianae* population in comparison with a resistant check CTRI-Sulakshana and a susceptible check *Lanka* special. Properly ventilated plastic containers were lined with a layer of 1% agar agar and supplied with the healthy and fresh leaf of each test germplasm or variety replicated thrice. Two fully grown and healthy adult aphids were released in each container. Observations on the aphid population were taken on 1, 3, 5 and 7 days after release. The growth rate of aphids was also calculated (Krbes., 2014). The population growth of aphids in KRB-3 was compared with the resistant and susceptible check.

RESULTS

On the first day of observation, aphid population doubled in KRB-3 and increased by 6 times in resistant check CTRI-Sulakshana and by 8 times in susceptible check *Lanka* Special. On the Day 3, population increased by 5 times in KRB-3, whereas it was 10 times in CTRI-Sulakshana and 18 times in *Lanka* special.

On the whole, average population of aphids in KRB 3, CTRI Sulakshana and *Lanka* special was 15.58, 26.08 and 51.58 aphids, which favoured aphid population growth by 8, 13 and 26 times over the initial population of two aphids.
The growth rate of *Myzus nicotianae* was also calculated based on the daily counts for 3, 5 and 7th day after release. The least growth rate for aphids was recorded with KRB-3 (0.39) in comparison with CTRI-Sulakshana (0.47). The highest growth rate was observed in case of *Lanka* tobacco (0.52).

Table 1: Population counts of *Myzus nicotianae* in different entries

Entries	Tobacco line/ Variety	Day 0	Day 1	Day 3	Day 5	Day 7	Average
Test entry	KRB 3	2	4.00	9.00	18.33	31.00	15.58
Resistant check	CTRI- Sulakshana	2	11.00	19.33	20.67	53.33	26.08
Susceptible check	*Lanka* Special	2	16.67	36.33	76.00	77.33	51.58

Table 2: Growth rate of *Myzus nicotianae* in different entries

Entries	Tobacco line/ Variety	NT/N0	ln (NT/ N0)	Growth rate (r)
Test entry	KRB 3	15.50	2.74	0.39
Resistant check	CTRI- Sulakshana	26.67	3.28	0.47
Susceptible check	*Lanka* Special	38.67	3.65	0.52

NT- Population on day 7 N0- Initial Population

HUNSUR

Project No: OFT

Research project title	**On Farm Trial on FCV tobacco**
Investigators	Nanda C
Year of start	2024-25
Year of completion	2024-25
Location	ICAR-NIRCA Research Station, Hunsur

On farm trials with promising hybird FCHH-2 and CH 3 were successfully conducted at two villages. The line recorded an average of 15-22% improvement in cured leaf yield over the hybrid check CH3.

Table OFT: On-farm testing of FCHH-2 in KLS

Village	Farmer	Cured leaf yield (kg/acre)		% increase over CH-3
		FCHH-2	CH-3	
Harave, Periyapatna	Nayankumar H.R. S/o Ravi TBGRNo.4/087/011	3300	2700	22
Hadya, Chilkunda	H.V. Nagesh TBGRNo.62/172/005	3000	2500	20

SHIVAMOGGA

Project No.: VFSBRC 4.1

Research project title	**Station Varietal Trial-I on FCV tobacco**
Objectives	▪ To identify high yielding good quality FCV tobacco varieties for zone 7 (KLS region) of Karnataka
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Year of start	2023
Year of completion	2025
Location	AINP(T), ZAHRS, Navile, Shivamogga

Treatments	:	13 (10+3)	Spacing	:	90 x 60 cm
Replications	:	Three	Plot size	:	6 x 3.6 m
Design	:	RCBD			
Fertilizers	:	40:30:80 kg N:P:K /ha			
DOS: 29-04-2024			DOP: 13-08-2024		

RESULTS

Ten test entries were evaluated for green leaf yield (GLY), cured leaf yield (CLY) and top-grade equivalent (TGE) in a replicated trial along with four checks *viz*., FCS-4, Sahyadri, Kanchan, and Thrupthi. Only one entry FCS 23-6 (13946, 1801, 1132 kg/ha) recorded significantly superior GLY, CLY and TGE over the best check FCS-4 (12771, 1653, 1033 kg/ha), respectively. Entry FCS 23-6 (1801 kg/ha) recorded 8.9% higher CLY compared to best check FCS-4 (1653 kg/ha) and it can be promoted for further testing. Under *Natu*ral epiphytotic conditions, the entries were also scored for their response to major diseases like frog-eye leaf spot, black shank, TMV and ToLV, and insect pests like *Spodoptera litura* and *Helicoverpa armigera*. The entries, FCS 23-8, FCS 23-3, and FCS 23-1 recorded higher incidence and susceptibility to black shank compared to checks. However, the incidence for other entries was within comparable limits against checks for all diseases and pests.

Salient findings/Achievements

- Among the test entries, entry FCS 23-6 (13946, 1801, 1132 kg/ha) recorded significantly superior GLY, CLY and TGE over the best check FCS-4
- Entry FCS 23-6 (1801 kg/ha) recorded 8.9% higher CLY compared to best check FCS-4 (1653 kg/ha)

Conclusion: The entries FCS 23-6 found to be superior

Table 1 VFSBR 4.1: Evaluation of entries for GLY, CLY and TGE in station trial (2024-25)

Entries	GLY	CLY	TGE
	kg/ha		
FCS23-1	10965	1436	898
FCS23-2	7733	928	580
FCS23-3	8507	1021	638
FCS23-4	9112	1091	684
FCS23-5	8486	1019	637
FCS23-6	13946	1801* (8.9%)	1132*
FCS23-7	7650	918	574
FCS23-8	12487	1499	1041
FCS23-9	9829	1180	737
FCS23-10	11530	1384	866
FCS-4 (C)	12771	1653	1033
Sahyadri (C)	12433	1650	1011
Kanchan (C)	10613	1274	796
Thrupthi (C)	8489	1019	637
S.Em. ±	431.7	41.8	32.4
C.D. at 5%	1255	122	94
C.V. (%)	7.24	5.68	6.97

*Figures in the parenthesis are increase over Thrupthi

Table 2 VFSBRC 4.1: Incidence of pest and diseases in station trial during 2024-25

Entries	Diseases				Insect pests	
	FLS	BS	TMV	ToLV	***S.litura***	*H.armigera*
FCS23-1	1.00	23.19	0.0	0.00	2.33	6.33
FCS23-2	1.00	6.52	0.0	0.00	0.33	3.67
FCS23-3	1.00	23.29	0.0	0.00	0.00	3.50
FCS23-4	1.00	8.14	0.0	0.00	0.67	3.67
FCS23-5	1.00	9.09	0.0	0.00	0.00	3.33
FCS23-6	1.00	10.77	0.0	0.00	1.67	3.67
FCS23-7	1.00	8.99	0.0	1.12	2.33	4.00
FCS23-8	1.00	56.67	0.0	0.00	0.00	7.00
FCS23-9	1.00	14.81	0.0	0.00	0.00	4.33
FCS23-10	1.00	12.50	0.0	0.00	0.33	2.67
FCS-4 (C)	1.00	10.26	0.0	0.00	1.00	2.67
Thrupthi (C)	1.00	12.50	0.0	0.00	1.67	5.67
Kanchan (C)	1.00	8.00	0.0	0.00	0.67	2.67
Sahyadri (C)	1.00	10.00	0.0	0.00	0.33	2.33

1-5 scale: FLS–Frog-eye leaf spot

% plants infected: BS–Black shank, TMV–Tobacco mosaic virus, ToLV–Tobacco leaf curl virus

No. of larvae/ plant: *Spodoptera litura*, *Helicoverpa armigera*

Project No.: VFSBRC 4.2

Research project title	**Station Varietal Trial-II on FCV tobacco**
Objectives	▪ To identify high yielding good quality FCV tobacco varieties for zone 7
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Year of start	2022
Year of completion	2024
Location	AINP(T), ZAHRS, Navile, Shivamogga

Treatments	:	8 (5+3)	Spacing	:	90 x 60 cm
Replications	:	Three	Plot size	:	6 x 3.6 m
Design	:	RCBD			
Fertilizers	:	40:30:80 kg N:P:K /ha			
DOS: 29-04-2024			DOP: 14-08-2024		

RESULTS

Five test entries were evaluated for green leaf yield (GLY), cured leaf yield (CLY) and top-grade equivalent (TGE) in a replicated trial along with four checks *viz*., FCS-4, Sahyadri, Kanchan, and Thrupthi. The test entries TB-100 x TB-102 (Sel-5) (10753, 1417, 1157 kg/ha), NLST-2 x FCH-221 (Sel-1) (10582, 1334, 1094 kg/ha), and TB-70 x TB-102 (Sel-2) (9436, 1197, 964 kg/ha) recorded significantly superior for GLY, CLY and TGE over the best check FCS-4 (8328, 1028, 839 kg/ha), respectively. Other test entries Tobios-6 x Sahyadri (Sel-8) (8505, 1046, 848 kg/ha) and Tobios -5 x Kanchan (Sel-1) (8559, 1086, 880 kg/ha) also recorded numerically superior GLY, CLY and TGE over the best check FCS-4. The entries TB-100 x TB-102 (Sel-5) (1417 kg/ha, 37.8%), NLST-2 x FCH-221 (Sel-1) (1334 kg/ha, 29.8%), and TB-70 x TB-102 (Sel-2) (1197 kg/ha, 16.4%) recorded higher CLY over the best check FCS-4 (1028 kg/ha). Hence, the all the five test entries can be promoted for further testing. Under *Natu*ral epiphytotic conditions, the entries were also scored for their response to major diseases like frog-eye leaf spot, black shank, TMV and ToLV, and insect pests like *Spodoptera litura* and *Helicoverpa armigera*. The incidence was within comparable limits against checks.

Salient findings/Achievements

- Among the five test entries, TB-100 x TB-102 (Sel-5), NLST-2 x FCH-221 (Sel-1) TB-70 x TB-102 (Sel-2) recorded significantly superior for GLY, CLY and TGE over the best check FCS-4.
- The entries TB-100 x TB-102 (Sel-5) (1417 kg/ha, 37.8%), NLST-2 x FCH-221 (Sel-1) (1334 kg/ha, 29.8%), and TB-70 x TB-102 (Sel-2) (1197 kg/ha, 16.4%) recorded higher CLY over the best check FCS-4 (1028 kg/ha).

Conclusion: The entries, TB-100 x TB-102 (sel-5) and NLST-2 x FCH-221 (sel-1) and TB-70 x TB-102 (Sel-2) found superior

Table 1 VFSBR 4.2: Evaluation of entries for GLY, CLY and TGE in station trial (2024-25)

Entries	GLY	CLY	TGE
	kg/ha		
TB- 70 x TB-102 (sel-2)	9436*	1197* (16.4%)	964*
TB-100 xTB-102 (sel-5)	10753*	1417* (37.8%)	1157*
Tobios-6 x Sahyadri (sel-8)	8505	1046	848
Tobios -5 x Kanchan(sel-1)	8559	1086	880
NLST-2 x FCH-221 (sel-1)	10582*	1334* (29.8%)	1094*
FCS-4 (C)	8328	1028	839
Sahyadri (C)	7889	983	818
Kanchan (C)	7675	967	788
Thrupthi (C)	7213	895	725
S.Em. ±	254.1	27.3	24.3
C.D. at 5%	827	89	79
C.V. (%)	9.10	9.50	9.82

*Figures in the parenthesis are increase over Thrupthi

Table 2 VFSBRC 4.2: Incidence of pest and diseases in station trial during 2024-25

Entries	Diseases				Insect pests	
	FLS	BS	TMV	ToLV	*S.litura*	*H.armigera*
TB- 70 x TB-102 (sel-2)	1.0	18.8	0	0	0.5	3.0
TB-100 xTB-102 (sel-5)	1.0	6.3	0	0	0.0	3.0
Tobios-6 x Sahyadri (sel-8)	1.0	3.8	0	0	1.5	5.5
Tobios -5 x Kanchan(sel-1)	1.0	16.7	0	0	2.0	5.5
NLST-2 x FCH-221 (sel-1)	1.0	7.9	0	0	0.5	6.5
FCS-4 (C)	1.0	9.5	0	0	0.0	4.5
Sahyadri (C)	1.0	12.5	0	0	0.0	7.0
Kanchan (C)	1.0	5.9	0	0	0.0	4.5
Thrupthi (C)	1.0	5.6	0	0	2.0	2.0

1-5 scale: FLS–Frog-eye leaf spot

% plants infected: BS–Black shank, TMV–Tobacco mosaic virus, ToLV–Tobacco leaf curl virus

No. of larvae/ plant: *Spodoptera litura*, *Helicoverpa armigera*

Project No.: VFSBR 5

Research project title	Evaluation and characterization of FCV tobacco germplasm
Objectives	▪ To know the yield contributing characters of the entries
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Year of start	2022
Year of completion	2025
Location	AINP(T), ZAHRS, Navile, Shivamogga

Treatments : 30 (25 + 5)   Plot size : 6 × 1.8 m
Design : RCBD   Fertilizer dose : 40:30:80 N:P:K (kg/ha)
Replications : Two
DOS: 29-04-2024   DOP: 16-08-2024

S. No	Entries	S.No	Entries
1	VA-770	16	EC-554926
2	V-373[SER]	17	EC-554930
3	NC-2326	18	COKER-176
4	Q-46	19	NC-37-NF
5	RHOMAS-7	20	NC-729
6	SPEIGHT-G-103	21	Delcrest-66
7	NC-940	22	A-23
8	REAMS-744	23	Olior-10
9	RG-17	24	VA-115
10	SPEIGHT-G-152	25	VA-4219
11	SPEIGHT-G-172	26	Thrupthi
12	SPEIGHT-G-178	27	Kanchan
13	SPEIGHT-NF-3	28	Sahyadri
14	VA-119	29	FCS-4
15	YELLOW SPECIAL-A	30	TOBIOS-6

RESULTS

The plant population and phenotypic expression was not proper; hence, the experiment will be repeated next year.

Project No.: VFSBR 6

Research project title	Back cross breeding programme: Conversion of promising lines into male sterile lines
Objectives	▪ To develop high yielding FCV tobacco hybrids for zone 7 (KLS region)
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Year of start	2015
Year of completion	2025
Location	AINP(T), ZAHRS, Navile, Shivamogga

RESULTS

The experiment cannot be continued as seeds of CMS lines even of earlier year are not available. If fresh CMS lines are provided, we will begin conversion with FCS-4.

Table VFSBR 6: Male sterile lines maintained

MS1 TOBIOS -6	TOBIOS -6
MS1 FCH 222	FCH 222
MS1 BHAVYA	BHAVYA
MS1 SAHYADRI	SAHYADRI
MS TOBIOS -6	TOBIOS -6
MS2 FCH 222	FCH 222
MS2 BHAVYA	BHAVYA
MS2 SAHYADRI	SAHYADRI
MS2 TOBIOS -6	TOBIOS -6
MS THRUPTI	THRUPTI

Project No.: VFSBR 7

Research project title	New crosses & early generation studies
Objectives	▪ Development of resistant lines for black shank and TMV and for other agronomic traits.
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Year of start	2022
Year of completion	Long term
Location	AINP(T), ZAHRS, Navile, Shivamogga
DOS: 15-05-2024	DOP: 16-08-2024

RESULTS

Among three F_3 populations, selections were made and advanced. Four new crosses were generated.

The crosses are in F_3 generation

1. Sahyadri x FCR-68
2. Sahyadri x CTRI Sulakshana
3. Sahyadri x VT1158

Salient findings/Achievements

- Selections were made and advanced from three F_3 populations
- Eight new crosses were generated for development of new varieties

Table 1 VFSBR 7: Eight new crosses were generated for development of new high yielding and stress tolerant varieties

Cross	Target traits
FCS-4 × FCH-1	Leaf parameters, short internodal length
FCH-2 × FCS-4	Short internodal length, puckering
FCK-9 × FCS-4	Drought tolerance, dark green caste
FCS-4 × FCK-10	Drought tolerance, dark green caste
IET-129 × FCS-4	Puckering, dark green caste, short internodal length
IET-127 × FCS-4	More no. of leaves
FCH-1 × IET-103	Short internodal length, leaf parameters
FCH-1 × IET-109	Short internodal length, more no. Of leaves

Project No.: VFSBR 11

Research project title	Conversion of FCH-1, FCH-2 and FCS-4 in male sterile lines

RESULTS

The experiment was not taken up due to non availability of the male sterile lines

Project No.: Germplasm maintenance

Germplasm maintenance	113 FCV germplasm lines are maintained at the AINPT, Shivamogga.
Investigators	Santosh Pattanashetti, Shashikala S Kolakar, T.M. Soumya, Prashantha C.
Location	AINP(T), ZAHRS, Navile, Shivamogga
No. of Genotypes : 30 (25 + 5)	Spacing: 90 x 60 cm
Plot size: 6 m (1 row) x 0.9 m /entry	Fertilizer dose: 40:30:80 N:P:K (kg/ha)
DOS: 29-04-2024	DOP: 16-08-2024

RESULTS

113 FCV germplasm lines seeds were multiplied and maintained at the AINPT, Shivamogga.

B. *BIDI* TOBACCO

COORDINATED EVALUATION OF *BIDI* TOBACCO GENOTYPES

IVT ON *BIDI* TOBACCO

BDABRC/ BDNBRC/ BDNyBRC 2: INITIAL VARIETAL TRIAL ON *BIDI* TOBACCO

Objectives: To evaluate the *Bidi* tobacco entries for yield and quality at three centres *viz.,* Anand, Nipani and Nandyal along with respective check varieties.

Year of start **:** 2024-25

Year of Completion: 2024-25

***Bidi* tobacco Centres and Investigators**

Centres	:	**Investigators**
Anand	:	D.A. Patel & D.R. Delvadiya
Nipani	:	S.B. Patil, Dr. Shivamurthy D. & Dr. Geeta Dandin
Nandyal	:	P. Pulli Bai & K. Satish Babu

Design : RBD
Total treatments : 06 + checks as given above
Replications : Three (03)

Entries: 06 (Six)

1. IET 137
2. IET 138
3. IET 139
4. IET 140
5. IET 141
6. IET 142

Checks at different Centres

Anand	1. A 119	2. GT 7	3. GABT-11	4. GABTH-2
Nipani	1. A 119	2. Bhavyashree	3. NBD 209	
Nandyal	1. A 119	2. Nandyal Pogaku-1	3.Nandyal Pogaku-2	

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Anand	3.6 × 7.5 m	0.90 m x 0.75 m
Nipani	4.0 × 7.5 m	1 m x 1 m
Nandyal	6.75 × 1.5 m	0.75 x 0.75 m

RESULTS

In the Initial varietal trial (IVT), six entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Table 1 to 5 IVT *Bidi* Tobacco. The results are presented centre-wise.

ANAND

Yield: None of the line showed significant superiority for cured leaf yield over better check.

Morphological characterization: All the morphological characters i.e. no. of leaves per plant, plant height, leaf length, leaf width, leaf thickness, days to flowering and days to maturity were comparable with check variety.

Disease /Pest incidence: TMV and leaf curl incidence were found 16.67 % and 13.33% for test entry IET 140, respectively. TMV incidence was found minimum (1.67%) in the entry, IET-139 and the check, A 119.

Salient findings/Achievements

- None of the lines showed significantly superior cured leaf yield over better check
- None of the lines tested was free from leaf curl and tobacco mosaic virus diseases

Conclusion: None of the line showed significantly superior for cured leaf yield over better check. So, none of the entries were promoted to AVT.

NIPANI

Yield: All the test entries except IET-142 recorded significantly superior cured leaf yield over popular bidi tobacco check A-119 (538 kg/ha).

Morphological characterization: Among the entries tested (check NBD 209) recorded highest plant height (117.13 cm), number of leaves (22), leaf length (51.56 cm) and leaf width (21 cm). The test entries IET-140 and IET-141 recorded better number of leaves, leaf length and leaf width compare to best check NBD-209. However, these two entries were dwarf with shorter internodal length compared to checks.

Salient findings/Achievements

- The test entries, IET-137, IET-138, IET-139, IET-140 & IET-141 recorded statistically on par cured leaf yield compared to the best check NBD-209 (1249 kg/ha)

Conclusion: The test entries, IET-137, IET-138, IET-139, IET-140 & IET-141 will be promoted to AVT-I during 2025-26.

NANDYAL

Yield: None of the entries recorded a significantly higher cured leaf yield. However, the entry IET 138 recorded a cured leaf yield of (1584 kg/ha), which was on par with the best check, Nandyal Pogaku 2 (1524 kg/ha).

Morphological characterization: The tested entries has recorded on an average plant height (66.7 cm), Days to flowering (145), leaf length (34.1 cm), leaf width (12.2 cm), spangle score (4) & leaf thickness (12.33 mg/m^2).

Salient findings/Achievements

- IET-138 recorded a cured leaf yield of (1584 kg/ha), which was on par with the best check, Nandyal Pogaku 2 (1524 kg/ha)

Conclusion: None of the entries was found significant for cured leaf yield and these entries will not be promoted to the AVT-I during 2025-26.

Recommendation for promoting to AVT-I: Based on the result of *bidi* centres and as per the proceedings of the committee constituted for consideration of IVT proposals, met on 30th July 2025, none of the entries are significantly superior over better checks, so none of them are forwarded to AVT-I for the crop season 2025-26.

Table 1 IVT *Bidi* Tobacco: Cured Leaf yield and morphological characters of IVT entries at different centres (2024-25)

Entries	Yield (kg/ha)			No. of leaves/plant		
	Anand	Nipani	Nandyal	Anand	Nipani	Nandyal
IET 137	3445	989	1483	25	20.53	23
IET 138	2980	956	1584	22	19.10	24
IET 139	3351	967	1552	22	13.13	24
IET 140	3608	1089	1544	24	21.87	22
IET 141	3341	1051	1537	23	20.13	22
IET 142	2009	720	1428	19	18.60	23
A 119 (C)	2069	538	1309	16	9.27	17
GT 7 (C)	1748	-	-	18	-	-
GABT-11 (C)	3723	-	-	26	-	-
GABTH-2 (C)	3300	-	-	21	-	-
Bhavyasree (C)	-	696	-	-	7.73	-
NBD-209 (C)	-	1249	-	-	12.33	-
Nandyal Pogaku-1 (C)	-	-	1519	-	-	22
Nandyal Pogaku-2 (C)	-	-	1524	-	-	24
G. Mean	-	917	1498	-	15.86	22.0
S. Em+	193.0	104.77	38.7	0.97	1.54	-
C.D. at 5%	573	314	114	2.88	4.60	-
C.V. (%)	11.30	19.79	7.0	7.75	16.78	-

**Significant at 5%*

Table 2 IVT *Bidi* Tobacco: Morphological characters of IVT entries at different centres (2024-25)

Entries	Plant Height (cm)			Leaf Length (cm)			Leaf Width (cm)		
	A	N	Ny	A	N	Ny	A	N	Ny
IET 137	84.3	60.60	55.5	67.9	47.06	29.4	30.7	19.23	10.7
IET 138	103.6	74.70	67.7	65.0	51.56	39.3	33.7	16.71	12.8
IET 139	109.8	50.77	65.5	63.7	40.76	36.4	32.8	16.50	12.2
IET 140	90.6	57.67	60.4	65.0	51.13	33.1	30.5	21.08	13.3
IET 141	85.3	63.73	65.7	68.5	49.49	31.2	35.7	20.61	12.4
IET 142	99.1	99.20	65.7	63.2	48.23	33.6	29.9	21.04	12.0
A 119 (C)	85.3	66.73	62.1	58.7	38.51	31.4	29.4	14.85	11.2
GT 7 (C)	76.5	-	-	57.5	-	-	23.2	-	-
GABT-11 (C)	85.5	-	-	69.0	-	-	35.5	-	-
GABTH-2 (C)	97.5	-	-	64.7	-	-	32.9	-	-
Bhavyasree (C)	-	86.13	-	-	40.87	-	-	13.85	-
NBD-209 (C)	-	117.13	-	-	43.39	-	-	17.48	-
Nandyal Pogaku-1 (C)	-		77.4	-	-	34.1	-	-	12.4
Nandyal Pogaku-2 (C)	-		80.5	-	-	38.4	-	-	12.6
G. Mean	-	75.19	66.7	-	45.67	34.1	-	17.93	12.2
S. Em+	4.67	8.21	-	1.49	3.73	-	1.34	1.97	-
C.D. at 5%	13.9	24.63	-	4.43	11.19	-	3.89	5.90	-
C.V. (%)	8.8	18.92	-	4.01	14.16	-	11.38	19.02	-

Table 3 IVT *Bidi* Tobacco: Morphological characters of IVT entries at different centres (2024-25)

Entries	Days to flower		Leaf thickness (mg/cm^2)		Days to Maturity	Spangle Score	% IOC (NP2)
	A	Ny	A	Ny	A	Ny	Ny
IET 137	80	155	13.66	11.65	164	3	-
IET 138	73	158	13.50	12.67	158	3	4
IET 139	72	155	13.22	11.77	161	4	-
IET 140	81	156	12.39	11.88	163	4	-
IET 141	81	154	12.64	12.22	167	4	-
IET 142	81	135	11.81	12.45	169	4	-
A 119 (C)	54	125	13.22	11.54	157	5	-
GT 7 (C)	77	-	13.80	-	157	-	-
GABT-11 (C)	83	-	13.12	-	164	-	-
GABTH-2 (C)	75	-	13.08	-	160	-	-
Bhavyasree (C)	-	-	-	-	-	-	-
NBD-209 (C)	-	-	-	-	-	-	-
Nandyal Pogaku-1 (C)	-	126	-	13.35	-	5	-
Nandyal Pogaku-2 (C)	-	140	-	12.46	-	3	-
G. Mean	-	145	-	12.33	-	4	-
S. Em+	2.60	-	-	-	1.84	-	-
C.D. at 5%	7.72	-	-	-	5.46	-	-
C.V. (%)	5.95	-	-	-	1.97	-	-

A: Anand; N: Nipani; Ny: Nandyal

Table 4 IVT *Bidi* Tobacco: Incidence of pest and diseases in the entries of IVT at Anand (2024-25)

Entries	TMV (%)	Leaf Curl (%)				
		LCA	LCB	LCC	LCD	LCX
IET 137	10.00	-	-	Yes	-	-
IET 138	3.33	-	-	-	Yes	-
IET 139	1.67	-	-	-	Yes	-
IET 140	16.67	-	-	Yes	-	-
IET 141	5.00	-	Yes	-	-	-
IET 142	6.67	-	-	-	Yes	-
A 119 (C)	1.67	-	-	Yes	-	-
GT 7 (C)	3.33	-	-	Yes	-	-
GABT-11 (C)	16.67	-	-	-	-	Yes
GABTH-2 (C)	5.00	-	-	-	-	Yes

Where, LCA = Low, **LCB** = 10%, **LCC** = 10-20%, **LCD** = 20-30%, **LCX** = highly affected/Severe

Table 5 IVT *Bidi* Tobacco: Quality parameters of the entries of IVT at Anand (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
IET 137	6.57	5.80	0.816
IET 138	6.35	5.05	0.603
IET 139	6.87	5.85	0.568
IET 140	6.40	4.95	0.532
IET 141	6.25	4.25	0.818
IET 142	6.75	5.85	0.532
A 119 (C)	5.95	5.05	0.603
GT 7 (C)	6.40	5.25	0.674
GABT-11 (C)	6.50	6.35	0.745
GABTH-2 (C)	5.90	5.45	0.390

COORDINATED EVALUATION OF *BIDI* TOBACCO GENOTYPES

BDABRC/ BDNBRC/ BDNyBRC 1.1:
ADVANCED VARIETAL TRIAL ON *BIDI* TOBACCO (AVT-I)

Objectives: To evaluate the *Bidi* tobacco entries for yield and quality at three centres *viz.,* Anand, Nipani and Nandyal along with respective checks in AVT-I.

Year of start **:** 2024-25

Year of Completion : 2024-25

***Bidi* tobacco Centres and Investigators**

Centres	:	**Investigators**
Anand	:	D. A. Patel & D.R. Delvadiya
Nipani	:	S.B. Patil, Shivamurthy D. & Geeta Dandin
Nandyal	:	P. Pulli Bai & K. Satish Babu

Design : RBD
Total treatments : 03 + checks as given above
Replications : Three

Entries: 03

1. IET 113
2. IET 114
3. IET 115

Checks at different Centres

Anand	1. A 119	2. GT 7	3. GABT-11	4. GABTH-2
Nipani	1. A 119	2. Bhavyashree	3. NBD 209	
Nandyal	1. A 119	2. Nandyal Pogaku-1	3.Nandyal Pogaku-2	

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Anand	3.6 × 7.5 m	0.90 m x 0.75 m
Nipani	4.0 × 7.5 m	1 m x 0.75 m
Nandyal	6.75 × 3.0 m	0.75 x 0.75 m

RESULTS

In the AVT-I, three entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Chemical quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Table 1 to 4 AVT-I *Bidi* Tobacco. The results are presented centre-wise.

ANAND

Three entries were tested with four checks *viz,* A 119, GT 7, MRGTH 1 and GABT 11. The results indicated significant yield differences among the entries tested. None of the entry was significantly superior over better check GABT11 (3744 kg/ha) for yield. The line IET 113 and checks A 119, GT 7, MRGTH 1 and GABT 11 were free from tobacco mosaic virus disease.

Salient findings/Achievements

- None of the entry was significantly superior over better check GABT11 (3744 kg/ha) for yield
- TMV and leaf curl incidence were found 3.75 % and 28.13% for test entry IET 114, respectively

NIPANI

The Advanced Varietal Trial-I (AVT-I) trial consisted of three entries and four checks which were evaluated in RBD with three replications and spacing of 4 x 7.5 m (Gross and Net plot). Test entry IET-113 (1796 kg/ha) registered significantly higher leaf yield compared to best check NBD-316 (1514 kg/ha). The other two test entries IET-114 (953 kg/ha) and IET-115 (625 kg/ha) had scored lower leaf yield compared to local check Bhavyashree (1250 kg/ha), popular check A-119 (1197 kg/ha) and NBD-209 (1111 kg/ha). Test entry IET-113 has shown highest number of leaves per plant (17), higher leaf length (50.48 cm) and leaf width (21.96 cm) compared to other entries and checks. The check NBD 209 recorded highest plant height (122.87) compared to all other entries.

Salient findings/Achievements

- The entry IET-113 (1796 kg/ha) registered significantly higher leaf yield compared to best check NBD 316 (1514 kg/ha)
- All the test entries from AVT-I will be promoted to AVT-II during 2025-26
- Test entry IET-113 will be tested in Bulk trial along with the best check and On Farm Trial

NANDYAL

In AVT-I on bidi tobacco, 3 varieties along with three checks were evaluated. None of the entry has recorded significantly higher cured leaf yield when compared with the best check Nandyal Pogaku-2.

Salient findings /Achievements

- None of the entry has recorded significantly higher cured leaf yield when compared with the best check Nandyal Pogaku-2

Recommendation: All the entries evaluated under AVT-I will be assessed in AVT-II at all centres

Table 1 AVT-I *Bidi* Tobacco: Yield characters of AVT-I entries during 2024-25

Entries	Yield (kg/ha)			No. of leaves/ Plant		
	ANAND	NIPANI	NANDYAL	ANAND	NIPANI	NANDYAL
IET 113	2089	1796*	2445	20	17	22
IET 114	2585	953	2403	21	15	21
IET 115	2436	625	2390	21	16	21
A 119 (C)	1897	1197	2182	19	14	15
GT 7 (C)	2715	-	-	21	-	-
MRGTH-1 (C)	2575	-	-	22	-	-
GABT-11 (C)	3744	-	-	25	-	-
Bhavyasree (C)	-	1250	-	-	14	-
NBD-209(C)	-	1111	-	-	15	-
NBD-316 (C)	-	1514	-	-	14	-
Nandyal Pogaku-1 (C)	-		2417	-	14.94	20
Nandyal Pogaku-2 (C)	-		2509	-	-	22
G. Mean	-	1196.89	2391	-	-	21.50
S. Em+	111.1	89.91	67.81	0.86	1.22	-
C.D. at 5%	330.0	277.05	NS	2.56	3.76	-
C.V. (%)	8.62	13.01	6.0	8.08	14.15	-

Significant at 5%

Table 2 AVT-I *Bidi* Tobacco: Morphological characters of AVT-I entries at different centres (2024-25)

Entries	Plant Height (cm)			Leaf Length (cm)			Leaf Width (cm)		
	A	N	Ny	A	N	Ny	A	N	Ny
IET 113	77	118.00	72.6	154	50.48	41.7	60.8	21.96	16.1
IET 114	71	112.67	63.4	154	45.52	40.2	59.5	17.72	15.6
IET 115	74	53.33	58.5	158	44.40	37.4	53.9	17.31	13.8
A 119 (C)	56	110.67	53.5	148	45.27	33.0	61.6	18.15	11.6
GT 7 (C)	64	112.40	-	153	-	-	59.6	18.73	-
MRGTH-1 (C)	63	122.87	-	150	-	-	64.0	18.29	-
GABT-11 (C)	86	120.67	-	159	-	-	67.5	19.51	-
Bhavyasree (C)	-	-	-	-	46.40	-	-	-	-
NBD-209 (C)	-	-	-	-	45.60	-	-	-	-
NBD-316 (C)	-	-	-	-	46.23	-	-	-	-
Nandyal Pogaku-1 (C)	-	-	73.7	-	-	39.5	-	-	15.6
Nandyal Pogaku-2 (C)	-	-	82.7	-	-	44.0	-	-	20.8
G. Mean	-	107.23	67.4	-	46.27	39.30	-	18.81	15.58
S. Em+	2.32	5.15	-	1.35	2.61	-	1.27	1.55	-
C.D. at 5%	6.89	15.86	-	4.01	8.03	-	3.78	4.79	-
C.V. (%)	6.61	8.31	-	1.76	9.75	-	4.17	14.31	-

Table 3 AVT-I *Bidi* Tobacco: Morphological characters of AVT-I entries at different centres (2024-25)

Entries	Inter-nodal length	Spangle score	Days to Init. Flow	Days to 50% flowering	Days to flower	Days to maturity	Leaf thickness (mg/cm^2)	
	NIPANI	NANDYAL	NANDYAL	NANDYAL	ANAND	ANAND	ANAND	NANDYAL
IET 113	4.96	3	129	135	99.1	11.94	31.7	12.8
IET 114	5.47	3	131	138	106.4	10.57	33.3	12.1
IET 115	3.59	4	133	140	119.9	8.92	28.4	12.0
A 119 (C)	5.69	6	118	124	96.6	12.98	31.2	12.1
GT 7 (C)	-	-	-	-	106.0	10.89	27.4	-
MRGTH-1 (C)	-	-	-	-	106.2	12.40	31.7	-
GABT-11 (C)	-	-	-	-	91.6	10.51	31.2	-
Bhavyasree (C)	5.52	-	-	-	-	-	-	-
NBD-209 (C)	5.81	-	-	-	-	-	-	-
NBD-316 (C)	6.04	-	-	-	-	-	-	-
Nandyal Pogaku-1 (C)	-	6	120	125	-	-	-	13.4
Nandyal Pogaku-2 (C)	-	3	135	150	-	-	-	12.7
G. Mean	5.30	4.17	128	135	-	-	-	12.5
S. Em+	0.42	-	-	-	2.45	-	1.35	-
C.D. at 5%	1.28	-	-	-	7.29	-	NS	-
C.V. (%)	13.61	-	-	-	4.74	-	8.80	-

Table 4 AVT-I *Bidi* Tobacco: Disease incidence and chemical quality (%) parameters at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)			Nicotine	Reducing Sugars	Chlorides
		LCA	LCC	LCD			
IET 113	0.00	-	-	Yes	6.25	6.65	0.674
IET 114	3.75	-	-	Yes	6.90	5.95	0.532
IET 115	1.25	-	Yes	-	6.85	4.34	0.816
A 119 (C)	0.00	Yes	-	-	5.33	4.48	0.710
GT -7 (C)	0.00	Yes	-	-	6.50	5.85	0.816
MRGTH- 1(C)	0.00	Yes	-	-	6.90	5.95	0.603
GABT- 11 (C)	0.00	Yes	-	-	7.15	6.17	0.639

Where, LCA = Low, LCC = 10-20%, LCD = 20-30%

COORDINATED EVALUATION OF *BIDI* TOBACCO GENOTYPES

BDABRC/ BDNBRC/ BDNyBRC 1.2: ADVANCED VARIETAL TRIAL ON *BIDI* TOBACCO (AVT-I)

Objectives: To evaluate the *Bidi* tobacco entries for yield and quality at three centres *viz.,* Anand, Nipani and Nandyal along with respective checks in AVT-I.

Year of start **:** 2024-25

Year of Completion : 2024-25

***Bidi* tobacco Centres and Investigators**

Centres	:	Investigators
Anand	:	D. A. Patel & D.R. Delvadiya
Nipani	:	S.B. Patil, Dr. Shivamurthy D. & Dr. Geeta Dandin
Nandyal	:	P. Pulli Bai & K. Satish Babu

Design : RBD
Total treatments : 02 + checks as given above
Replications : Four (04)

Entries: 02 (Two)

1. ABD 239
2. ABD 244

Checks at different Centres

Anand	1. A 119	2. GT 7	3. GABT-11	4. GABTH-2
Nipani	1. A 119	2. Bhavyashree	3. NBD 209	
Nandyal	1. A 119	2. Nandyal Pogaku-1	3.Nandyal Pogaku-2	

Plot size and spacing at the respective centres

Centre	Plot size	Spacing
Anand	3.6 × 7.5 m	0.90 m x 0.75 m
Nipani	4.0 × 7.5 m	1 m x 0.75 m
Nandyal	6.75 × 3.0 m	0.75 x 0.75 m

RESULTS

In the AVT-II, two entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Chemical quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Table 1 to 5 AVT-II *Bidi* Tobacco. The results are presented centre-wise.

ANAND

The entries were tested with four checks *viz.,* A 119, GT 7, MRGTH 1 and GABT 11. The results indicated significant yield differences among the entries tested. None of the entry had significant superiority over better check GABT11 (4217 kg/ha) for yield. The line ABD-244 and check MRGTH 1 were found free from tobacco mosaic virus disease.

Salient findings/Achievements:

- None of the line showed significant superiority for cured leaf yield over better check GABT 11. Line ABD-241 showed maximum cured leaves yield
- TMV and leaf curl incidence were found 8.13% and 10.63% for test entry ABD- 239, respectively

NIPANI

Test entry ABD 239 (1099 kg/ha) registered numerically higher leaf yield over the popular check A-119 (1091 kg/ha). But none of the test entries registered significantly superior leaf yield over the best check NBD-209 (1530 kg/ha). The other physiological parameters like plant height (133.96 cm), number of leaves per plant (13), leaf length (52.32 cm) and leaf width (22.84 cm) were also observed highest in the best check, NBD 209 compared to other entries and checks.

Salient findings/Achievements

- Test entry ABD-239 (1.45%) recorded on par nicotine, significantly higher reducing sugars (6.49%) and numerically lower chlorides (0.21%) compare to popular check, A-119
- Pooled analysis over three years revealed that none of the test entries were superior to the best check NBD 209 (1410 kg/ha)

NANDYAL

In advanced varietal trial II (2024-25) of bidi tobacco, 2 varieties along with three checks were evaluated. The entry ABD 239 (1807 kg/ha) has recorded numerically higher cured leaf yield with improvement of 11.4 % when compared to the best check Nandyal Pogaku-2 (1622 kg/ha). This entry will be promoted to OFT on bidi tobacco during 2025-26.

Salient findings /Achievements

- The entry, ABD-239 (1724 kg/ha) has recorded significantly higher cured leaf yield, showing a 14.7% improvement compared to the best check
- The entry, ABD-239 will be evaluated under OFT during 2025-26

Recommendation: The entry, ABD-239 will be evaluated under OFT during 2025-26.

Table 1 AVT-II *Bidi* Tobacco: Yield characters of AVT-II entries during 2024-25

Entries	Yield (kg/ha)			No. of leaves/ Plant		
	ANAND	NIPANI	NANDYAL	ANAND	NIPANI	NANDYAL
ABD 239	3420	1099	1807 (11.4)	23	13	22
ABD 241	4029	813	1571	24	11	20
ABD 244	3580	-	-	23	-	-
GT 7 (C)	3058	-	-	23	-	-
MRGTH-1 (C)	2781	-	-	23	-	-
GABT-11 (C)	4217	-	-	25	-	-
Bhavyasree (C)	-	-	-	-	-	-
NBD-209 (C)	-	-	-	-	-	-
A 119 (C)	2042	1091	1364	17	12	15
Nandyal Pogaku-1 (C)	-	1234	1049	-	11	18
Nandyal Pogaku-2 (C)	-	1530	1622	-	13	22
G. Mean	-	1153.48	1483	-	12.02	19.4
S. Em+	142.8	62.18	79.4	0.86	0.50	-
C.D. at 5%	424.3	186.43	240	2.55	1.51	-
C.V. (%)	8.64	12.05	11.9	7.63	9.39	-

Significant at 5%

Table 2 AVT-II *Bidi* Tobacco: Morphological characters of AVT-I entries at different centres (2024-25)

Entries	Plant Height (cm)			Leaf Length (cm)			Leaf Width (cm)		
	A	N	Ny	A	N	Ny	A	N	Ny
ABD 239	81	108.56	76.4	159	48.24	44.9	62.5	18.86	15.6
ABD 241	82	56.96	78.7	165	49.33	39.4	63.0	19.34	13.8
ABD 244	80	-	-	165	-	-	62.1	21.49	-
GT 7 (C)	62	-	-	155	-	-	60.5	21.97	-
MRGTH-1 (C)	59	-	-	155	-	-	62.9	22.84	-
GABT-11 (C)	78	-	-	161	-	-	65.3	-	-
A 119 (C)	49	107.56	83.7	149	51.57	41.7	60.2	-	14.0
Bhavyasree (C)	-	108.52	-	-	51.37	-	-	-	-
NBD-209 (C)	-	133.96	-	-	52.32	-	-	-	-
Nandyal Pogaku-1 (C)	-	-	62.9	-		33.5	-	-	11.9
Nandyal Pogaku-2 (C)	-	-	77.0	-		42.8	-	-	15.5
G. Mean	-	**103.11**	**76.0**	-	**50.56**	**40.4**	-	**20.90**	**14.14**
S. Em+	2.10	**7.05**	-	1.47	**1.06**	-	1.19	**0.83**	-
C.D. at 5%	6.25	**21.13**	-	4.36	**3.18**	-	NS	**2.50**	-
C.V. (%)	6.00	**15.29**	-	1.85	**4.70**	-	3.82	**8.91**	-

A: ANAND; N: NIPANI; Ny: NANDYAL

Table 3 AVT-II *Bidi* Tobacco: Morphological characters of AVT-I entries at different centres (2024-25)

Entries	Inter-nodal length	Spangle score	Days to flower		Days to 50% flowering	Days to maturity		Plant population
	NIPANI	NANDYAL	ANAND	NANDYAL	NANDYAL	ANAND	ANAND	NANDYAL
ABD 239	5.57	3	97.1	166	161	12.37	29.6	26
ABD 241	3.94	3	100.8	160	155	12.02	29.0	26
ABD 244	-	-	108.3	-	-	11.12	30.5	-
GT 7 (C)	-	-	97.9	-	-	15.66	27.6	-
MRGTH-1 (C)	-	-	96.5	-	-	13.09	31.0	-
GABT-11 (C)	-	-	91.6	-	-	12.50	30.1	-
Bhavyasree (C)	6.22	-	-	-	-	-	-	-
NBD-209 (C)	6.46	-	-	-	-	-	-	-
A 119 (C)	6.50	6	91.2	124	120	10.77	29.0	26
Nandyal Pogaku-1 (C)	-	5	-	125	122	-	-	28
Nandyal Pogaku-2 (C)	-	3	-	155	140	-	-	27
G. Mean	5.74	4	-	146	139.6	-	-	26.6
S. Em+	0.41	-	2.44	-	-	-	0.94	-
C.D. at 5%	1.23	-	7.26	-	-	-	NS	-
C.V. (%)	15.98	-	5.01	-	-	-	6.35	-

Table 4 AVT-II *Bidi* Tobacco: Disease incidence and chemical quality (%) parameters at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)			Nicotine	Reducing Sugars	Chlorides
		LCB	LCC	LCD			
ABD 239	8.13	-	Yes	-	6.85	5.35	0.710
ABD 241	2.50	-	Yes	-	6.25	5.97	0.532
ABD 244	0.00	-	Yes	-	6.35	5.05	0.674
A 119 (C)	5.63	-	Yes	-	5.85	4.48	0.426
GT -7 (C)	2.50	-	Yes	-	6.93	5.95	0.603
MRGTH- 1(C)	0.00	-	Yes	-	6.95	6.15	0.639
GABT- 11 (C)	8.13	-	-	Yes	7.05	6.85	0.461

Where, LCB = 10%, LCC = 10-20%, LCD = 20-30%

Table 5 AVT-II *Bidi* Tobacco: Quality parameters of entries in AVT-II at Nipani (2024-25)

Entries	Nicotine (%)	Reducing sugars (%)	Chlorides (%)
ABD 239	1.45	6.49	0.21
ABD 244	1.15	5.13	1.13
A-119 (C)	1.53	4.94	0.25
Bhavyashree (C)	1.45	5.32	0.25
NBD-209 (C)	1.37	7.17	0.25
Mean	1.39	5.81	0.42
S.Em±	0.05	0.35	0.07
C.D. @ 5%	0.15	1.08	0.22
C.V. (%)	6.93	12.05	33.71

POOLED ANALYSIS

ANAND

Three entries were tested with four checks viz., A 119, GT 7, MRGTH 1 and GABT 11 in AVT trials. The results of pooled analysis indicated significant yield differences among the entries tested. None of the entry was significantly superior over better check GABT11 (3708 kg/ha) for yield however, ABD-241 (3704 kg/ha) and ABD-244 (3537 kg/ha) were found statistically at par.

NIPANI

Pooled analysis over three years revealed that both the test entries ABD-239 (1147 kg/ha) and ABD-244 (1069 kg/ha) ware numerically superior to the popular check A-119 (929 kg/ha) but lesser than the best check NBD 209 (1410 kg/ha).

NANDYAL

The pooled results of AVT-II on *bidi* tobacco, revealed that the entry ABD-239 (1724 kg/ha) has recorded significantly higher cured leaf yield, showing a 14.7% improvement compared to the best check, Nandyal Pogaku-2 (1503 kg/ha). This entry will be evaluated under OFT during 2025-26.

Conclusion: The entry, ABD-239 (1724) will be evaluated under OFT during 2025-26.

Table 6 AVT-II *Bidi* Tobacco: Pooled analysis for yield in AVT-I and AVT-II (2023-25) at Anand

Entries	Cured Leaf (kg/ha)		Pooled Mean
	2023-24	2024-25	
ABD 239	2938	3420	3179
ABD 241	3380	4029	3704
ABD 244	3494	3580	3537
A 119 (C)	1881	2042	1961
GT 7 (C)	2114	3058	2586
MRGTH 1(C)	1910	2781	2346
GABT 11 (C)	3199	4217	3708
T			
S. Em. ±	164.2	142.8	162.9
C.D.@ 5 %	506.1	424.2	464.4
Y			
S. Em. ±	-	-	100.0
C.D.@ 5 %	-	-	346.0
Y x T			
S. Em. ±	-	-	142.7
C.D.@ 5 %	-	-	409.6
CV%	10.53	8.64	9.50

Table 7 AVT-II *Bidi* Tobacco: Pooled analysis for yield in IVT, AVT-I and AVT-II (2022-25) at Nipani

Entries	Leaf yield (kg/ha)			
	IVT (2022-23)	AVT–I (2023-24)	AVT–II (2024-25)	Pooled Average
ABD 239	800	1543	1099	1147
ABD 244	1267	1126	813	1069
A-119 (C)	773	921	1091	929
Bhavyashree (C)	1000	1500	1234	1245
NBD-209 (C)	1120	1580	1530	1410
Mean	960.03	1333.96	1153.48	1159.83
S.Em±	50.88	102.14	62.18	128.82
C.D. @ 5%	148.5	314.74	186.43	420.11
C.V. (%)	11.85	15.31	12.05	19.24

Table 8 AVT-II *Bidi* Tobacco: Pooled analysis for yield in IVT, AVT-I and AVT-II (2022-25) at Nandyal

Entries	Cured leaf yield (kg/ha)		Mean CLY (kg/ha)	% Increase over best check NP2
	2023-24	**2024-25**		
ABD 239	1641	1807	1724*	14.7
ABD 244	1308	1571	1440	
A119(C)	1113	1049	1081	
Nandyal pogaku-1(C)	1013	1364	1189	
NandyalPogaku 2(C)	1384	1622	1503	
Grand Mean	**1292**	**1483**	**1387**	
	Years	**Entries**	**Years x Entries**	
S.Em±	46.1	79.4	67.5	
C.D.at 5%	139.5	240	194	
C.V%	8.5	11.9	10.2	

ANAND

Project No.: On Farm Trial (OFT)

Research project title	**On Farm Trial**
Objectives	▪ To evaluate the performance of promising entry of *bidi* tobacco for yield and quality
Investigators	D. A.Patel & D. R. Delvadiya
Year of start	2024-25
Year of completion	2024-25
Location	BTRS, AAU, Anand

Treatments : 3 (1+2)
Spacing : 90 x 75 cm
Plot size : 18.0 x 15 m

RESULTS

ABD 241 showed maximum cured leaf yield over better check GABTH 2.

Table 1 OFT: Yield and morphological characters during 2024-25

Entries	**Cured Leaf**	**Per cent increase over checks**	
		GT 7	**GABTH 2**
ABD-241	3675	40.10	8.95
GT 7(C)	2623	-	
GABTH 2(C)	3373	-	

Table 2 OFT: Morphological characters of on farm trial entries (2024-25)

Entries	**No. of leaves/ plant**	**Days to flower**	**Days to maturity**	**Leaf length (cm)**	**Leaf width (cm)**	**Plant height (cm)**	**Leaf thickness (mg/cm^2)**
ABD-241	24	84	165	64.0	28.0	102.8	11.00
GT 7 (C)	23	70	158	60.0	27.0	98.2	12.20
GABTH 2 (C)	22	**72**	162	64.2	32.4	98.5	12.08

Table 3 BDABRC 1.2: Chemical quality (%) parameters (2024-25)

Entries	**Nicotine**	**Reducing Sugars**	**Chlorides**
ABD-241	6.20	5.67	0.562
GT -7 (C)	6.73	5.75	0.600
GABTH- 2 (C)	6.40	5.55	0.490

NIPANI

Project No.: STATION TRIAL (ST)

Research project title	**Station Trial**
Objectives	▪ Identification of superior *bidi* entries
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	15	Plot size	:	2m x 7.5m
Replications	:	2	Design	:	RBD

RESULTS

Test entry KS-15 (633 kg/ha) has registered higher leaf yield followed by KS-13 (610 kg/ha) and KS-1 (547 kg/ha). The entry KS-13 has recorded highest plant height (108.33 cm), intermodal length (5.83 cm), leaf length (36.17 cm) and leaf width (13.20 cm) compared to all other test entries.

Salient findings/Achievements

- Test entry KS-15 (633 kg/ha) has registered higher leaf yield followed by KS-13 (610 kg/ha) and KS-1 (547 kg/ha)

Table 1 ST: Data on yield and morphological characters during 2024-25

Entries	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm
KS-1	547	71.00	11	5.07	30.37	10.57
KS-2	493	80.17	14	4.60	30.80	10.87
KS-3	447	82.00	13	4.80	32.07	10.63
KS-4	416	74.00	11	4.73	29.53	9.47
KS-5	293	70.33	12	4.03	27.33	9.73
KS-6	241	66.33	11	3.97	26.87	8.93
KS-7	374	73.17	12	3.63	27.40	8.97
KS-8	507	75.50	11	4.43	30.90	10.20
KS-9	253	72.17	12	4.33	27.83	9.10
KS-10	273	72.33	12	4.33	27.83	9.20
KS-11	453	92.83	15	4.33	33.70	12.30
KS-12	533	82.33	14	4.70	33.07	11.30
KS-13	610	108.33	13	5.83	36.17	13.20
KS-14	387	90.33	19	4.80	34.77	11.97
KS-15	633*	89.67	19	3.90	27.07	8.97
Mean	430.65	80.03	13.33	4.50	30.38	10.36
S.Em±	55.64	5.26	1.17	0.45	1.46	0.52
C.D.at 5%	168.75	15.95	3.55	1.36	4.43	1.58
C.V%	18.27	9.29	12.41	14.12	6.8	7.11

Project No.: BDNBR 3.3

Research project title	Station Varietal Trial - Seeds on *bidi* tobacco
Objectives	▪ Identification of superior *bidi* tobacco entries for Karnataka
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	15 (10+5)	Plot size	:	2 × 7.5 m
Replications	:	Three	Design	:	R B D

RESULTS

The Station Varietal Trial-Seeds consisted of 10 test entries and five checks which were evaluated in RBD with three replications and spacing of 2 m x 7.5 m (Gross and Net plot). Among the 10 test entries, five entries *viz.,* NBD-S-2 (1174 kg/ha), NBD-S-20 (991 kg/ha), NBD-S-22 (998 kg/ha), NBD-S-27 (895 kg/ha) and NBD-S-26 (884 kg/ha) recorded statistically on par leaf yield compared to best check NBD-209 (Table 1 BDNBR 3.3). The entry NBD-S-2 (1174 kg/ha) recorded significantly higher leaf yield over popular check A-119 (804 kg/ha). The test entries viz., NBD-S-27 (451.44 kg/ha), NBD-S-25 (377.24 kg/ha), NBD-S-2 (345.69 kg/ha) and NBD-S-1 (328.81 kg/ha) recorded on par seed yield compared to best check NBD-209 (3952.79 kg/ha).

Salient findings/Achievements

- NBD-S-2 recorded numerically higher leaf yield and on par seed yield compared to NBD-209
- NBD-S-27 recorded numerically higher seed yield and on par leaf yield compared to NBD-209
- NBD-S-27 is proposed for IVT 2025-26

Table 1 BDNBR 3.3: Data on yield and morphological traits in SVT (Seeds) during 2024-25

SVT (Seeds)	Pedigree	Seed yield (kg/ha)	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm)
NBD-S-1	A-119 x ArBD-7	328.81	649	88.00	9	4.88	44.84	16.64
NBD-S-2	A-119 x ArBD-7	345.69	1174	91.07	10	4.85	41.24	15.90
NBD-S-3	A-119 x ArBD-7	267.49	800	103.00	14	5.33	39.40	15.36
NBD-S-20	ABD119 x ABD 69	306.59	991	107.33	12	5.80	41.00	16.64
NBD-S-21	Bhagyashree x ArBD-7	137.30	276	100.00	12	4.91	43.60	15.66
NBD-S-22	Bhagyashree x ArBD-7	297.26	998	141.67	17	6.44	45.68	18.96
NBD-S-24	Bhagyashree x ArBD-7	158.18	373	93.73	11	4.91	36.60	14.74
NBD-S-25	Bhagyashree x ArBD-7	377.24	707	92.00	12	4.89	45.84	18.20
NBD-S-26	Bhagyashree x ArBD-7	319.03	884	100.07	14	5.03	44.74	18.10
NBD-S-27	NBD 259 x TI-525	451.44	895	112.13	14	5.32	46.14	18.10
A-145	--	371.02	796	96.00	13	4.96	43.68	17.22
Vedaganga-1	--	369.69	829	129.60	13	5.95	47.26	19.64
A-119	--	384.79	804	94.47	12	5.07	45.74	17.62
Bhavya-shree	--	333.25	992	113.27	14	5.28	49.76	21.20
NBD-209	--	392.79	1089	121.00	16	5.17	49.46	20.70
	Mean	322.70	817.06	105.56	12.86	5.25	43.99	17.31
	S.Em ±	23.64	84.29	6.31	1.03	0.36	2.35	1.22
	C.D. at 5%	68.48	244.17	18.29	2.98	1.05	6.81	3.53
	C.V%	12.69	17.87	10.36	13.85	11.97	9.26	12.18

Table 2 BDNBR 3.3: Pooled seed yield (kg/ha) and leaf yield (kg/ha) data of PVT-S and Station Varietal Trial (S) (2024-25)

Entries	Pedigree	Seed yield (kg/ha)			Leaf yield (kg/ha)		
		PVT (S) 2023-24	SVT(S) 2024-25	Average	PVT (S) 2023-24	SVT(S) 2024-25	Average
NBD-S-1	A-119 x ArBD-7	446.21	328.81	387.51	1015	649	832
NBD-S-2	A-119 x ArBD-7	706.65	345.69	526.17	1120	1174	1147
NBD-S-3	A-119 x ArBD-7	508.92	267.49	388.21	1853	800	1327
NBD-S-20	ABD119 x ABD 69	500.43	306.59	403.51	2152	991	1572
NBD-S-21	Bhagyashree x ArBD-7	379.99	137.30	258.65	2443	276	1359
NBD-S-22	Bhagyashree x ArBD-7	277.33	297.26	287.30	1920	998	1459
NBD-S-24	Bhagyashree x ArBD-7	300.88	158.18	229.53	2413	373	1393
NBD-S-25	Bhagyashree x ArBD-7	449.77	377.24	413.51	716	707	711
NBD-S-26	Bhagyashree x ArBD-7	418.21	319.03	368.62	2781	884	1833
NBD-S-27	NBD 259 x TI-525	411.99	451.44	431.72	2421	895	1658
A-145	--	334.21	371.02	352.62	1779	796	1287
Vedaganga-1	--	321.77	369.69	345.73	1704	829	1266
A-119	--	435.99	384.79	410.39	1410	804	1107
Bhavyashree	--	344.44	333.25	338.85	1253	992	1122
NBD-209	--	420.92	392.79	406.86	1341	1089	1215
	Mean	356.47	322.70	--	1350.08	817.06	--
	S.Em ±	29.57	23.64	--	119.48	84.29	--
	C.D. at 5%	85.18	68.48	--	344.17	244.17	--
	C.V%	11.73	12.69	--	12.52	17.87	--

Project No.: BDNBR 4.1

Research project title	**Station Varietal Trial-I on *bidi* tobacco**
Objectives	▪ Identification of superior *bidi* tobacco entries for Karnataka under SVT-I
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	12 (8+4)	Plot size	:	2 × 7.5 m
Replications	:	Three	Design	:	RBD

RESULTS

The Station Varietal Trial (SVT) consisted of eight test entries and four checks which were evaluated in RBD with three replications and spacing of 2 m x 7.5 m (Gross and Net plot). The check Vedaganga-1 has registered higher leaf yield (1951 kg/ha), among all test entries and checks. The test entry NBD-387 (1729 kg/ha) has registered numerically higher leaf yield compared to all three checks *viz.,* Bhavyashree (1680 kg/ha), A-119 (1661 kg/ha) and NBD 209 (1319 kg/ha) and has shown highest plant height (161.67 cm). The check Vedaganga-1 has recorded higher number of leaves per plant (19), higher inter-nodal length (5.99 cm) and higher leaf length (48.83 cm) compared to other entries and checks. (Table 1 BDNBR 4.1)

Pooled analysis

Pooled analysis over two years revealed that, the test entry NBD 407 (2491 kg/ha) has registered significantly higher and the test entry NBD 387 (1533 kg/ha) has recorded numerically superior leaf yield than the best check Vedaganga-1 (1479 kg/ha) (Table 2 BDNBR 4.1).

Salient findings/Achievements

- The test entry NBD-387 (1729 kg/ha) has registered numerically higher leaf yield compared to all three checks *viz.,* Bhavyashree (1680 kg/ha), A-119 (1661 kg/ha) and NBD-209 (1319 kg/ha)
- The test entry NBD-407 (2491 kg/ha) has registered significantly higher leaf yield than the best check Vedaganga-1 (1479 kg/ha) in pooled analysis.
- NBD-407 proposed for IVT 2025-26

Table 1 BDNBR 4.1: Data on yield and morphological characters in SVT-I during 2024-25

Entries	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm)
NBD 381	1489	151.47	17	5.41	45.20	17.64
NBD 387	1729	161.67	18	5.05	46.63	18.09
NBD 388	1493	145.13	19	5.51	48.09	16.85
NBD 390	1613	161.40	19	4.83	46.33	16.03
NBD 393	1448	100.00	12	5.53	44.49	17.28
NBD 398	1422	97.07	11	5.69	46.33	18.87
NBD 406	1378	102.27	16	4.71	47.27	18.99
NBD 407	1511	90.53	17	4.91	43.23	17.89
Vedaganga-1 (C)	1951	148.73	19	5.99	48.83	16.40
A-119 (C)	1661	150.40	13	5.45	40.21	19.55
Bhavyashree (C)	1680	144.20	16	5.49	45.89	17.24
NBD-209 (C)	1319	151.13	14	6.03	43.69	16.57
Mean	1557.86	133.67	15.98	5.38	45.52	17.62
S.Em+	119.31	4.69	1.09	0.39	1.96	1.23
C.D.at 5%	349.94	13.76	3.19	1.14	5.76	3.6
C.V%	13.27	6.08	11.78	12.47	7.48	12.07

Table 2 BDNBR 4.1: Pooled leaf yield (kg/ha) data of Preliminary Varietal Trial and Station Varietal Trial (2023-25)

Entries	2023-24 (PVT)	2024-25 (SVT)	Pooled Average
NBD 381	1100	1489	1295
NBD 387	1337	1729	1533
NBD 388	1034	1493	1264
NBD 390	1240	1613	1427
NBD 393	1278	1448	1363
NBD 398	1283	1422	1353
NBD 406	1245	1378	1311
NBD 407	2491	1511	2001*
Vedaganga-1 (C)	1006	1951	1479
A-119 (C)	897	1661	1279
Bhavyashree (C)	1037	1680	1359
NBD-209 (C)	1231	1319	1275
Mean	904.9	1557.86	1439.1
S.Em±	44.22	119.31	153.87
C.D.at 5%	127.38	349.94	451.3
C.V%	6.91	13.27	18.52

Project No.: BDNBR 4.2

Research project title	**Station Varietal Trial-II on *bidi* tobacco**
Objectives	▪ Identification of superior *bidi* tobacco entries for Karnataka under SVT-II
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	13 (9+4)	Plot size	:	2 × 7.5 m
Replications	:	Three	Design	:	RBD

RESULTS

The Station Varietal Trial (SVT-R) consisted of nine test entries and four checks which were evaluated in RBD with three replications and spacing of 2 m x 7.5 m (Gross and Net plot). The two test entries NBD-360 (1458 kg/ha) and NBD-365 (1268 kg/ha) have registered significantly higher leaf yield than the best check NBD-209 (1015 kg/ha). The test entry NBD-368 (1031 kg/ha) has recorded numerically higher leaf yield compared to the best check NBD-209. Similarly higher leaf length (42.92 cm) and leaf width (17.91 cm) recoded by the test entry NBD-360 (Table 1 BDNBR 4.2).

Pooled analysis

Pooled analysis over two years revealed that, the test entry NBD 360 (1563 kg/ha) has registered significantly higher and the test entries NBD 365 (1188 kg/ha) and NBD 380 (1106 kg/ha) have recorded numerically superior leaf yield than the best check NBD 209 (1018 kg/ha) (Table 2 BDNBR 4.2).

Salient findings/Achievements

- The two test entries NBD-360 (1458 kg/ha) and NBD-365 (1268 kg/ha) have registered significantly higher leaf yield than the best check NBD 209 (1015 kg/ha)
- Pooled analysis over two years revealed that, the test entry NBD-360 (1563 kg/ha) has registered significantly higher leaf yield than the best check NBD-209 (1018 kg/ha)
- The entry NBD-360 was proposed for IVT 2025-26

Table 1 BDNBR 4.2: Data on yield and morphological characters in SVT-II (2024-25)

Entries	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm)
NBD-360	1458*	125.47	15	5.92	42.92	17.91
NBD-361	907	139.33	15	5.76	42.65	16.43
NBD-365	1268*	151.33	16	6.19	44.65	16.37
NBD-368	1031	154.13	17	5.48	42.93	17.20
NBD-373	898	158.60	17	5.87	41.27	15.61
NBD-374	915	142.00	18	5.37	42.72	15.75
NBD-375	1003	161.33	17	5.47	40.95	16.40
NBD-376	791	113.80	14	4.73	41.09	15.87
NBD-380	969	158.33	17	5.87	37.60	14.61
Vedaganga-1 (C)	773	135.47	15	6.91	39.45	14.40
A-119 (C)	977	114.13	14	4.95	40.09	14.73
Bhavyashree (C)	889	133.13	17	4.76	41.24	15.31
NBD-209 (C)	1015	131.47	16	5.55	41.35	15.23
Mean	991.94	132.89	16.00	5.60	41.46	15.83
S.Em±	81.38	4.99	0.86	0.30	1.82	0.80
C.D.at 5%	237.52	14.57	2.50	0.88	5.32	2.32
C.V%	14.21	6.18	9.27	9.35	7.61	8.71

Table 2 BDNBR 4.2: Pooled Leaf Yield (kg/ha) data of Preliminary Varietal Trial and Station Varietal Trial (R) (2023-25)

Entries	Leaf yield (kg/ha)		
	PVT (2022-23)	SVT (R) (2024-25)	Pooled average
NBD-360	1667	1458	1563*
NBD-361	1316	907	1112
NBD-365	1108	1268	1188
NBD-368	647	1031	839
NBD-373	1091	898	994
NBD-374	1164	915	1040
NBD-375	1183	1003	1093
NBD-376	1198	791	995
NBD-380	1242	969	1106
Vedaganga (C)	980	773	877
A-119 (C)	911	977	944
Bhavyashree(C)	1001	889	945
NBD 209 (C)	1021	1015	1018
Mean	937.96	991.94	1046.79
S.Em±	72.68	81.38	112.54
C.D.at 5%	212.14	237.52	328.49
C.V%	10.96	14.21	18.62

Project No.: BDNBR 4.4

Research project title	**Preliminary Varietal Trial on *bidi* tobacco**
Objectives	▪ Identification of superior *bidi* tobacco entries for Karnataka
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	30 (26+4)	Plot size	:	2 × 7.5 m
Replications	:	Two	Design	:	R B D

RESULTS

The Preliminary Varietal Trial consisted of 26 test entries and four checks which were evaluated in RBD with two replications and spacing of 2 m x 7.5 m (Gross and Net plot). Among the test entries NBD 430 (3747 kg/ha), NBD 415 (2832 kg/ha) and NBD 426 (2675 kg/ha) have recorded significant superiority for the leaf yield over the best check NBD 209 (2347 kg/ha). However, other six test entries *viz.,* NBD 431 (2646 kg/ha), NBD 425 (23837 kg/ha), NBD 427 (2347 Kg/ha), NBD 432 (2183 kg/ha), NBD 418 (2133 kg/ha) and NBD 411 (1982 kg/ha) have recorded significant superiority for the leaf yield over the local check AVedaganga-1 (1587 kg/ha) (Table 1 BDNBR- 4.4).

Salient findings/Achievements

- NBD 430 (3747 kg/ha), NBD-415 (2832 kg/ha) and NBD-426 (2675 kg/ha) have recorded significant superiority for the leaf yield over the best check NBD-209 (2347 kg/ha)

- The best test entries NBD-411, NBD-415, NBD-418, NBD-425, NBD-426, NBD-427, NBD-430, NBD-431 and NBD-432 will be evaluated in Station Varietal Trial (SVT) along with checks during 2025-26

Table 1 BDNBR 4.4: Data on yield and morphological characters in PVT during 2024-25

Entries	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm)
NBD 410	1458	122.50	15	6.54	44.76	17.46
NBD 411	1982	125.70	15	6.04	46.84	18.62
NBD 412	1560	123.20	15	6.60	50.86	20.96
NBD 413	1527	134.50	16	6.60	48.30	19.10
NBD 414	1403	121.20	16	7.40	48.70	20.46
NBD 415	2832*	120.50	14	6.76	47.40	19.32
NBD 416	1820	129.70	15	6.56	48.16	20.18
NBD 417	1673	121.80	15	5.50	49.94	20.44
NBD 418	2133	131.50	15	6.42	50.52	21.26
NBD 419	1280	125.10	15	6.02	44.26	16.26
NBD 420	1340	131.00	16	6.06	47.50	18.88
NBD 421	1494	127.00	16	6.66	47.52	18.90
NBD 422	1028	113.20	15	5.60	44.76	16.74
NBD 423	1161	118.00	15	5.52	45.20	17.92
NBD 424	1793	122.30	15	5.46	46.20	18.32
NBD 425	2387	116.50	14	5.52	44.50	17.22
NBD 426	2675*	123.20	15	6.04	45.02	17.20
NBD 427	2347	124.00	15	6.12	48.42	18.56
NBD 428	1460	113.50	15	6.06	45.86	17.26
NBD 429	1180	124.50	15	5.92	45.36	18.70
NBD 430	3747*	119.00	14	5.78	42.22	16.54
NBD 431	2646	93.00	15	5.08	39.24	15.56
NBD 432	2183	89.40	13	4.54	36.98	14.66
NBD 433	1843	88.50	13	3.82	39.32	14.44
NBD 434	1400	119.50	16	6.18	39.24	15.72
NBD 435	1553	116.00	15	6.04	43.44	21.46
Vedaganga-1 (C)	1587	125.00	15	5.44	41.18	15.68
A-119 (C)	1133	118.30	15	6.04	43.96	19.01
Bhavyashree (C)	1320	130.80	15	6.04	42.00	15.70
NBD-209 (C)	2347	137.70	16	7.08	47.16	19.28
Mean	1831.92	119.01	14.88	5.96	45.40	18.16
S.Em$\pm$	106.16	5.32	0.61	0.31	1.56	1.17
C.D.at 5%	307.06	15.38	1.76	0.38	4.50	3.39
C.V%	8.02	6.32	5.78	3.12	4.85	9.13

Project No.: BDNBR 4.6

Research project title	**Preliminary Hybrid Trial on *bidi* tobacco**
Objectives	▪ Identification of superior *bidi* tobacco hybrids for Karnataka
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Nipani

Treatments	:	34	Plot size	:	1 × 7.5 m
Replications	:	Two	Design	:	R B D

RESULTS

The Preliminary Hybrid Trial (PHT) consisted of 19 test hybrids and four checks and 11 parents were evaluated in RBD with tow replications and spacing of 1 m x 7.5 m (Gross and Net plot). Total seven test hybrids recorded significant superiority for the leaf yield over the best check NBD 209 (1167 kg/ha). The test hybrid, NBTH-1121 (MS GT-5 X NBD-343) has recorded highest leaf yield (1967 kg/ha) followed by NBTH-1117 (1652 kg/ha), NBTH-1105 (1650 kg/ha), NBTH-1122 (1623 kg/ha), NBTH-1120 (1617 kg/ha), NBTH-1119 (1567 kg/ha) and NBTH-1118 (1533 kg/ha) (Table 1 BDNBR 4.6).

Salient findings/Achievements

- The test hybrid, NBTH 1121 (MS GT-5 X NBD 343) has recorded highest leaf yield (1967 kg/ha) over the best check NBD 209 (1167 kg/ha)

- All these seven test hybrids *viz.,* NBTH-1105, NBTH-1117, NBTH-1118, NBTH-1119, NBTH-1120, NBTH-1121 and NBTH-1122 will be evaluated in SHT during 2025-26

Table 1 BDNBR 4.6: Cured leaf yield and morphological characters in PHT during 2024-25

Entries	Leaf yield (kg/ha)	Plant Height (cm)	No. of leaves/ plant	Int. length (cm)	Leaf length (cm)	Leaf width (cm)
NBTH 1104	1255	117.00	13	5.60	47.48	18.80
NBTH 1105	1650*	108.60	14	5.20	47.24	19.80
NBTH 1106	1023	113.00	13	5.14	44.18	17.94
NBTH 1107	472	88.00	11	4.54	44.16	17.72
NBTH 1108	1033	115.10	16	5.58	47.28	19.12
NBTH 1109	1057	98.60	12	4.94	43.52	17.90
NBTH 1110	1033	121.00	14	5.20	43.48	17.68
NBTH 1111	1352	122.60	14	4.94	52.40	23.10
NBTH 1112	1350	137.30	14	6.00	48.60	20.60
NBTH 1113	1400	117.00	13	5.22	43.44	17.26
NBTH 1114	1433	114.00	15	6.24	45.96	18.88
NBTH 1115	1217	154.00	16	6.14	49.36	20.04
NBTH 1116	1317	129.00	15	5.24	47.04	17.32
NBTH 1117	1652*	119.00	15	5.78	47.48	18.40
NBTH 1118	1533*	124.00	15	5.70	47.60	18.32
NBTH 1119	1567*	122.50	14	5.44	51.88	21.38
NBTH 1120	1617*	132.00	14	6.24	46.08	18.62
NBTH 1121	1967*	137.50	15	6.04	45.12	18.18
NBTH 1122	1623*	116.60	12	5.64	43.28	16.22
Vedaganga-1 (C)	1050	105.50	13	5.32	40.56	16.50
A-119 (C)	1126	119.50	13	5.60	40.28	15.12
Bhavyashree (C)	1105	106.00	13	5.92	40.24	15.08
NBD-209 (C)	1167	122.50	12	6.00	41.32	17.66
NBD 343	1200	101.00	12	5.54	43.28	16.82
NBD 344	1124	110.00	13	4.96	41.48	15.82
NBD 356	895	96.00	12	5.52	35.28	15.08
MS A 119	1160	103.50	13	6.20	43.20	16.48
MS NBD 209	1200	115.50	12	5.48	39.52	15.50
MS NPN 22	1326	132.00	12	5.94	39.04	16.44
MS Bhagyashree	1300	140.00	14	6.10	39.52	15.28
MS Vedaganga	900	122.50	15	5.96	37.12	15.06
MS A-2	1333	132.00	14	5.94	37.64	16.06
MS PL- 5	1131	136.20	14	5.88	39.32	16.68
MS GT-5	1090	136.60	15	6.00	38.00	16.00
Mean	1273.46	117.94	13.48	5.58	44.32	17.75
S.Em±	111.50	7.34	0.99	0.18	1.57	0.69
C.D.at 5%	320.82	21.13	2.86	0.51	4.52	1.97
C.V%	12.38	8.81	10.43	4.47	5.02	5.46

Project No.: BDNBR 5

Research project title	GENERATION OF BREEDING MATERIAL
Objectives	▪ Breeding for higher yield and quality coupled with disease resistance
Investigators	S.B. Patil, Shivamurthy D. & Geeta Dandin
Year of start	2024-25
Year of completion	-
Location	ARS, Nipani

Project No.: BDNBR 5.1

Research project title	Generation of New Crosses

RESULTS

A total of 31 new inter varietal crosses were generated for good leaf yield, quality and disease and pest resistance.

Salient findings/Achievements

- The new cross combinations will be evaluated for their yield and agronomic characters during 2025-26

Table 1 BDNBR 5.1: List of inter varietal crosses generated during 2024-25

Objective: High & quality leaf yield coupled with disease & pest resistance

S. No.	Crosses
1.	A-119 x NBD 316
2.	NBD 316 x A-119
3.	NBD 209 x NBD 316
4.	NBD 316 x NBD 209
5.	NBD 316 x Bhavyashree
6.	A-428 x A-119
7.	A-428 x NBD 209
8.	NBD 316 x IET 137
9.	NBD 316 x IET 138
10.	NBD 316 x IET 139
11.	NBD 316 x IET 140
12.	NBD 316 x IET 141
13.	NBD 316 x IET 142
14.	NBD 209 x IET 137
15.	NBD 209 x IET 138
16.	NBD 209 x IET 139
17.	NBD 209 x IET 140
18.	NBD 209 x IET 141
19.	NBD 209 x IET 142
20.	IET 137 x NBD 316

S. No.	Crosses
21.	IET 138 x NBD 316
22.	IET 139 x NBD 316
23.	IET 140 x NBD 316
24.	IET 141 x NBD 316
25.	IET 142 x NBD 316
26.	IET 137 x NBD 209
27.	IET 138 x NBD 209
28.	IET 139 x NBD 209
29.	IET 140 x NBD 209
30.	IET 141 x NBD 209
31.	IET 142 x NBD 209

Objective: To maintain A line and released varieties

Table 2 BDNBR 5.1: List of new MS based crosses generated during 2024-25

S.No.	Entry Name	S.No.	Entry Name
1	MS A-119 x A-119	1	A-119
2	MS NBD-209 x NBD 209	2	NBD-209
3	MS Bhavyashree x Bhavyashree	3	Bhavyashree
4	MS Bhagyashree x Bhagyashree	4	Bhagyashree
5	MS Vedagandga x Vedaganga	5	Vedaganga
6	MS A-2 x A-2	6	A-2
7	MS PL-5 x PL-5	7	PL-5
8	MS GT-5 x GT-5	8	GT-5

Objective: To maintain CMS Lines for NBD316

Table 2 BDNBR 5.1: List of new MS based crosses generated during 2024-25

S.No.	Crosses
1.	MS A-119 x NBD 316
2.	MS NBD-209 x NBD 316
3.	MS Bhavyashree x NBD 316
4.	MS Bhagyashree x NBD 316
5.	MS Vedagandga x NBD 316
6.	MS A-2 x NBD 316
7.	MS PL-5 x NBD 316
8.	MS GT-5 x NBD 316

Project No.: BDNBR 5.2

Research project title	Generation of breeding material (F_1 evaluation)

Evaluation of F_1s

A total 45 F_1s evaluated along with four checks *viz.,* Vedaganga-1, A-119, Bhavyashree and NBD-209. Out of 45 F1s, the cross combinations A-119 x NBD 344, A-2 x NBD 344, Vedaganga-1 x A-428, NBD 209 x A-428 and NBD 316 x A-428 were found to be potential heterotic cross combinations and will be advanced to F_2 generation during 2025-26 (Table 1 BDNBR 5.2).

Salient findings/Achievements

- The potential heterotic cross combinations selected based on visual and yield performance will be advanced to next generation (F_2).

Objective: Identification of superior bidi entries for Karnataka

Table 1 BDNBR 5.2: Selected F_1s for advancement of F_2 (2024-25)

S.No	F_1	Leaf yield potential (kg/ha)
1	A-119 x NBD 344	2460
2	A-2 x NBD 344	2320
3	Vedaganga-1 x A-428	1340
4	NBD 209 x A-428	2660
5	316 x A-428	2900

Project No.: BDNBR 5.2

Research project title	Generation of breeding material (F_2 evaluation)

Evaluation of F_2s

A total eight F_2 population namely, ABD 226 x A-119, ABD 228 x A-119, ABD 228 x NBD 209, ABD 228 x Vedaganga-1, ABD 229 x NBD 209, A-119 x ABD 228, ABD 209 x ABD 226 and NBD 316 x ABD 226 were evaluated. Total 99 plants were selected from eight populations and finally 42 plants selected based on yield performance will be advanced to next generation (F_3) which are given in the following table.

Salient findings/Achievements

- A total of 42 plants were selected based on the visual observation and yield performance will be advanced to F_3 generation.

Table 1 BDNBR 5.3: Data on F_2 plants selected for advancement of F_3 generation (2024-25)

Entries	Plants population maintained	Initial selection	Final selection
ABD 226 x A-119	400	10	4
ABD 228 x A-119	400	7	6
ABD 228x NBD209	400	16	4
ABD 228 x Vedaganga-1	400	16	9
ABD 229x NBD209	250	13	4
A-119x ABD228	400	10	5
NBD209x ABD226	170	13	7
NBD316x ABD226	190	14	3
	Total	**99**	**42**

Table 2 BDNBR 5.3: List of F_3 population 2024-25

S. No.	Entry code	Pedigree
1	2022-1-4-4	NBD 209 x ABD 101
2	2022-2-15-6	NBD 209 x ABD 95
3	2022-2-15-10	NBD 209 x ABD 95
4	2022-3-5-8	NBD 316 x ABD 95
5	2022-3-6-4	NBD 316 x ABD 95
6	2022-3-24-2	NBD 316 x ABD 95
7	2022-3-35-7	NBD 316 x ABD 95
8	2022-3-35-9	NBD 316 x ABD 95
9	2022-3-43-3	NBD 316 x ABD 95
10	2022-4-15-3	NBD 316 x NBD 111
11	2022-4-18-9	NBD 316 x NBD 111
12	2022-5-4-10	NBD 316 x S-20

Project No.: BDNBR 5.3

Research project title	**Generation of breeding material (F_3 evaluation)**

Evaluation of F_3s

Twelve F3 families of the Five, NBD 209 x ABD 101, NBD209 x ABD 95, NBD 316x ABD 95, NBD 316x NBD 111and NBD 316 x S-20 were evaluated for leaf yield and its attributes. A total of 22 plants out of five crosses selected and finalised based on visual and yield performance will be advanced to next generation (F4) which are given in the following table.

Salient findings/Achievements

- Twenty two superior progenies selected from F_3 families of above mentioned pedigrees will be advanced to next generation (F_4)

Table 1 BDNBR 5.4: Data on selected F_3's for advancement to F_4 generation

Entries	Plants population maintained	Initial selection	Final selection
NBD 209 x ABD 101	40	5	3
NBD209 x ABD 95	80	11	5
NBD 316x ABD 95	240	24	10
NBD 316x NBD 111	80	4	3
NBD 316 x S-20	40	2	1
	Total	**46**	**22**

Table 2 BDNBR 5.4: List of F_4 population

S. No.	Entry Code	Pedigree
1	2021-1-1/2-4/3-9	A-119 x NBD 276
2	2021-1-1/6-3/6-4	A-119 x NBD 276
3	2021-1-1/6-3/7-6	A-119 x NBD 276
4	2021-1-1/6-3/8-8	A-119 x NBD 276
5	2021-2-1/4-8/5-7	A-119 x NBD 277
6	2021-3-1/3-6/2-1	NBD 209 x NBD 277
7	2021-3-1/3-6/3-5	NBD 209 x NBD 277
8	2021-3-1/3-6/3-9	NBD 209 x NBD 277
9	2021-3-2/9-4/4-6	NBD 209 x NBD 277
10	2021-4-1/8-2/3-8	Vedaganga-1 x NBD 277
11	2021-4-1/2-6/1-4	Vedaganga-1 x NBD 277
12	2021-4-1/2-6/2-10	Vedaganga-1 x NBD 277
13	2021-5-2/2-3/10-8	A-2 x NBD 277
14	2021-5-2/6-2/22-7	A-2 x NBD 277
15	2021-12-2/5-9/2-5	Bhagyashree x NBD 277
16	2021-12-2/5-9/2-9	Bhagyashree x NBD 277

Project No.: BDNBR 5.5

Research project title	**Generation of breeding material (F_4 evaluation)**

Evaluation of F_4s

Sixteen F_4 lines evaluated in an un replicated yield trial. The F_4 lines were evaluated for yield and yield attributes and superior lines were selected and will be tested in F_5 (PVT) during 2025-26.

Salient findings/Achievements

- Twenty-five entries forwarded to F_5 from F_4 generation

Table 1 BDNBR 5.4: F_4 lines forwarded to F_5

Entry code	Pedigree	Plants population maintained	Initial Selection	Final Selection
2021-1-1/2-4/3-9	A-119 x NBD 276	60	2	2
2021-1-1/6-3/6-4	A-119 x NBD 276	60	4	2
2021-1-1/6-3/7-6	A-119 x NBD 276	60	7	3
2021-1-1/6-3/8-8	A-119 x NBD 276	60	5	1
2021-2-1/4-8/5-7	A-119 x NBD 277	60	5	1
2021-3-1/3-6/2-1	NBD 209 x NBD 277	60	4	3
2021-3-1/3-6/3-5	NBD 209 x NBD 277	60	0	0
2021-3-1/3-6/3-9	NBD 209 x NBD 277	60	3	1
2021-3-2/9-4/4-6	NBD 209 x NBD 277	60	4	2
2021-4-1/8-2/3-8	Vedaganga-1 x NBD 277	10	4	3
2021-4-1/2-6/1-4	Vedaganga-1 x NBD 277	20	0	0
2021-4-1/2-6/2-10	Vedaganga-1 x NBD 277	20	3	2
2021-5-2/2-3/10-8	A-2 x NBD 277	30	1	1
2021-5-2/6-2/22-7	A-2 x NBD 277	60	3	1
2021-12-2/5-9/2-5	Bhagyashree x NBD 277	60	4	1
2021-12-2/5-9/2-9	Bhagyashree x NBD 277	60	3	2
	Total	**800**	**52**	**25**

NANDYAL

Project No.: OFT

Research project title	**On Farm Trial on *bidi* tobacco**
Objectives	▪ To evaluate the performance of promising *bidi* tobacco entries under Nandyal conditions in on-farm trial
Investigators	P. Pulli Bai , K. Sathish Babu & L.K. Prasad
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments : 6 (3+3) Plot size : 1000 m^2
Design : Non-replicated

RESULTS

The on-farm trial (2024-25) conducted across five farmer fields in Midthur and JP Bunglow mandals.Three hybrids along with three checks were evaluated. Among the hybrids, NyBTH-152 recorded the higher mean cured leaf yield (2594 kg/ha**)** showing 20.4% increase over the best check Nandyal Pogaku-2 (2154 kg/ha)**.** NyBTH-157 (2409 kg/ha) and NyBTH-171(2400 kg/ha) also performed well, with yield advantages of 11.8% and 11.4%**,** respectively, over Nandyal Pogaku 2 (2154 kg/ha).Farmers opined the NyBTH-52 having more price Rs.158/kg of cured leaf with good quality (Table 1 OFT).The pests and diseases were observed under field condition is below ETL. During 2025-26 the above hybrids will be evaluated under farmers' fields of Nandyal and Kurnool dt.

Salient Findings/Achievements

- NyBTH-152 recorded the higher mean cured leaf yield (2594 kg/ha**)** showing 20.4% increase over the best check Nandyal Pogaku-2 (2154 kg/ha)
- NyBTH-157 (2409 kg/ha) and NyBTH-171 (2400 kg/ha) also performed well, with yield advantage of 11.8% and 11.4%**,** respectively, than the check Nandyal Pogaku-2 (2154 kg/ha)

Table 1 OFT: Morphological characters & (2023-24)

Name of the farmer	**Villages**	**Bidi tobacco hybrids cured leaf yield (kg/ha)**			**Checks cured leaf yield (kg/ha)**		
		NyBTH-152	**NyBTH-157**	**NyBTH-171**	**A119**	**NP-1**	**NP-2**
Daveedu	Midthur (M) Kadumuru (vi)	2610	2507	2460	1427	1660	2200
Bhaskar	Midthur (M) Kadumuru (vi)	2560	2395	2395	1500	1715	2150
PullamRaju	Midthur (M) Kadumuru (vi)	2593	2350	2355	1430	1685	2068
Sudhakar Reddy	JP Bunglow (M) Parumanchala (vi)	2625	2310	2340	1425	1760	2144
Ayyanna	Midthur (M) Kadumuru (vi)	2580	2483	2452	1410	1730	2210
	Mean cured leaf yield (kg/ha)	2594	2409	2400	1438	1710	2154
	% IOC (NP-2)	20.4	11.8	11.4			

Table 2 OFT: Incidence of pest and disease (2024-25)

Entries	**Mealy bug (0-4)**	**Frog eye leaf spot (0-5)**	Leaf curl **(0-9)**	Leaf blight /burn **(0-9)**
NyBTH 152	1	1	0	0
NyBTH 157	1	1	0	0
NyBTH 171	1	1	0	0
Nandyal Pogaku-2 (C)	0	1	0	3
Nandyal Pogaku-1 (C)	1	2	1	0
A119 (C)	2	2	2	0

Project No.: ST

Research project title	**Station Trial on *bidi* tobacco**
Objectives	▪ To evaluate the performance of promising *bidi* tobacco entries under Nandyal conditions in on-farm trial
Investigators	P. Pulli Bai , K. Sathish Babu & L.K. Prasad
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments	:	18 (15+3)	Spacing	:	75 x 75 cm
Replications	:	Two	Plot size	:	6.75 × 2.25 m
Design	:	RBD	DOS	:	30.07.2024
DOP	:	04.10.2024	DOH	:	18.02.2025

RESULTS

In row replicated yield trial (2024-25) on *bidi* tobacco, 15 entries along with three checks were evaluated. None of the entries were recorded significantly higher cured leaf yield when compared to the best check Nandyal Pogaku-2 (Table 1 ST). These entries will not be evaluated during 2025-26.

Salient findings/Achievements

- None of the entries were recorded significantly higher cured leaf yield when compared to the best check Nandyal Pogaku-2

Table 1 ST: Data on cured leaf yield and morphological characters (2024-25)

Entries	**Cured leaf yield (kg/ha)**	**Plant popln**	**Days to Inti. flo.**	**Days to 50% flo.**	**No.of leaves /pl.**	**Pl.ht (cm)**	**Leaf length (cm)**	**Leaf width (cm)**	**Spangle score**
KS 6-2	1759	16	140	147	23	84.4	40.5	17.1	5
KS 6-1	1670	15	142	148	22	76.5	35.7	16.3	3
KS 4-1	1667	16	141	148	19	68.5	37.0	13.0	4

Entries	Cured leaf yield (kg/ha)	Plant popln	Days to Inti. flo.	Days to 50% flo.	No.of leaves /pl.	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)	Spangle score
KS 6-4	1652	18	143	151	20	68.4	34.4	12.9	4
KS 6-3	1617	18	145	152	20	81.1	35.9	16.5	5
KS 4-4	1607	15	143	142	18	74.1	35.9	14.1	3
KS 5-4	1569	18	135	141	20	69.4	37.2	12.8	4
KS 4-5	1540	17	143	153	21	65.7	34.3	14.0	3
KS 5-2	1532	18	143	147	19	70.9	34.7	14.1	4
KS 4-3	1520	17	143	152	21	63.6	35.0	13.7	4
KS 5-5	1499	17	136	143	20	65.2	33.4	13.4	4
KS 6-5	1497	17	143	150	20	67.7	38.9	14.5	3
KS 4-2	1477	16	143	150	18	70.9	37.2	14.0	4
KS 5-3	1452	18	141	147	20	65.5	33.2	13.5	4
KS 5-1	1442	17	144	149	21	70.2	33.8	13.2	4
A119 (C)	1516	17	122	126	17	62.9	33.9	12.5	6
Nandyal pogaku-1 (C)	1751	16	124	128	20	79.1	40.4	15.1	5
Nandyal pogaku-2 (C)	1773	17	141	148	22	83.2	44.3	16.5	3
GM	1586	16.8	139.5	145.6	20.06	71.5	36.4	14.3	4
SEm$\pm$	155								
C.D. at 5%	NS								
C.V%	13.8								

BDNyBR 4: HYBRIDIZATION AND SELECTION TO EVOLVE SUPERIOR *BIDI* TOBACCO VARIETIES/HYBRIDS

Project No.: BDNyBR 4.1

Research project title	**Observational Varietal Trial-I on *bidi* tobacco**
Objectives	▪ To evolve high yielding and better quality *bidi* tobacco hybrids with good aroma. ▪ To develop *bidi* tobacco hybrids with lower levels of smoke toxicants *viz.,* tar, Carbon monoxide (CO), polyphenol and smoke nicotine.
Investigators	P. Pulli Bai , K. Sathish Babu & L.K. Prasad
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments	:	21 (18+3)	Spacing	:	75 x 75 cm
Replications	:	Two	Plot size	:	6.75 × 1.50 m
Design	:	RBD			

RESULTS

In observational varietal trial- I (2024-25) on *bidi* tobacco, 18 entries along with three checks were evaluated. None of the entries recorded significantly higher cured leaf yield. However, the entry NyBD 104 (1461 kg/ha) was recorded on par cured leaf yield with the best check, Nandyal Pogaku 1 (1461 kg/ha) (Table 1 BDNyBR 4.1). In this trial all the entries completely inundated with water logging followed by moisture stress, recorded lower yields. This trial will be evaluated under OVT II on *bidi* tobacco during 2025-2026.

Salient Findings/Achievements

- NyBD-104 (1461 kg/ha) was recorded on par cured leaf yield with the best check, Nandyal Pogaku-1 (1461 kg/ha).

Table 1 BDNyBR 4.1: Data on cured leaf yield (kg/ha) and morphological characters (2024-25)

Entries	Cured leaf yield	Plant popln	Days to 50% flow.	No.of leaves/ pl.	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)	Spangle score	LT (mg/ cm^2)
NyBD 97	1244	17	134	19	77.3	32.9	11.75	4	16.7
NyBD 98	1285	17	133	23	69.2	32.0	11.8	4	15.8
NyBD 99	1380	17	132	20	70.4	30.4	9.5	4	16.5
NyBD 100	1329	15	138	17	68.8	32.5	9.8	5	15.2
NyBD 101	1291	15	134	17	78.5	28.8	9.1	5	15.6
NyBD 102	1355	16	136	21	78.7	29.9	9.3	5	13.8
NyBD 103	1409	17	136	19	70.3	31.5	9.3	4	14.7
NyBD 104	1461	16	135	19	63.8	33.9	9.0	4	15.4
NyBD 105	1441	16	134	21	65.1	31.0	9.4	3	14.7
NyBD 106	1102	16	135	19	59.3	28.0	9.6	4	13.8
NyBD 107	1164	16	136	19	66.6	30.0	9.5	3	12.9
NyBD 108	1275	16	135	19	61.5	28.8	8.5	3	13.1
NyBD 109	1377	16	137	19	65.7	29.3	9.4	4	13.8
NyBD 110	1327	17	137	21	76.6	26.4	9.4	2	15.8
NyBD 111	1359	17	138	19	76.9	34.3	10.2	3	14.0
NyBD 112	1356	16	139	22	59.2	32.4	9.9	4	14.7
NyBD 113	1354	17	137	22	67.3	29.0	8.2	4	14.5
NyBD 114	1141	17	136	17	60.5	32.2	8.6	4	15.4
A119 (C)	1316	17	130	16	64.4	31.0	7.3	6	15.4
Nandyal pogaku-1 (C)	1461	17	132	19	55.4	38.2	9.7	5	16.1
Nandyal Pogaku-2 (C)	1386	16	145	22	67.9	34.8	11.8	4	16.1
GM	1324	16.3	136	19	67.8	31.3	9.6	4	15.0
SEm±	45.39								
C.D.@5%	134.86								
C.V%	6.8								

Project No.: BDNyBR 4.2

Research project title	**Observational varietal trial-II on *bidi* tobacco**
Objectives	▪ To evolve high yielding and better quality *bidi* tobacco hybrids with good aroma ▪ To develop *bidi* tobacco hybrids with lower levels of smoke toxicants *viz.,* tar, Carbon monoxide (CO), polyphenol and smoke nicotine
Investigators	P. Pulli Bai , K. Sathish Babu & L.K. Prasad
Year of start	2024-25
Year of completion	2025-26
Location	AINPT, RARS, Nandyal

Treatments	:	6 (3+3)	Spacing	:	75 x 75 cm
Replications	:	Four	Plot size	:	6.75 × 2.25 m
Design	:	R B D			

RESULTS

In observational varietal trial-II (2024-25) on bidi tobacco, 3 entries along with three checks were evaluated. None of the entry has recorded significantly higher cured leaf yield when compared to the checks Nandyal Pogaku-1 and Nandyal Pogaku-2 but when compared with the check A119 (1453 kg/ha), 3 entries NyBD-96 (1737 kg/ha), NyBD-95 (1697 kg/ha) & NyBD-91 (1689 kg/ha) recorded significantly higher cured leaf yield with improvement of 16.2 %-19.5% (Table 1 BDNyBR 4.2).

Pooled analysis

The pooled cured leaf yield performance of observational varietal Trial II on bidi tobacco during (2023-24 and 2024-25), 3 entries along with three checks were evaluated. None of the entry has recorded significantly higher cured leaf yield when compared to the check Nandyal Pogaku-2 but when compared with the checks A119 (1393 kg/ha) & Nandyal pogaku-1 (1619 kg/ha), the entry NyBD-91 (1793 kg/ha) has recorded significantly higher cured leaf yield, showing an improvement of 10.7% (Table 2 BDNyBR 4.2). NyBD-91 proposed for for IVT trials during 2025-26.

Salient Findings/Achievements

- None of the entry has recorded significantly higher cured leaf yield when compared to the check Nandyal pogaku 2
- NyBD-91 (1793 kg/ha) has recorded significantly higher cured leaf yield, showing an improvement of 10.7 % with the checks A119 (1393 kg/ha) & Nandyal pogaku 1(1619 kg/ha)

Table 1 BDNyBR 4.2: Yield and Morphological characters in OVT-II (2024-25)

Entries	Cured leaf yield (kg/ha)	Plant popln	Days to Inti. flo.	Days to 50% flow.	No.of leaves /pl.	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)	Spangle score	LT (mg/ cm^2)	% IOC (A119)
NyBD 91	1689	17	132	140	22	80.8	33.1	12.1	4	14.03	16.2
NyBD 95	1697	16	129	135	23	79.9	38.0	13.0	4	14.26	16.7
NyBD 96	1737	17	131	138	23	78.5	33.6	12.7	5	14.60	19.5
A119 (C)	1453	18	120	124	16	74.3	34.2	11.0	6	12.79	
Nandyal pogaku-1 (C)	1748	18	122	130	20	80.1	39.8	13.7	5	14.37	
Nandyal Pogaku-2 (C)	1847	16	135	155	22	84.6	40.2	14.1	3	14.48	
GM	1695	17.0	128.2	137.0	21.0	79.7	36.5	12.8	4.5	14.09	
SEm±	36.2										
C.D. at 5%	105.4										
C.V%	5.0										

Table 2 BDNyBR 4.2: Pooled data on cured leaf yield in OVT-II (2023-25)

Entries	Cured leaf yield (kg/ha)		Mean Cured leaf yield (kg/ha)	% Increase over check
	2023-24	2024-25		
NyBD-91	1896	1689	1793*	10.7
NyBD-95	1634	1697	1665	
NyBD-96	1562	1737	1650	
A119 (C)	1333	1453	1393	
Nandyal Pogaku-1 (C)	1490	1748	1619	
Nandyal Pogaku-2 (C)	1554	1847	1701	
Grand Mean	1578	1695	1637	
	Years	**Entries**	**Years x Entries**	
S.Em±	58.1	36.2	46.9	
C.D.at 5%	145.3	105.4	135.6	
C.V%	9.0	5.0	7.7	

Project No.: BDNyBR 4.2

Research project title	**Observational Hybrid Trial-II on *bidi* tobacco**
Objectives	▪ To evolve high yielding and better quality *bidi* tobacco hybrids with good aroma. ▪ To develop *bidi* tobacco hybrids with lower levels of smoke toxicants *viz.,* tar, Carbon monoxide (CO), polyphenol and smoke nicotine.
Investigators	P. Pulli Bai , K. Sathish Babu & L.K. Prasad
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments	:	13 (9+4)	Spacing	:	75 x 75 cm
Replications	:	Three	Plot size	:	6.75 × 2.25 m
Design	:	RBD	Fertilizer	:	NPK 110:70:50 kg/ha

RESULTS

In observational hybrid trial-II (2024-25) on bidi tobacco, 9 hybrids along with four checks were evaluated. None of the entries recorded significantly higher cured leaf yield. However, the entry NyBTH 210 (1500 kg/ha) was recorded on par cured leaf yield with the best check, NandyalPogaku1 (1469 kg/ha) (Table 1 BDNyBR 4.2). During 2025-26 these hybrids will not be evaluated.

Pooled analysis

Pooled cured leaf yield performance of observational hybrid trial-II on bidi tobacco during (2023-24 and 2024-25), nine hybrids along with four checks were evaluated. None of the hybrids recorded significantly higher cured leaf yield when compared with the best check, NandyalPogaku2 (1304 kg/ha) (Table 2 BDNyBR 4.2). No hybrid will be promoted to IHT during 2025.

Salient findings/Achievements

- None of the hybrids recorded significantly higher cured leaf yield when compared with the best check, Nandyal Pogaku-2 (1304 kg/ha)

Table 1 BDNyBR 4.2: Data on Morphological characters & yield in OHT-II (2024-25)

Entries	Plant popln	Days to Inti. flo.	Days to 50% flow.	No.of leaves /pl.	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)	Spangle score	LT (mg/ cm^2)	Cured leaf yield (kg/ha)
NyBTH 208	16	131	140	19	75.8	36.3	11.1	5	15.8	1345
NyBTH 209	16	137	145	22	83.1	34.6	9.8	5	15.2	1250
NyBTH 210	17	133	138	14	83.7	36.4	11.6	4	15.2	1500
NyBTH 211	18	126	130	19	80.7	39.4	14.9	4	16.1	1397
NyBTH 212	17	139	142	19	78.7	45.8	16.5	5	15.8	1329
NyBTH 213	17	132	138	17	83.7	45.0	16.0	5	14.9	1345
NyBTH 214	16	134	140	19	86.3	44.6	16.6	4	15.1	1364
NyBTH 215	18	137	144	19	86.0	45.6	16.3	4	13.9	1357
NyBTH 216	17	133	139	18	85.6	41.2	15.2	4	14.0	1274
Nandyal pogaku-1(C)	18	125	130	17	77.8	45.0	15.3	5	16.1	1469
NandyalPogaku 2(C)	17	141	153	20	80.4	45.0	15.0	3	15.8	1465
GABTH 2(C)	17	155	165	21	63.4	43.8	15.0	2	15.5	1328
A119 (C)	17	123	127	17	70.2	37.5	11.5	6	13.4	1177
GM	17	134.00	140.00	18.42	79.58	41.6	14.2	4.42	15.2	1354
SEm+										45.12
C.D.@5%										132.4
C.V%										6.0

Table 2 BDNyBR 4.2: Pooled data of cured leaf yield performance of OHT-II (2023-25)

Name of the entries	Cured leaf yield (kg/ha)		Mean
	2023-24	2024-25	
NyBTH 208	1082	1345	1214
NyBTH 209	1096	1250	1173
NyBTH 210	1032	1500	1266
NyBTH 211	1151	1397	1274
NyBTH 212	1177	1329	1253
NyBTH 213	1043	1345	1194
NyBTH 214	1042	1364	1203
NyBTH 215	1038	1357	1197
NyBTH 216	1090	1274	1182
Nandyal Pogaku-1(C)	1112	1469	1290
Nandyal Pogaku-2(C)	1142	1465	1304
GABTH 2(C)	1029	1328	1178
A119 (C)	1038	1177	1108
Grand Mean	1083	1354	1218
	Years	**Entries**	**Years x Entries**
S.Em±	11.87	30.28	42.83
C.D.at 5%	33.89	86.28	122.0
C.V%	9.0	6.0	7.5

BDNyBR 5: STUDY AND GENERATION OF BREEDING MATERIAL

Project No.: BDNyBR 5.1

Research project title	**Study and Generation of Breeding Material in bidi tobacco**
Objectives	▪ To evolve high yielding and better quality *bidi* tobacco hybrids with good aroma ▪ To develop *bidi* tobacco hybrids with lower levels of smoke toxicants *viz.,* tar, Carbon monoxide (CO), polyphenol and smoke nicotine
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	Long term
Location	AINPT, RARS, Nandyal

DOS: 25-07-2024 & 27-07-2024 DOT: 08-10-2024 & 10-10-2024

RESULTS

The following crosses were made

S.No.	**Cross combination**	**Objective**
1	A 119 X NyBD 92	Drought tolerant high nicotine
2	A 119 X NyBD 91	Drought tolerant high nicotine
3	ABD 252 X NyBD 92	Higher cured leaf yield
4	ABD 252 X NyBD 91	Higher cured leaf yield

2. Maintenance of CMS and parental lines for hybrid seed multiplication

RESULTS

CMS A119 X A119, CMS GT4 X GT4, CMS GT5 X GT5 & CMS GT7 X GT7 and seed multiplication of parental lines for evaluation of station hybrid trials.

Project No.: BDNyBR 5.2

Research project title	**Study of F_1 generation**
Objective	Drought tolerant higher cured leaf yield with high nicotine content.

DOS: 27-07-2024 DOT: 11-10-2024

RESULTS

In F_1 generation 4 crosses were evaluated during 2024-25 and these will be forwarded under F_2 generation during 2025-26.

Table BDNyBR 5.2: Study of F_1 generation

Crosses	**Objective**
GABT 11 X ABD-239	Drought tolerant higher cured leaf yield with high nicotine content
GABT 11 X ABD-244	Drought tolerant higher cured leaf yield with high nicotine content
NBD 260 X ABD-239	Higher cured leaf yield with high nicotine content
NBD 260 X ABD-244	Higher cured leaf yield with high nicotine content

Project No.: BDNyBR 5.3

Research project title	Study of segregating generations in *bidi* tobacco

DOS: 29-07-2024 DOT: 11-10-2024

RESULTS

During *Kharif,* 2024-25, 9 *bidi* tobacco crosses were evaluated under F_2 generation, 38 superior single plants were selected and these will be further evaluated under F_3 generation during 25-26.

Table BDNyBR 5.3: Evaluation of F_2 generation

Cross combination	Objective	No. of single plants selected
ABD 132 (NP-2) X NBD 276	Drought tolerant, higher cured leaf yield	4
ABD 132 (NP-2) X ABD146	Drought tolerant, higher cured leaf yield	4
ABD 132 (NP-2) X NBD 289	Drought tolerant, higher cured leaf yield	3
NyBD 56 X NBD 276	Early drought tolerant, higher cured leaf yield with high nicotine content	5
NyBD 56 X ABD 146	Early drought tolerant, higher cured leaf yield with high nicotine content	6
NyBD 56 X NBD 289	Early drought tolerant, higher cured leaf yield with high nicotine content	4
NP 1 X NBD 276	Early drought tolerant, higher cured leaf yield with high nicotine content	5
NP 1 X ABD 146	Early drought tolerant, higher cured leaf yield with high nicotine content	3
NP 1 X NBD 289	Early drought tolerant, higher cured leaf yield with high nicotine content	4
	Total	**38**

Project No.: BDNyBR 5.4

Research project title	Evaluation of F_3 generation

DOS: 29-07-2024 DOT: 11-10-2024

RESULTS

During *Kharif* 2024-25, 6 bidi tobacco crosses were evaluated under F_3 generation, 40 plant progenies studied from these 23 superior single plants were selected and these will be further evaluated under F_4 generation during 2025-26.

Table BDNyBR 5.4: Evaluation of F_3 generation

S.No	Crosses	Objective	No. of plant progenies studied	No. of SPs
1	GT7 X ABD-211	Drought tolerant higher cured leaf yield with good leaf quality	6	4
2	GT7 X NyBD-56		8	5
3	GT4 X NyBD-56		6	3
4	GT4 XABD-211		9	6
5	A119XABD-211		6	2
6	A119 XNyBD-56		5	3
	Total		**40**	**23**

Project No.: BDNyBR 5.5

Research project title	Evaluation of F_4 generation

DOS: 29-07-2024 DOT: 11-10-2024

RESULTS

During *Kharif* 2024-25, 6 bidi tobacco crosses were evaluated under F_4 generation, 21 plant progenies studied from this 24 superior single plants were selected and these will be further evaluated under F_5 generation during 2025-26.

Table BDNyBR 5.5: Evaluation of F_4 generation

S.No	Crosses	Objective	No. of plant progenies studied	No. of SPs
1	GT4 XABD196	Drought tolerant higher cured leaf yield with good leaf quality	3	5
2	GT4X NyBD 62		2	3
3	GT7X ABD 196		4	3
4	GT7X NyBD 62		5	4
5	A119XABD 196		4	4
6	A119XNyBD 62		3	5
	Total		**21**	**24**

Project No.: BDNyBR 5.6

Research project title	Evaluation of F_5 generation
Objectives	Drought tolerant higher cured leaf yield with less smoke toxicants

DOS: 30-07-2024 DOT: 18-10-2024

RESULTS

During Kharif 2024-25, 6 F_5 *bidi* crosses were evaluated from 19 single plant progenies 25superior single plants were selected and promoted to F_6 generation during 2025-26.

Table BDNyBR 5.6: Evaluation of F_5 generation

S.No.	Crosses	No. of plant progenies studied	No. of SPs
1	GT4 X NBD316	3	2
2	GT4 X ABD189	4	3
3	GT7 X NBD316	3	4
4	GT7 X ABD189	3	5
5	A119 X NBD316	3	6
6	A119 X ABD189	3	5
	Total	**19**	**25**

Project No.: BDNyBR 5.7

Research project title	**Evaluation of F_6 generation**
Objective	Drought tolerant, high yielding with good leaf quality

DOS: 30-07-2024 DOT: 18-10-2024

RESULTS

During *Kharif* 2024-25, 6 F_6 bidi crosses were evaluated from 22 single plant progenies out of this 24 superior uniform bulks were selected and these will be evaluated under OVT-I during 2025-26

Salient findings /Achievements

- Four fresh crosses were made for higher cured leaf yield and high nicotine content these will be evaluated under F_1 generation during 2024-25
- From F_1 to F_6 generations out of 37 crosses 102 plant progenies studied in these 134 single plant progenies were selected for further evaluation during 2025-26

Table BDNyBR 5.7: Evaluation of F_6 generation

S. No.	Cross combination	No. of plant progenies studied	No. of uniform bulks selected
1.	GT4 X ABD174	3	4
2.	GT4 X ABD 166	3	3
3.	GT7 X ABD 174	4	4
4.	GT7X ABD 166	2	3
5.	A119 X ABD 174	6	4
6.	A119 X ABD 166	4	6
7.	**Total**	**22**	**24**

Project No.: BDNyBR 1

Research project title	Collection, evaluation and maintenance of *bidi* tobacco germplasm
Objectives	▪ To maintain and study *bidi* germplasm lines for utilization in future breeding programmes. ▪ To evaluate and isolate superior *bidi* Tobacco lines for direct release ▪ To collect local land races, varieties and lines by under taking expeditions in *bidi* Tobacco growing areas of the tract
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

DOS: 01-08-2024 & 02-08-2024 DOT:19-10-2024

RESULTS

Two hundred and twenty two *bidi* tobacco germplasm lines were maintained. During *kharif* 2024-25, 6 new germplasm lines from Anand and Nandyal centre (IET 137-IET 142) & 2 advanced lines (NyBD 95 & 96) received from Nandyal centre. 61 *bidi* tobacco germplasm lines were evaluated during 2024-25. Data pertaining to the characters: Days to flowering:130-150 (A 119, NP-1, IET-142) -150-176 (IET 139, ABD-244, NyBD-107, ABD-239, IET-140), Plant height (cm): 60-100 (A119, NP-1, IET-142) – 100-200 (NBD-257, NP-2, NyBD-92,97), leaf length (cm): 30-45 (NBD-114 236, ABD 43, 62) – 46-58 (NP1,NP2,IET 112,NyBD 92, 95),leaf width (cm): 10-15 (A119, NyBD-97, NBD 95, NyBD-108) to 15-25 (NP1, ABD-43, NyBD-100, NBD-257), SPAD : 48-55 (ABD 43, 84,90,110 & ArBD 39) to 72-80 (ABD 51, 52, 102, 110 & 113), Relative Water Content % (RWC): 50-75 (NBD 48-1, NyBD 105,NBD 159) to 75-85 (NP-1, NP-2, ABD 239, NBD-53, NyBD 100), Leaf thickness (mg/cm^2): 7.5-10.5 (IET 115, NBD 53, NyBD 114) to 10.5-19.5 (NBD 257, IET 139, NyBD 106) & Spangle score : 2-4 (ABD 239, IET-140, IET-113, 137, 139, ABD-104) to 4-6 (A119, NP-1, NyBD-100, NyBD-103), remaining data recording is under progress (Table 2 BDNyBR 1).

Salient findings /Achievements

- 61 *bidi* tobacco germplasm lines were evaluated during 2024-25
- The higher cured leaf yield per plant was observed in IET-115 (101 g), followed by NBD 236 and IET 113 (98 g), and ABD 239 (98 g)
- NyBD-111 (87.9%), NyBD-99 (87.1%), and NyBD 100 (86.7%) recorded higher Relative Water Content (RWC), under terminal moisture stress conditions
- NBD-67 and IET 139 showed high leaf thickness (LT: 14.3 and 15.66 mg/cm^2 respectively), another trait linked to drought resilience
- NP-2 having superior leaf dimensions with leaf length of 58.5 cm and leaf width of 28.5 cm, making it a valuable donor for leaf area and biomass traits

Table 1 BDNyBR 1: Characters of *Bidi* tobacco germplasm lines span a wide range.

S. No.	Characters	Range	
		Mini	Max
1	Days to flowering	130-150 (A119, NP-1, IET-142, NyBD-96, ABD-43, NyBD-112)	150-176 (IET-139, ABD-244, NyBD-107, ABD-239, ABD-244, IET-140, NP-2)
2	Plant height (cm)	60-100 (IET 112,IET 114,IET 138,A119,NP1,IET 142,NyBD 105)	100-200 (NBD-257, NBD-316, NP-1, NP-2,NyBD-92, 97)
3	Leaf length (cm)	30-45 (NBD,114236, ABD 43, 62, NyBD 97)	46-58 (NP-1, NP-2, IET-112, NyBD-92, 95, NBD-155, NBD-159, IET-112)
4	Leaf width (cm)	10-15 (A119, NyBD97, NBD 95, NyBD 108)	15-25 (NP-1, ABD-43, ABD-239, NyBD-100, NBD-257)
5	RWC %	50-75 (NBD 48-1, NyBD 105,NBD 159)	75-85 (NP-1, NP-2, ABD-239, NBD-53, NyBD-100)
6	Leafthickness((mg/cm^2))	7.5-10.5 (IET 115, NBD 53,NyBD 114)	10.5-19.5 (NBD-257, IET-139, NyBD-106)
7	Spangle score	2-4(ABD 239, IET 140, IET 113,137, 139, ABD 104)	4-6 (A 119, NP-1, NyBD-100, NyBD-103)
8	High nicotine content (%)	> 7 .0 % (NyBD-59, 63, 75 ,93, ABD 54, ABD 68,GT4 & GT 5)	8.24 % (NyBD-79)

Table 2 BDNyBR 1: Data on Cured leaf yield morphological characters of *Bidi* tobacco Germplasm lines during 2024-25

S. No.	Germplasm	Plant habit	Plant height (cm)	No.of days to flower-ing	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf characters		Total leaf number	Suckering habit	Span-gling	Cured leaf yield /plant (g)
								Colour	Gummy-ness				
1.	AKBT-03-02	Open	160	152	2.0	89	Green	Green	High	24	Medium	Medium	78
2.	ABD 62	Semi erect	100	157	2..2	92	Green	Green	Low	25	Heavy	Medium	68
3.	ABD 104	Semi erect	90	144	1.5	78	Green	Green	Medium	19	Medium	Medium	82
4.	NBD 53	Semi erect	120	146	2.0	70	Green	Green	Medium	23	Low	Low	85
5.	NBD 155	Semi erect	100	148	2.5	60	Green	Green	High	20	Low	Medium	90
6.	NBD 159	erect	125	144	2.3	68	Green	Green	High	34	Medium	Low	87
7.	NBD 80-2	Open	100	148	2.5	59	Green	Green	Medium	24	Medium	Medium	91
8.	NBD 111	Erect	140	165	2.2	61	Green	Green	Low	27	Heavy	Low	78
9.	NBD 114	Open	106	148	2.5	58	Green	Green	Low	19	Heavy	Medium	65
10.	NBD 48-1	Open	120	165	2.6	70	Green	Green	Medium	20	Heavy	Low	72
11.	NBD 57	Erect	138	157	2.5	72	Green	Green	Low	25	Heavy	Medium	63
12.	NBD 71	Open	142	159	2.5	65	Green	Green	High	23	Low	Medium	78

S. No.	Germplasm	Plant habit	Plant height (cm)	No.of days to flower-ing	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf characters		Total leaf number	Suckering habit	Span-gling	Cured leaf yield /plant (g)
								Colour	Gummy-ness				
13.	NBD 257	Erect	130	163	2.5	89	Green	Green	Low	22	Medium	Medium	95
14.	NBD 236	Open	125	148	2.0	90	Green	Green	Medium	18	Medium	Medium	98
15.	NBD 95	Erect	127	164	2.3	81	Green	Green	Medium	25	Low	Medium	72
16.	NBD 136	Open	169	165	2.2	56	Green	Green	High	30	Heavy	Low	88
17.	NBD 33	Open	146	144	2.0	66	Green	Green	High	18	Heavy	Medium	58
18.	NBD 57-1	Erect	100	148	2.1	78	Green	Green	Low	23	Medium	Medium	62
19.	NBD 316	Open	102	148	2.2	88	Green	Green	Medium	24	Low	Low	92
20.	NBD 67	Open	153	169	3.2	90	Green	Green	Low	25	Heavy	Medium	74
21.	NP 23	Erect	100	172	3.5	95	Green	Green	Medium	30	Medium	Low	52
22.	NBD 85	Open	126	167	3.2	96	Green	Green	Medium	25	Low	Medium	66
23.	NBD 80-1	Open	132	144	2.2	94	Green	Green	High	27	Heavy	Medium	69
24.	ABD 43	Erect	125	141	2.3	85	Green	Green	High	28	Medium	Medium	70
25.	IET 137	Semi erect	95	170	2..2	95	Green	Dark green	Low	20	Low	Medium	89

S. No.	Germplasm	Plant habit	Plant height (cm)	No.of days to flower-ing	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf characters		Total leaf number	Suckering habit	Span-gling	Cured leaf yield /plant (g)
								Colour	Gummy-ness				
26.	IET 138	Semi erect	82	165	4.0	96	Green	Green	Medium	29	Low	Medium	91
27.	IET 139	Semi erect	90	195	3.0	98	Green	Green	Medium	32	Heavy	Medium	78
28.	IET 140	Semi erect	92	168	2.0	71	Green	Green	High	30	Heavy	Medium	82
29.	IET 141	Semi erect	98.0	169	2.0	86.2	Green	Green	High	26	Heavy	Medium	86
30.	IET 142	Open	89.0	162	3.0	80.0	Green	Green	Low	28	Medium	Medium	90
31.	IET 112	Erect	80.	159	2.0	89.2	Green	Dark green	Medium	20	Low	Medium	95
32.	IET 113	Erect	90		2.0	85.5	Green	Green	Medium	18	Heavy	Low	98
33.	IET 114	Open	70	171	2.0	67.0	Green	Green	High	22	Medium	Medium	88
34.	IET 115	Open	60	175	3.0	81.5	Green	Green	High	20	Heavy	Low	101
35.	ABD 239	Semi erect	91	144	2.0	77.0	Green	Green	Low	16	Medium	Medium	98
36.	ABD 244	Erect	89	143	2.0	70.5	Green	Green	Medium	17	Low	Medium	75
37.	NyBD 97	Semi erect	91	148	3.0	88	Green	Green	Medium	12	Heavy	Low	69
38.	NyBD 98	Semi erect	85	149	5.0	82	Green	Green	High	14	Medium	Medium	78

S. No.	Germplasm	Plant habit	Plant height (cm)	No.of days to flower-ing	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf characters		Total leaf number	Suckering habit	Span-gling	Cured leaf yield /plant (g)
								Colour	Gummy-ness				
39.	NyBD 99	Semi erect	85	148	4.0	90	Green	Green	High	16	Heavy	Low	80
40.	NyBD 100	Semi erect	95	161	2.0	86	Green	Green	Low	20	Medium	Medium	85
41.	NyBD 101	Semi erect	101	168	3.0	95	Green	Green	Medium	16	Low	Low	91
42.	NyBD 102	Semi erect	103	166	3.0	86	Green	Green	Medium	12	Heavy	Medium	94
43.	NyBD 103	Semi erect	98	169	3.0	90	Green	Green	High	14	Heavy	Low	81
44.	NyBD 104	Semi erect	97	161	3.0	95	Green	Green	High	16	Medium	Medium	79
45.	NyBD 105	Semi erect	87	172	2.0	82.0	Green	Green	Low	18	Low	Low	82
46.	NyBD 106	Semi erect	91	170	2.0	85.0	Green	Green	Medium	12	Heavy	Medium	83
47.	NyBD 107	Erect	98	179	3.0	70.0	Green	Green	Medium	14	Medium	Low	76
48.	NyBD 108	Open	101	180	2.0	80.2	Green	Green	High	17	Heavy	Medium	78
49.	NyBD 109	Open	102	165	3.0	85.2	Green	Green	High	14	Medium	Low	86
50.	NyBD 110	Semi erect	98	148	2.0	95.5	Green	Green	High	16	Low	Medium	91
51.	NyBD 111	Semi erect	92	144	2.1	98	Green	Green	High	20	Medium	Medium	80

S. No.	Germplasm	Plant habit	Plant height (cm)	No.of days to flower-ing	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf characters		Total leaf number	Suckering habit	Span-gling	Cured leaf yield /plant (g)
								Colour	Gummy-ness				
52.	NyBD 112	Open	98	140	2.2	85	Green	Green	Low	21	Low	Low	78
53.	NyBD 113	Open	110	163	2.3	95	Green	Green	Medium	16	Heavy	Medium	76
54.	NyBD 114	Semi erect	105	165	.2.1	87	Green	Green	Medium	14	Medium	Low	92
55.	NyBD 91	Open	108	157	1.9	95	Green	Green	High	18	Heavy	Medium	87
56.	NyBD 92	Semi erect	106	151	2.2	101	Green	Green	High	21	Medium	Low	90
57.	NyBD 95	Open	110	134	2.3	105	Green	Green	High	23	Low	Medium	88
58.	NyBD 96	Open	120	136	2.2	108	Green	Green	High	22	Medium	Medium	88
59.	A119	Open	90	180	2.0	89	Green	Green	High	20	Heavy	Heavy	69
60.	NP1	Open	168	169	2.4	105	Green	Green	High	21	Heavy	Heavy	85
61.	NP2	Erect	210	162	2.0	119	Green	Dark green	High	26	Heavy	Medium	90

Table 3 BDNyBR 1: Data on morphological characters of *Bidi* tobacco Germplasm lines during 2024-25

S.No.	Germplasm	RWC %	LT (mg/ cm^2)	Inflorescence	Flower colour	Corolla shape	Leaf Length (cm)	Leaf width (cm)	Capsule shape	Capsule length (cm)	Capsule width (cm)	Seed colour	Rooting habit
1.	AKBT-03-02	78.9	10.79	Compact	Pink	Fluted	43.5	12.2	Conical	1.5	1.0	Brown	Medium
2.	ABD 62	63.2	10.3	Open	Pink	Funnel	35.2	13.5	Ovoid	1.4	0.7	Brown	Deep
3.	ABD 104	77.2	10.54	Compact	Pink	Fluted	43.5	20.2	Ovoid	1.5	0.9	Brown	Medium
4.	NBD 53	85.6	10.11	Open	Caramine	Fluted	49.6	16.5	Ovoid	2.0	0.9	Brown	Medium
5.	NBD 155	78.5	12.44	Compact	Caramine	Fluted	57.5	24.0	Ovoid	1.8	0.7	Brown	Medium
6.	NBD 159	71.7	12.54	Open	Caramine	Fluted	57.2	22.0	Conical	1.9	1.0	Brown	Medium
7.	NBD 80-2	81.5	10.2	Compact	Pink	Funnel	43.4	14.2	Ovoid	1.5	1.0	Brown	Medium
8.	NBD 111	77	10.7	Highly branched	Pink	Funnel	45.5	18.1	Conical	1.3	1.0	Brown	Medium
9.	NBD 114	80.5	10.5	Open	Pink	Funnel	35.6	15.0	Ovoid	2.2	0.8	Brown	Medium
10.	NBD 48-1	56.3	11.5	Open	Caramine	Fluted	46.4	20.0	Conical	2.5	0.7	Brown	Medium
11.	NBD 57	73.9	10.6	Compact	Caramine	Funnel	41.3	19.2	Conical	2.0	0.9	Brown	Deep
12.	NBD 71	76	10.4	Highly branched	Caramine	Funnel	35.5	12.2	Conical	2.0	0.9	Brown	Medium
13.	NBD 257	74.2	13.16	Compact	Caramine	Fluted	52.1	25.3	Conical	2.1	0.9	Brown	Medium
14.	NBD 236	72.7	10.2	Highly branched	Caramine	Funnel	56.9	16.2	Conical	2.2	1.0	Brown	Deep
15.	NBD 95	80.7	10.3	Compact	Pink	Funnel	42.4	11.2	Conical	2.5	1.0	Brown	Medium
16.	NBD 136	78.7	11.6	Compact	Pink	Fluted	48.5	20.5	Conical	2.0	1.0	Brown	Medium
17.	NBD 33	74.1	11.8	Open	Caramine	Fluted	44.6	19.5	Conical	2.0	0.7	Brown	Medium
18.	NBD 57-1	78.7	10.7	Compact	Pink	Funnel	47.5	15.9	Conical	2.1	0.9	Brown	Medium
19.	NBD 316	79.4	10.3	Open	Pink	Funnel	35.5	13.5	Ovoid	2.2	0.8	Brown	Deep
20.	NBD 67	77.6	14.3	Highly branched	Caramine	Fluted	52.2	22.0	Conical	2.5	0.7	Brown	Medium
21.	NP 23	75	10.9	Compact	Pink	Funnel	43.5	15.2	Conical	2.0	0.9	Brown	Medium

S.No.	Germplasm	RWC %	LT (mg/ cm^2)	Inflorescence	Flower colour	Corolla shape	Leaf Length (cm)	Leaf width (cm)	Capsule shape	Capsule length (cm)	Capsule width (cm)	Seed colour	Rooting habit
22.	NBD 85	76.8	10.4	Highly branched	Pink	Funnel	42.6	14.2	Ovoid	2.0	0.8	Brown	Deep
23.	NBD 80-1	80.3	10.5	Highly branched	Pink	Fluted	44.4	15.0	Conical	2.1	1.0	Brown	Medium
24.	ABD 43	72	10.5	Compact	Pink	Fluted	37.5	16.0	Conical	2.2	1.0	Brown	Medium
25.	IET 137	80.4	10.8	Compact	Pink	Funnel	43.5	18.2	Ovoid	2.0	0.7	Brown	Medium
26.	IET 138	82.5	10.4	Compact	Pink	Fluted	46.4	16.5	Ovoid	2.1	0.9	Brown	Medium
27.	IET 139	82.7	15.66	Compact	Pink	Funnel	55.5	24.2	Ovoid	2.2	0.9	Brown	Medium
28.	IET 140	75.2	10.2	Compact	Pink	Funnel	45.2	14.5	Ovoid	2.5	0.9	Brown	Medium
29.	IET 141	77.8	11.8	Compact	Pink	Fluted	52.2	21.2	Ovoid	2.0	1.0	Brown	Medium
30.	IET 142	73.6	11.6	Open	Pink	Funnel	48.2	16.5	Conical	2.0	1.0	Brown	Medium
31.	IET 112	80.2	11.9	Compact	Pink	Funnel	56.2	21.5	Ovoid	2.1	1.0	Brown	Medium
32.	IET 113	74	10.3	Open	Pink	Fluted	41.5	16.5	Conical	2.2	0.7	Brown	Medium
33.	IET 114	74.4	10.4	Open	Pink	Funnel	37.5	13.8	Conical	2.5	0.9	Brown	Medium
34.	IET 115	77.3	10.1	Open	Pink	Funnel	39.5	15.5	Conical	2.0	0.8	Brown	Medium
35.	ABD 239	84.3	11.9	Compact	Pink	Fluted	48.0	18.5	Ovoid	2.2	1.0	Brown	Medium
36.	ABD 244	72.9	10.5	Compact	Caramine	Funnel	44.5	15.6	Conical	2.5	1.0	Brown	Medium
37.	NyBD 97	71.4	9.8	Open	Pink	Funnel	40.2	10.2	Conical	2.0	0.9	Brown	Deep
38.	NyBD 98	74.8	10.4	Open	Pink	Fluted	42.3	13.5	Conical	2.0	0.8	Brown	Medium
39.	NyBD 99	87.1	12.4	Compact	Caramine	Fluted	53.5	18.5	ovoid	2.1	0.7	Brown	Medium
40.	NyBD 100	86.7	12.2	Open	Pink	Fluted	49.0	16.0	Conical	2.2	0.9	Brown	Medium
41.	NyBD 101	78.9	9.9	Compact	Pink	Fluted	42.0	14.5	Conical	2.5	1.0	Brown	Deep
42.	NyBD 102	50	10.3	Highly branched	Pink	Fluted	50.2	15.2	Conical	2.5	1.0	Brown	Medium
43.	NyBD 103	77.2	12.4	Compact	Pink	Fluted	48.2	16.5	Ovoid	2.0	1.0	Brown	Medium
44.	NyBD 104	83.8	11.3	Highly branched	Pink	Fluted	55.2	18.5	Conical	2.0	0.9	Brown	Deep
45.	NyBD 105	62.5	11.4	Compact	Pink	Fluted	52.5	14.5	Ovoid	2.1	0.9	Brown	Medium

S.No.	Germplasm	RWC %	LT (mg/ cm^2)	Inflorescence	Flower colour	Corolla shape	Leaf Length (cm)	Leaf width (cm)	Capsule shape	Capsule length (cm)	Capsule width (cm)	Seed colour	Rooting habit
46.	NyBD 106	52.5	19.1	Highly branched	Pink	Fluted	48.2	13.5	Conical	2.2	1.0	Brown	Medium
47.	NyBD 107	74.3	9.8	Open	Pink	Fluted	40.5	12.5	Conical	2.5	1.0	Brown	Deep
48.	NyBD 108	76.7	10.2	Highly branched	Pink	Fluted	46.2	11.5	Conical	2.0	1.0	Brown	Medium
49.	NyBD 109	86.6	10.4	Open	Caramine	Fluted	51.5	13.5	Ovoid	2.0	1.0	Brown	Medium
50.	NyBD 110	69	11.1	Compact	Pink	Fluted	48.0	15.2	conical	2.1	0.9	Brown	Deep
51.	NyBD 111	87.9	11.2	Open	Pink	Funnel	45.2	15.0	conical	2.2	1.0	Brown	Medium
52.	NyBD 112	80	11.8	Compact	Pink	Fluted	50.2	16.5	conical	1.5	1.0	Brown	Deep
53.	NyBD 113	77.7	11.3	Open	Pink	Fluted	55.2	18.5	conical	1.6	1.0	Brown	Medium
54.	NyBD 114	74.2	7.6	Compact	Pink	Fluted	49.2	15.5	conical	1.8	1.0	Brown	Deep
55.	NyBD 91	80.5	9	Highly branched	Pink	Fluted	52.0	16.5	conical	1.9	1.0	Brown	Medium
56.	NyBD 92	75.4	11.7	Compact	Pink	Fluted	58.0	18.2	conical	2.0	1.0	Brown	Deep
57.	NyBD 95	72.8	10.1	Highly branched	Pink	Fluted	56.0	14.5	conical	2.2	1.0	Brown	Medium
58.	NyBD 96	73.5	9.8	Compact	Pink	Fluted	48.0	13.8	conical	2.2	1.0	Brown	Deep
59.	A119	74	10.6	Highly branched	Pink	Fluted	42.5	10.5	conical	1.6	1.0	Brown	Medium
60.	NP1	83.2	12.1	Highly branched	Pink	Fluted	56.5	15.5	conical	2.4	1.0	Brown	Deep
61.	NP2	82.8	10.1	Compact	Pink	Funnel	58.5	28.5	conical	1.5	1.0	Brown	Medium

C. *NATU / PIKKA* TOBACCO

COORDINATED EVALUATION OF *NATU/ PIKKA* TOBACCO GENOTYPES

AVT-I ON *NATU/PIKKA* TOBACCO

NTJBRC/ NTGBRC/ NTNyBRC/ NTBBRC 2: INITIAL VARIETAL TRIAL ON *NATU* TOBACCO

Objectives: To evaluate the *Natu* tobacco entries for yield and quality at four centres *viz.,* Jeelugumilli, Guntur, Nandyal and Berhampur along with respective checks under AVT-I.

Year of start **:** 2024-25
Year of Completion **:** 2024-25

***Natu* tobacco Centres and Investigators**

Centres	:	**Investigators**
Jeelugumilli	:	K. Sarala and K. Prabhakara Rao
Guntur	:	P. Venkateswarlu
Nandyal	:	P. Pulli Bai and K. Sathish Babu
Berhampur	:	Pavitra Mohan Mohapatra, Prasant Kumar Panda & Satyajit Behera

Design : RBD
Total treatments : 3 + checks as given above
Replications **:** Five

Entries: 3 (Three)

1. IET-118
2. IET-119
3. IET-121

Checks at different Centres

Jeelugumilli	1. Kommagudem	2. Rangapuram
Guntur	1. Bhairavi	2. WAF
Nandyal	1. Bhairavi	2. WAF
Berhampur	1. Gajapati	2. JP Local

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Jeelugumilli	2.0 X 12.0 m	1.0 x 0.6 m
Guntur	2.8 x 5.6 m	0.7 x 0.7 m
Nandyal	6.75 x 2.25 m	0.7 x 0.7 m
Berhampur	5 x 3.75 m	0.75 x 0.50 m

RESULTS

In the Advanced varietal trial-I (AVT-I), three entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases.Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha.Data on yield characteristics at different centres are presented in Tables 1 to 7 AVT-I *NATU* Tobacco. The results are discussed centre-wise.

JEELUGUMILLI

Yield: The differences among the entries tested for cured leaf found to be significant. The entry IET-119 recorded significantly higher green leaf yield (9063 kg/ha), cured leaf yield (1529 kg/ha), *Melimi* (919 kg/ha)and *Gulla* (610 kg/ha)an improvement of 19%, 23%, 23% and 22% over better control, Kommugudem, respectively. However, the Entry-119 found has less leaf puckeringand morphologically similar to FCV type.

Morphological characterization: The plant height in the tested entries ranged from 96 (IET-118) to 146 (Kommugudem), internodal length lies between 2-3 cm, total no. of leaves ranges from 20 (IET-121 & Kommugudem) to 24 (IET-118), leaf length values ranged from 42-57 cm and width from 19-25 cm in various entries. IET-121 recorded higher leaf length (57 cm) and Kommugudem higher leaf width (25cm).

Disease /Pest incidence: Among the entries, lowest number of aphids was recorded on IET-119 (8.25 per plant) and highest in Rangapuram (18.42 per plant). Highest incidence of *S. litura* was also noticed on Rangapuram with 4.0 larvae/plant followed by IET-119 (3.0 larvae/plant). Only one genotype IET-121 recorded *H. armigera* infestation.

Chemical quality: Nicotinecontent in the tested entries (0.57 to 1.12%) found to be lesser than controls (1.63 to 1.93%). The quality parameters viz., reducing sugars and chlorides of tested entries are found to be comparable to controls (Table 4 VFRJBRC 3.2).

Salient Findings/Achievements

- A trial conducted with 3 entries (IET-118, IET-119, IET-121) along with two control varieties viz., Kommugudem andRangapuram, the differences among the entries tested for cured leaf found to be significant
- The entry IET-119 recorded significantly higher green leaf yield (9063 kg/ha), cured leaf yield (1529 kg/ha), *Melimi* (919 kg/ha) and *Gulla* (610 kg/ha) an improvement of 19%, 23%, 23% and 22% over better control, Kommugudem, respectively

Conclusion: AVT-I trial will be evaluated as AVT-II during 2025-26 by all the centres.

GUNTUR

Three improved *Natu* tobacco lines *viz*., IET-118, IET-119 and IET-121 were evaluated along with two checks, Bhairavi and WAF in replicated trial for their yield and quality. Among these, the performance of IET-119 and IET-121 was significantly superior to check, WAF. Although these two lines gave slightly more yields than the better check, Bhairavi but, statistically non significant. Maximum green leaf of 12304 kg/ha and cured leaf of 2071 kg/ha was recorded in IET-119 followed by IET-121 with 11882 and 2072 kg/ha of green leaf and cured leaf, respectively. There was an increase of 8.78 and 8.48% in respect of green leaf, respectively due to IET-119 entry over the better check, Bhairavi. The data on chemical quality parameters of above three improved lines along with two checks were presented in the Table 7 AVT-I *NATU* TOABCCO. Nicotine, reducing sugars and chlorides were within the acceptable limits in all the lines including checks. Nicotine ranged from 1.24 to 2.83%, reducing sugars ranged from 1.34 to 3.24% and chlorides ranged from 0.19 to 0.47% in these three lines and checks.

NANDYAL

In advanced varietal trial –I (2024-25) on *Natu* tobacco, 3 entries along with two checks were evaluated. The entry IET-118 (1041 kg/ha) has recorded numerically higher cured leaf yield with improvement of 8.2 % and none of the entries were recorded significant cured leaf yield when compared to the best check WAF (962 kg/ha). The entries in this trial was completely inundated at the time of vegetative stage followed by subjected to moisture stress at the time of 65 days after transplanting was recorded lower cured leaf yield and these entries will not be promoted to AVT-II on *Natu* tobacco during 2025-26.

Salient Findings/Achievements

- The entry, IET-118 (1041 kg/ha) has recorded numerically higher cured leaf yield with improvement of 8.2 % over check WAF
- None of the entries were recorded significant cured leaf yield when compared to the best check WAF (962 kg/ha)

Conclusion: The trial will be evaluated under AVT-II during 2025-26.

BERHAMPUR

Three promising *pikka* tobacco genotypes (IET-118, IET-119 and IET-121) along with two check varieties, Gajapati and JP Local were evaluated during 2024 in RBD with five replications for cured leaf yield and ancillary characters such as topped plant height (cm), no. of leaves / plant, leaf length (cm) and leaf width (cm). Test entries IET-119, IET-121 exhibited significantly higher leaf number (26.21), (27.2) and leaf length (61.35), (67.09) respectively than check variety Gajapati (23.46 and 54.49 cm respectively), Both entries IET-119 (26.15) and IET-121 (30.72 cm) recorded significantly higher leaf width than check variety, JP Local (21.16). These two entries IET-119 and IET-121 also produced significantly higher curd leaf yield (3639 kg/ha) and (3494 kg/ha) respectively than check variety, Gajapati (2911 kg/ha) and JP Local (2873 kg/ha) with yield superiority of IET-119 (25%) and IET-121 (20%) increase over the check variety Gajapati and IET-119 (27%), IET-121 (22%) IOC Varierty, JP Local Respectively.

Conclusion: In Advance Varietal Trial--I 2025, two test entries, IET-119 (3639 kg/ha) and IET-121 (3494 kg/ha) produced significantly higher cured leaf yield than check variety, Gajapati and JP Local with yield advantage of 25 and 20 percent and 27 and 22% respectively.

Recommendation: The AVT-I trial will be evaluated as AVT-II during 2025-26 at all *Natu/pikka* centers.

Table 1 AVT-I *NATU* TOBACCO: Yield (kg/ha) of AVT-I entries at Guntur and Jeelugumilli centres (2024-25)

Entries	Green Leaf Yield (kg/ha)		*Melimi*	*Gulla*
	Guntur	Jeelugumilli	Jeelugumilli	
IET-118	11139	4375	446	298
IET-119	12304	9063* (19)	919* (23)	610* (22)
IET-121	11182	4583	491	321
Kommagudem (C)	-	7604	746	500
Rangapuram (C)	-	7083	725	481
Bhairavi (C)	11310	-	-	-
WAF (C)	9596	-	-	-
G. Mean	-	6541.67	665.21	442.08
S. Em±	450	289.04	35.69	23.25
C.D. at 5%	1349	887.04	109.52	71.36
C.V. (%)	8.95	8.84	10.73	10.52

**Significant at 5%; figures in paranthesis are percent increase over best check*

Table 2 AVT-I *NATU* TOBACCO: Data on cured leaf yield (kg/ha) at different centres (2024-25)

Entries	Yield (kg/ha)			
	Jeelugumilli	Guntur	Nandyal	Berhampur
IET-118	744	1937	1041 (8.2)	2174
IET-119	1529* (23)	2071	732	3639 (25)
IET-121	811	2072	811	3494(20)
Kommagudem (C)	1246	-	-	-
Rangapuram (C)	1206	-	-	-
Bhairavi (C)	-	1909	717	-
WAF (C)	-	1665	962	-
Gajapati (C)	-	-	-	2911.39
JP Local (C)	-	-	-	2872.73
G. Mean	1107.29	-	853	3018.22
S. Em±	58.43	65	73.7	119.97
C.D. at 5%	179.32	196	229.6	362.78
C.V. (%)	10.55	7.62	17.2	8.89

**Significant at 5%; figures in paranthesis are percent increase over best check*

Table 3 AVT-I *NATU* TOBACCO: Morphological characters of IVT entries atdifferent centres (2024-25)

Entries	Plant Height (cm)		Leaf length (cm)			Leaf width (cm)			No. of leaves		
	Ny	**J**	**Ny**	**B**	**J**	**Ny**	**B**	**J**	**J**	**Ny**	**B**
IET-118	70.7	45	33.6	54.98	19	11.2	18.68	96	24	23	18.53
IET-119	71.9	42	31	61.35	24	11.7	26.15	127	22	20	26.21
IET-121	67.2	57	33.1	67.09	24	10.6	30.72	142	20	20	27.02
Rangapuram (C)		56			22			121	22		
Kommugudem (C)		50			25			146	20		
Bhairavi (C)	79		33.6			11.4				21	
WAF (C)	77.2		37.4			10.7				22	
Gajapati (C)				54.49			22.29				23.46
JP Local (C)				51.03			21.17				21.02
G. Mean	73.2		33.74	57.78		11.12	23.80			21	23.24
S. Em±			1.70				1.01				1.27
C.D. at 5%				5.14			3.04				3.85
C.V. (%)	73.2			6.44			8.93				11.97

Ny= Nandyal; J= Jeelugumilli; B= Berhampur

Table 4 AVT-I *NATU* TOBACCO: Pest and disease incidence of AVT-I entries at Jeelugumilli centre (2024-25)

Entries/ Genotypes	Pest (Av. No. /plant)			
	Aphids	**Whiteflies**	***S. litura***	***H. armigera***
IET-118	10.83	0	0	0
IET-119	8.25	0	3	0
IET-121	9.33	0	0	1
Kommugudem (C)	16.42	0	0	0
Rangapuram (C)	18.42	0	4	0

Table 5 AVT-I *NATU* TOBACCO: Morphological characters and pest and disease incidence of AVT-I entries at Nandyal centre (2024-25)

Entries	Plant popln	Days to Inti. flo.	Days to 50% flo.	Mealy bug (0-4)	Frog eye leaf spot (0-5)	Leaf curl (0-9)	Leaf blight /burn (0-9)
IET 118	24	138	143	0	0	0	1
IET 119	25	142	148	0	1	0	3
IET 121	24	141	147	0	0	0	1
WAF (C)	26	135	140	0	0	0	1
Bhairavi (C)	27	138	142	1	1	0	3
GM	25.2	139	144				

Table 6 AVT-I *NATU* TOBACCO: Chemical parameters in different entries at Jeelugumilli centre during 2024-25

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
IET-118	0.57	0.85	2.08
IET-119	0.61	1.00	2.09
IET-121	1.12	1.33	2.53
Kommugudem (C)	1.93	1.08	2.53
Rangapuram (C)	1.63	1.09	2.46

Table 7 AVT-I *NATU* TOBACCO: Chemical parameters in different entries at Guntur centre during 2024-25

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
IET-118	1.74	3.16	0.27
IET-119	2.27	1.34	0.30
IET-121	2.83	1.45	0.19
Bhairavi (C)	1.24	3.24	0.33
WAF (C)	1.85	2.76	0.47

NANDYAL

Project No.: NTNyBR 4.1

Research project title	**Observational Varietal Trial-I on *Natu* tobacco**
Objectives	▪ To evolve high yielding and better quality *Natu* tobacco hybrids with good aroma ▪ To develop good nicotine content drought tolerant varieties
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments	:	4 (2+2)	Spacing	:	70 x 70 cm
Design	:	RBD	Replications	:	5
Plot size	:	5.4 × 2.2 m	DOS	:	27-07-2024
DOT	:	25-09-2025	DOH	:	12-02-2025

RESULTS

In observational varietal trial- I (2024-25) on *Natu* tobacco, 2 entries along with two checks were evaluated. The entry NyNT-105 (Bhairavi x KFC) (1288 kg/ha) has recorded on par cured leaf yield with the best check WAF (1158 kg/ha) (Table 1 NTNyBR 4.1). This trial affected by heavy rainfall due to these lower yields were recorded and it will be evaluated under OVT-II during 2025-26.

Salient findings /Achievements

- NyNT-105 (Bhairavi x KFC) (1288 kg/ha) has recorded on par cured leaf yield with the best check WAF (1158 kg/ha)

Table 1 NTNyBR 4.1: Data on Cured leaf yield and morphological characters under OVT-I on *Natu* tobacco (2024-25)

Entries	Cured leaf yield (kg/ha)	Plant popln	Days to 50% flow.	No.of leaves/ plant	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)
NyNT-105	1288 (11.2)	17	133	20	68.6	39.9	12.7
NyNT-106	1173	17	135	20	56.4	34.4	9.8
Bhairavi (C)	1010	17	138	21	54.1	42.1	11.7
WAF (C)	1158	16	137	22	62.9	33.4	10.3
GM	**1157**	**16.7**	**136**	**21**	**60.5**	**37.4**	**11.1**
SEm±	60.2						
C.D.@5%	188						
C.V%	11.6						

Table 2 NTNyBR 4.1: Data on pest and disease incidence under OVT-I on *Natu* tobacco (2024-25)

Entries	Mealy bug (0-4)	Frog eye leaf spot (0-5)	Leaf curl (0-9)	Leaf blight /burn (0-9)
NyNT-105	0	1	0	1
NyNT-106	0	1	0	1
Bhairavi (C)	0	1	0	1
WAF (C)	0	1	0	1

Project No.: NTNyBR 4.2

Research project title	**Observational Varietal Trial-II on *Natu* tobacco**
Objectives	▪ To evolve high yielding and better quality *Natu* tobacco hybrids with good aroma ▪ To develop good nicotine content drought tolerant varieties
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

Treatments	:	5 (3+2)	Spacing	:	70 x 70 cm
Design	:	RBD	Plot size	:	6.75 × 2.25 m
Replications	:	7	DOS	:	27-07-2024
DOT	:	25-09-2024	DOH	:	13-02-2025

RESULTS

In observational varietal trial-II (2024-25) on *Natu* tobacco, 3 entries along with two checks were evaluated. No test entries showed a significantly higher cured leaf yield than the checks, although NyNT-103 (1084 kg/ha), NyNT-98 (1057 kg/ha), and NyNT-104 (1045 kg/ha) did have numerically higher cured leaf yields compared to the best check, WAF (961 kg/ha). (Table 1 NTNyBR 4.2). This trial was affected with heavy rainfall at the time vegetative stage followed by terminal moisture stress during critical stage and it will be assessed under OVT II on *Natu* tobacco during 2025-26.

Pooled analysis

The pooled cured leaf yield performance of the observational varietal Trial-II on *Natu* tobacco during (2023-24 and 2024-25), three entries along with two checks were evaluated. The entry NyNT 103 (1430 kg/ha) recorded a significantly higher cured leaf yield, while NyNT 98 (1317 kg/ha) recorded an on-par cured leaf yield, showing an improvement of 17.4% and 8.1%, respectively, compared to the best check, Bhairavi (1218 kg/ha) (Table 3 NTNyBR 4.2).

Salient findings /Achievements

- NyNT-103 (1430 kg/ha) recorded a significantly higher cured leaf yield showing an improvement of 17.4% than the best check, Bhairavi (1218 kg/ha)

Table 1 NTNyBR 4.2: Data on Cured leaf yield and morphological characters under OVT-II on *Natu* tobacco (2024-25)

Entries	Cured leaf yield (kg/ha)	Plant popln	Days to 50% flow.	No.of leaves/ plant	Pl.ht (cm)	Leaf length (cm)	Leaf width (cm)
NyNT 98	1057 (9.9)	17	135	20	62.1	33.4	10.1
NyNT 103	1084 (12.7)	16	133	20	60.7	36.2	12.1
NyNT 104	1045 (8.7)	16	136	21	60.5	33.4	10.8
WAF (C)	961	18	133	21	69.2	35.2	12.4
Bhairavi (C)	810	15	135	20	72.7	35.7	12.3
GM	991	16.4	134	20	65.0	34.8	11.5
SEM±	49.7						
C.D.@5%	155						
C.V%	10.0						

Table 2 NTNyBR 4.2: Data on pest and disease incidence under OVT-II on *Natu* tobacco (2024-25)

Entries	Mealy bug (0-4)	Frog eye leaf spot (0-5)	Leaf curl (0-9)	Leaf blight /burn (0-9)
NyNT 98	0	1	0	1
NyNT 103	0	1	0	1
NyNT 104	0	0	1	1
WAF (C)	0	1	0	1
Bhairavi (C)	0	1	0	3

Table 3 NTNyBR 4.2: Pooled cured leaf yield performance of OVT-II on *Natu* tobacco during (2023-24 and 2024-25)

Entries	Cured leaf yield (kg/ha)		Mean	% Increase over best check
	2023-24	2024-25		
NyNT 103	1804	1084	1430*	17.4
NyNT 98	1551	1057	1317	8.1
NyNT 104	1514	1045	1280	5.0
Bhairavi (C)	1458	810	1134	
WAF (C)	1474	961	1218	
Grand Mean	1560	991	1276	
	Years	Entries	Years x Entries	
S.Em±	21.5	34.0	48.1	
C.D.at 5%	62.8	99.3	140.4	
C.V%	6.4	9.7	7.6	

NTNyBR 5: STUDY AND GENERATION OF BREEDING MATERIAL IN *NATU* TOBACCO

Project No.: NTNyBR 5.1

Research project title	**New crosses made (Hybridization and study of segregating generations in *Natu* tobacco)**
Objectives	▪ To evolve high yielding and better quality ***Natu*** tobacco hybrids with good aroma
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

DOS: 31-07-2024 DOT: 25-09-2024

RESULTS

For development of *Natu* tobacco varieties

Cross combination	**Objective**
NyNT 98 X NyNT 96	Higher cured leaf yield with good quality
NyNT 98 X (IET 120) NF 4-27-3	

Project No.: NTNyBR 5.2

Research project title	**Study of F_1 generation**

DOS: 31-07-2024 DOT: 25-09-2024

RESULTS

During 2024-25, 2 *Natu* tobacco crosses evaluated under F_1 generation and these will be evaluated under F_2 generation during 2025-26.

Evaluation of F_1 generation

Cross combination	Objective
Natu Special X ArBD-32	Higher cured leaf yield with good quality
Natu Special X *Natu* noonepalli	

Project No.: NTNyBR 5.3

Research project title	**Evaluation of F_2 generation**

DOS: 31-07-2024 DOT: 25-09-2024

RESULTS

During *Kharif* 2024-25, 3 *Natu* tobacco crosses were evaluated under F_2 generation, 11 superior single plants were selected and these will be evaluated under F_3 generation during 25-26.

Evaluation of F_2 generation

Cross combination	Objective	No.of SPs
Bhairavi X NyNT 94	High yielding, drought tolerant with good quality	3
Bhairavi X Line 372		5
Bhairavi X NyNT 91		3
	Total	11

Project No.: NTNyBR 5.4

Research project title	**Evaluation of F_3 generation**

DOS: 31-07-2024 DOT: 26-09-2024

RESULTS

During *Kharif* 2024-25, 2 *Natu* tobacco crosses were evaluated under F_3 generation, from 20 progenies 10 superior single plants were selected and these will be evaluated under F_4 generation during 25-26.

Evaluation of F_3 generation

Cross combination	Objective	No. of plant progenies studied	No. of SPs
Bhairavi X Line 361	Drought tolerant higher cure leaf yield	14	6
Bhairavi X NG 50		6	4
	Total	20	10

Project No.: NTNyBR 5.5

Research project title	**Evaluation of F_4 generation**

DOS: 31-07-2024 DOT: 26-09-2024

RESULTS

During *Kharif* 2024-25, 2 crosses were evaluated under F_4 generation, from 12 plant progenies 9 superior single plants were selected and these will be evaluated under F_5 generation during 25-26.

Evaluation of F_4 generation

Cross	Objective	No. of plant progenies studied	No. of SPs
Bhairavi X Peddavittanam	Drought tolerant higher cure leaf yield	8	2
Bhairavi X *Natu*noonepalli		4	7
	Total	12	9

Project No.: NTNyBR 5.6

Research project title	Evaluation of F_5 generation

DOS: 31-07-2024 DOT: 26-09-2024

RESULTS

During *Kharif* 2024-25, 2 F_5 *Natu* tobacco crosses were evaluated from 7 single plant progenies 12 superior single plants were selected and promoted to F_6 generation during 25-26.

Evaluation of F_5 generation

Cross combination	Objective	No. of plant progenies studied	No. of SPs
Bhairavi X Kavali	High yielding drought tolerant with good quality	5	6
Bhairavi X *Natu*parchur		2	6
	Total	7	12

Project No.: NTNyBR 5.7

Research project title	Evaluation of F_6 generation

DOS: 31-07-2024 DOT: 27-09-2024

RESULTS

In F_6 generation from 7 plant progenies of 2 crosses, 7 uniform bulks were made and these will be evaluated under OVT-I during 25-26.

Evaluation of F_6 generation

Cross combination	Objective	No. of plant progenies studied	No. of SPs
Bhairavi x WAF	Drought tolerant high yielding varieties	5	3
Bhairavi x *Natu* Special		2	4
	Total	7	7

Salient findings /Achievements

- Two fresh crosses were made for higher cured leaf yield with good nicotine content these will be evaluated under F_1 generation during 2025-26
- From F_1 to F_6 generations out of 13 crosses 46 plant progenies studied in these 49 single plant progenies were selected for further evaluation during 2025-26

Project No.: NTNyBR 1

Research project title	**Collection, evaluation and maintenance of *Natu* tobacco germplasm**
Objectives	▪ To maintain and study *Natu* germplasm linesfor utilization in future breeding programmes ▪ To evaluate and isolate superior *Natu*tobacco lines for direct release ▪ To collect local land races, varieties and lines by under taking expeditions in *Natu*tobacco growing areas of the tract
Investigators	P. Pulli Bai & K. Sathish Babu
Year of start	2024-25
Year of completion	2024-25
Location	AINPT, RARS, Nandyal

DOS: 01-08-2024 DOT: 29-09-2024

During 2024-25, 2 new lines NyNT-105 (Bhairavi x KFC) & NyNT-106 (Bhairavi x Talmariaku) is included and 38 germplasm lines were evaluated (Table 2 & 3 BDNyBR 1). Data pertaining to *Natu* germplasm lines, days to flowering: 130-140 (NGP-87, DG-5, NG-62, 65,82) to 140-165 (Line 362, NGP 81, local ankireddy palem, pottivittanam), Plant height (cm) : 58-76 (NGP-79, IET-118, 1ET-120, II 1068 & NGP-89) to 85-125 (DG-5, NyNT-103, Bommidala & NG-73), Leaf length (cm) : 30-40 (NGP-81,169-2, NGP-59, Bommidala & DG-5) to 41-61 (NG-55, Samson oriental, IET-121, A1-11-65, KFC, Pottivittanam & NyNT-98), Leaf width (cm) : 10-15 (Bommidala, Line 362, Samson, oriental & DG-5) to 15-24 (WAF, IET-120, local ankireddypalem, IET-118 & NGP-88), RWC % : 67.5-80 (Samson oriental, A1-11-65, IET-118, Pottivittanam, NGP-88 & IET-119) to 81-89.6 (NG-73, NGP-87, NG-23, NGP-81 & WAF), Nicotine % : 1-2.5 (Kavali, Mutant, Dharanikota, Nellore & WAF) to 2.5-3.5 (II 1872, Nandigama, Addanki & *Natu* special).

Salient findings /Achievements

- 38 germplasm lines were evaluated during 2024-25
- NyNT-105 (108 g), NyNT-106 (110 g), NyNT-103 (98 g) and NyNT 104 (100 g) recorded higher cured leaf yield per plant
- NyNT 104 having the higher Relative Water Content (RWC: 89.6%), followed by WAF (88.6%) and NG 23 (88.2%), under moisture stress conditions
- K-20 (LT: 15.4 mg/cm²) and NG 85 (16.5 mg/cm²) recorded thicker leaves, which is often associated with drought tolerance and better photosynthetic efficiency
- Leaf Length ranged from as low as 30.5 cm (NGP 81) to 58.2 cm (NyNT 106)
- Plant height varied from 58 cm (IET 118) to 125 cm (Bhairavi).

Table 1 BDNyBR 1: Characters of *Natu* tobacco germplasm lines span a wide range.

Characters	Range	
	Mini	**Max**
Days to flowering	130-140 (NGP-87, DG-5, NG-62,65, 82)	140-165 (Line-362, NGP-81, local ankireddy palem, pottivittanam)
Plant height (cm)	58-76 (NGP-79, IET-118, 1ET-120, II 1068 & NGP-89)	85-125 (DG-5, NyNT-103, Bommidala & NG-73)
Leaf length (cm)	30-40 (NGP-81,169-2, NGP-59, Bommidala & DG-5)	41-61 (NG-55, Samson, oriental, IET-121, A1-11-65, KFC, Pottivittanam & NyNT-98)
Leaf width (cm)	10-15 (Bommidala, Line 362, samson oriental & DG-5)	15-24 (WAF, IET-120, local ankireddypalem, IET-118 & NGP-88)
RWC %	67.5-80 (Samson, oriental, A1-11-65, IET 118, Pottivittanam, NGP-88 & IET-119)	81-89.6 (NG-73, NGP-87, NG-23, NGP-81 & WAF)
Nicotine %	1-2.5 (Kavali, Mutant, Dharanikota, Nellore & WAF)	2.5-3.5 (II-1872. Nandigama, Addanki & *Natu* special)

Table 2 BDNyBR 1: Evaluation of *Natu* tobacco germplasm lines during 2024-25

Germplasm	Plant habit	Plant Height (cm)	Days to flowering	Inter nodal length (cm)	Plant width (cm)	Stem colour	Leaf character		Total leaf number	Suckering habit	Spangling	CLY (g)
K-20	Open	100	163	1.2	89	Green	Green	Medium	21	Medium	Medium	61
R P K -1-2	Open	98	165	1.2	90	Green	Green	Medium	20	Heavy	Medium	68
DG-5	Open	86	154	14	58	Green	Green	High	16	Medium	Medium	58
A1-11-65	erect	76	167	1.8	86	Green	Green	High	17	Low	Low	66
NG 82	erect	76	166	1.5	98	Green	Green	Medium	18	Low	Medium	58
NGP 87	erect	63	169	1.9	95	Green	Green	Low	18	Medium	Low	86
NG 62	Open	79	161	2.2	96	Green	Green	Low	17	Medium	Medium	82
NGP 89	Erect	75	157	2.0	66	Green	Green	Medium	17	Heavy	Low	80
NG 23	Open	81	159	1.0	90	Green	Green	Low	16	Heavy	Medium	69
NGP 79	Open	58	160	1.0	88	Green	Green	High	16	Heavy	Low	78
NG 55	Erect	80	152	2.0	85	Green	Green	Low	18	Heavy	Medium	80
NGP 88	Open	100	157	2.5	90	Green	Green	Medium	24	Low	Medium	76
NG 85	Erect	102	159	1.0	85	Green	Green	Medium	20	Medium	Medium	63
NG 65	Open	101	162	2.0	82	Green	Green	High	24	Medium	Medium	58
NGP 81	Erect	102	165	2.5	90	Green	Green	High	12	Low	Medium	61
NG 73	Open	100	142	2.0	89	Green	Green	Low	18	Heavy	Low	88
NG 51	Open	69	144	1.0	96.2	Green	Green	Medium	21	Heavy	Medium	71
LINE 362	Erect	103	148	2.5	88.0	Green	Green	Low	22	Medium	Medium	85
Local ankireddy palem	Open	100	149	2.0	87.5	Green	Green	Medium	18	Low	Low	60
II 1068	Open	76	155	2.1	90.2	Green	Green	Medium	16	Heavy	Medium	68
Pottivithanam	Erect	91	157	2.0	98.2	Green	Green	High	15	Medium	Low	70
Samsung oriental	Open	96	159	1.0	99.5	Green	Green	High	16	Low	Medium	61
169-2	Open	95	165	2.5	80.2	Green	Green	Low	16	Heavy	Medium	58
Bommidala	Erect	90	161	2.0	89.0	Green	Green	Medium	12	Medium	Medium	78
NGP 59	Open	100	144	2.2	11.0	Green	Green	Medium	13	Low	Medium	79
IET-118	Erect	58	146	2.5	86.2	Green	Green	High	14	Low	Medium	80

IET 119	Open	68	161	2.0	78.5	Green	Green	High	19	1Heavy	Medium	78
IET 120	Erect	60	165	1.0	85.8	Green	Green	Low	16	Heavy	Medium	80
IET 121	Open	65	148	2.0	98	Green	Green	Medium	17	Heavy	Medium	85
WAF	Open	101	152	2.0	92.5	Green	Green	Medium	18	Medium	Medium	89
Bhairavi	Open	125	157	2.2	110	Green	Green	Medium	17	Medium	Medium	93
NyNT 105	Erect	98	148	2.0	102	Green	Green	Medium	15	Medium	Medium	108
NyNT 106	Open	104	146	2.2	98	Green	Green	Medium	16	Medium	Medium	110
NyNT 98	Erect	96	144	2.1	99	Green	Green	Medium	19	Medium	Medium	95
NyNT 103	Open	88	147	2.2	85	Green	Green	Medium	18	Medium	Medium	98
NyNT 104	Open	90	159	2.5	86	Green	Green	Medium	20	Medium	Medium	100
NyNT 96	Open	89	153	2.2	92	Green	Green	Medium	22	Medium	Medium	89
KFC	Erect	90	140	1.8	80	Green	Green	Medium	20	Medium	Medium	68

Table 3 BDNyBR 1: Evaluation of *Natu* tobacco germplasm lines during 2024-25

Germplasm	RWC %	LT (mg/ cm^2)	Inflorescence	Flower colour	Corolla shape	Leaf length (cm)	Leaf width (cm)	Capsule shape	Capsule length (cm)	Capsule width (cm)	Seed colour	Rooting habit
K-20	82.5	15.4	Compact	Pink	Fluted	51.2	18.0	Conical	1.9	1.0	Brown	Medium
R P K -1-2	85.2	9.6	Open	Pink	Funnel	46.5	14.5	Ovoid	2.0	1.0	Brown	Deep
DG-5	73.1	5.5	Compact	Pink	Fluted	40.5	11.5	Ovoid	1.5	1.0	Brown	Medium
A1-11-65	70.6	7.1	Open	Pink	Fluted	46.2	14.5	Ovoid	2.5	0.9	Brown	Medium
NG 82	74.3	5.5	Compact	Pink	Fluted	46.2	12.5	Ovoid	1.8	0.8	Brown	Medium
NGP 87	75.2	10.8	Open	White	Fluted	54.2	22.0	Conical	1.6	0.9	Brown	Medium
NG 62	81.5	4.5	Compact	Pink	Funnel	36.2	12.5	Ovoid	2.0	1.0	Brown	Medium
NGP 89	86.6	12.4	Highly branched	Pink	Funnel	46.5	16.0	Conical	2.2	1.0	Brown	Medium
NG 23	88.2	13.3	Compact	Pink	Funnel	50.5	18.5	Ovoid	26	1.0	Brown	Medium
NGP 79	81.7	10.5	Open	Pink	Fluted	42.6	16.0	Conical	23	1.0	Brown	Medium
NG 55	82.0	9.1	Compact	Pin	Funnel	42.0	13.0	Conical	2.2	0.9	Brown	Deep
NGP 88	78.5	10.7	Highly branched	Pink	Funnel	52.0	16.5	Conical	2.2	0.9	Brown	Medium
NG 85	85.6	16.5	Compact	Pink	Fluted	50.0	18.2	Conical	1.9	0.9	Brown	Medium

NG 65	81.3	8.4	Highly branched	Pink	Funnel	47.5	16.0	Conical	2.5	1.5	Brown	Deep
NGP 81	83.7	3.7	Compact	Pink	Funnel	30.5	12.0	Conical	2.0	1.0	Brown	Medium
NG 73	85.0	12.0	Compact	White	Fluted	53.2	21.5	Conical	2.5	1.5	Brown	Medium
NG 51	81.1	5.6	Open	Pink	Fluted	46.0	13.5	Conical	2.5	1.5	Brown	Medium
LINE 362	83.2	5.1	Compact	White	Funnel	45.5	13.5	Conical	2.5	1.0	Brown	Medium
Local ankireddypalem	85.2	9.2	Open	Pink	Funnel	58.5	15.8	Ovoid	2.0	0.9	Brown	Deep
II 1068	82.9	10.7	Highly branched	White	Fluted	48.5	16.5	Conical	2.0	0.9	Brown	Medium
Pottivithanam	72.3	9.0	Compact	Pink	Funnel	52.5	14.5	Conical	2.0	0.9	Brown	Medium
Samsung oriental	67.5	7.0	Highly branched	Pink	Funnel	41.5	11.0	Ovoid	2.2	0.8	Brown	Deep
169-2	82.6	8.2	Highly branched	Pink	Fluted	37.5	13.1	Conical	2.0	0.7	Brown	Medium
Bommidala	85.4	9.1	Compact	Pink	Fluted	40.0	12.5	Conical	2.0	0.8	Brown	Medium
NGP 59	75.7	5.4	Highly branched	Pink	Funnel	39.5	11.0	Conical	2.2	0.9	Brown	Deep
IET 118	72.9	8.7	Compact	Caramine	Fluted	48.5	18.0	Conical	2.0	0.8	Brown	Medium
IET 119	80.3	7.7	Highly branched	Pink	Funnel	50.2	16.2	Ovoid	2.2	0.9	Brown	Medium
IET 120	77.0	7.6	Compact	Pink	Funnel	46.5	15.5	Conical	2.0	0.8	Brown	Deep
IET 121	77.6	4.4	Compact	Caramine	Fluted	43.5	10.0	Conical	2.0	0.8	Brown	Medium
WAF	88.6	9.0	Compact	Pink	Fluted	57.5	14.5	Conical	2.5	1.0	Brown	Medium
Bhairavi	84.2	4.7	open	Pink	Funnel	53.5	11.5	Ovoid	2.2	1.0	Brown	Deep
NyNT 105	85.6	10.0	Compact	Pink	Fluted	55.2	12.5	Ovoid	2.5	1.0	Brown	Medium
NyNT 106	84.2	7.5	open	white	Fluted	58.2	15.2	Ovoid	2.0	0.9	Brown	Medium
NyNT 98	85.3	9.0	Compact	Pink	Fluted	55.2	15.6	Ovoid	2.0	0.8	Brown	Medium
NyNT 103	86.7	7.0	Open	Pink	Fluted	53.2	14.2	Conical	2.2	0.9	Brown	Medium
NyNT 104	89.6	9.9	Compact	Pink	Funnel	54.8	15.2	Ovoid	2.5	1.0	Brown	Medium
NyNT 96	86.3	13.3	Highly branched	Pink	Funnel	45.5	11.8	Conical	2.5	1.0	Brown	Medium
KFC	78.7	12.3	Compact	White	Funnel	45.6	12.5	Ovoid	2.5	1.0	Brown	Medium

BERHAMPUR

Project No.: PBBR 2

Research project title	**Collection, evaluation and maintenance of tobacco germplasm**
Objectives	▪ To collect, evaluate and maintain tobacco germplasm for future use
Investigators	**Pavitra Mohan Mohapatra, Prasant Kumar Panda, Satyajit Behera**
Year of start	1987
Year of completion	Continuing
Location	AINP on Tobacco, CPR, Berhampur

Treatments	:	143 (139+4)	Spacing	:	75 x 50 cm
Design	:	Non Replicated	Plot size (Gross)	:	Each entry in one row of 5.0 m length
Fertilizer dose	:	$N:P_2O_5:K_2O$: 80:40:40 kg/ha			

RESULTS

During kharif 2024, eighty nine germplasm lines, fifty advanced cultures and four checks were evaluated for topped plant height, leaf number, leaf length, leaf width and cured leaf yield and given in Table 1 PBBR 2. Genotypes exhibited wide variation for all biometrical characters. Topped plant height, number of leaves, leaf length, leaf width and cured leaf yield ranged from 80.52 cm (AC-15) to 136.21 cm (AC-3), 16.2 (AC 10) to 28 (*NATU* ANKREDDY), 48.25 cm (AC-17) to 48.25 cm (PATHARAPALLI), 15.16 cm (AC-7) to 40.63 cm (33-90) and 1834 kg/ha (BADAKHEMUNDI LOCAL) to 3651 kg/ha (*NATU* CHEBROLLU) respectively

Salient findings/Achievements

- Short topped plant height(<90 cm): 18 genotypes
- More number of leaves/plant (>20): 124 genotypes
- Leaf length (>60 cm): 74 genotypes
- Leaf width (>30 cm): 38 genotypes
- Cured leaf yield (>2500kg/ha): 65 genotypes

Table 1 PBBR 2: Data on morphological characters of tobacco germplasm (2024)

S.No.	Genotypes	Topped plant height (cm)	Number of leaves/ plant	Leaf length (cm)	Leaf width (cm)	Cured leaf yield (kg/ha)
1.	BADA KHEMUNDI LOCAL	91.31	21.60	69.56	33.00	1834
2.	HV 98-14	84.05	19.00	65.57	27.96	1919
3.	GNT 6 LOCAL	82.52	17.20	63.22	29.54	2146
4.	9 -- 14	84.14	17.40	65.96	27.73	1927
5.	1872	95.59	18.25	62.14	26.38	1967
6.	1076 X 409-IT	93.07	20.40	54.11	22.73	2354
7.	TOKA –AKU (FARM)	107.92	18.40	59.79	18.68	1978
8.	GADI KURCHIVITHENUM	102.05	20.60	58.78	25.83	2154
9.	*NATU* PATHAVERUM	108.54	22.60	53.67	21.78	2525
10.	MUSTABADA VITHENUM	115.66	19.20	65.59	29.40	2509
11.	DR 1	95.40	22.80	64.27	31.47	2751
12.	*NATU* SINGRIAKONDA	92.69	21.20	62.88	31.24	2895
13.	ANKREDDY PALAM	127.68	21.40	59.39	23.02	2741
14.	DONE VITHENUM	105.53	22.80	63.00	39.51	2802
15.	MUTANT (TOKAKU)	96.28	23.20	54.22	29.45	2258
16.	*NATU* LINGAYA PALAM)	92.48	25.20	54.36	27.13	3039
17.	JP 1	103.27	24.40	51.37	30.42	2738
18.	RAYALA (JUNALGODA)	106.70	19.60	60.62	26.15	2703
19.	RAYALA (ANKREDDY PALAM)	96.49	22.40	66.24	32.58	1021
20.	JML 33-90	86.46	22.20	57.58	27.90	2167
21.	BIHAR (SATHREN PALLI)	90.97	21.40	63.01	29.12	2271
22.	*NATU*	93.85	25.60	68.02	29.51	2522
23.	RANIPETA	82.72	19.40	62.64	28.45	2215
24.	PATIBITHENUM	83.54	18.20	64.62	28.59	2069
25.	TOKA -AKU (CHILACALURIPET)	87.33	20.20	60.39	26.29	2423
26.	TOKA –AKU (NERSERPETA)	91.79	23.20	51.83	23.32	2522
27.	*NATU* KAVELI	88.51	20.80	56.17	19.42	2666
28.	*NATU* (CHEBROLA)	92.87	21.60	61.20	26.77	3651
29.	*NATU* (NELLORE)	90.42	21.60	55.86	22.97	1714
30.	51-90	88.38	19.40	63.47	29.00	1991
31.	PRAVAT (*NATU*)	109.89	20.00	62.26	30.72	2149
32.	SEL. 36-3	109.24	21.60	59.66	30.18	1725

S.No.	Genotypes	Topped plant height (cm)	Number of leaves/ plant	Leaf length (cm)	Leaf width (cm)	Cured leaf yield (kg/ha)
33.	HV 98-18	96.95	25.60	62.22	22.79	1893
34.	KORAPUT LOCAL	99.91	24.40	62.56	34.25	2455
35.	1027 IT	104.46	20.00	59.53	29.89	3250
36.	PTB 6	109.98	23.60	66.24	27.00	3363
37.	1026 - IT	97.12	23.80	61.48	25.99	2802
38.	GNT 6 X 58-90	111.28	23.40	60.51	27.63	1645
39.	DG 4	105.03	23.20	60.50	32.09	2642
40.	1062 – IT	100.39	25.00	62.73	30.07	3252
41.	*NATU* ELURA	94.12	23.60	55.46	28.65	2103
42.	*NATU* METURMETA	101.80	23.60	59.62	27.31	2735
43.	1023- IT	105.12	22.60	62.92	31.47	3263
44.	*NATU* NONPALLI	100.86	22.40	56.84	31.41	2999
45.	MARAGADAM	95.37	23.60	59.77	36.40	2045
46.	J - 2	94.16	23.00	65.38	29.36	3101
47.	INUKUKU	96.29	23.80	57.12	30.52	2757
48.	M. TOKAKU	88.57	23.60	56.29	30.18	2490
49.	1072 – IT	92.64	25.60	57.57	31.72	2578
50.	*NATU* ANKREDDY PALAM	95.14	28.00	64.11	28.81	2410
51.	PATHARAPALLI	95.50	23.20	72.46	34.12	3269
52.	*NATU* MADIRA	102.08	26.20	68.47	29.08	2253
53.	45 – 90	94.17	24.40	66.11	30.66	3010
54.	HV 98 – 21	90.41	25.80	68.86	28.85	2293
55.	409 – IT	83.45	26.20	65.03	27.50	2207
56.	RAYALA (FARM)	96.38	25.40	57.01	23.85	1962
57.	PTB 5	114.56	22.40	62.68	19.80	2037
58.	RAYALA DHARANIKOTA	100.21	21.60	61.68	26.95	1861
59.	HV 98-2	106.42	23.40	56.56	22.90	2215
60.	MARAGADAM	110.51	24.40	68.48	30.52	2383
61.	PTB 11	92.82	25.20	67.17	32.59	1839
62.	1076 – IT	95.97	24.80	65.77	32.36	2143
63.	VR 2	109.21	25.20	62.28	24.14	3486
64.	33-90	91.15	24.80	65.89	40.63	2231
65.	58-90	97.79	23.00	57.12	30.57	3109
66.	BHAGYALAKSHMI	99.96	23.60	57.26	28.25	1949
67.	BOTCHAVITHANUM (ALLANKI)	99.65	20.00	54.27	31.54	2898
68.	KVT-GANAPAVARAM (SATTENAPALLI)	107.51	21.20	63.52	27.27	3545
69.	MANASI	102.46	23.40	69.14	33.70	2959
70.	*NATU* ADDANKI	104.00	24.40	60.48	29.02	1823
71.	*NATU* ANKAPALLI	111.80	20.60	65.90	30.24	2317
72.	*NATU* BURUGUPUDI	118.80	22.20	70.91	30.63	2375

S.No.	Genotypes	Topped plant height (cm)	Number of leaves/ plant	Leaf length (cm)	Leaf width (cm)	Cured leaf yield (kg/ha)
73.	*NATU* MEDARAMETLA	96.84	24.00	65.54	29.57	1466
74.	*NATU* SPECIAL	97.35	24.80	67.52	29.71	2133
75.	*NATU* YELAMANCHALI	96.42	21.60	63.28	27.41	1850
76.	*NATU* VITHANUM-ONGOLE	108.18	24.80	54.73	24.44	1402
77.	RAYALA NARSARPETA	103.54	24.40	59.06	20.54	1922
78.	PVM 2	97.02	23.20	64.10	27.89	1607
79.	PVM 3	96.35	20.40	58.76	24.09	2549
80.	PVM 4	104.50	25.00	66.37	30.12	2573
81.	PVM 6	92.35	23.40	65.15	35.37	1901
82.	PVM 7	85.70	26.20	62.56	31.01	2655
83.	G 88	98.01	23.80	65.12	28.12	1935
84.	G 89	91.03	26.20	65.45	27.11	1792
85.	BPT 3	104.82	25.80	62.43	28.75	1342
86.	BPT 4	95.09	22.40	69.14	33.21	1934
87.	PVM 14	95.52	25.00	64.37	31.19	1386
88.	NF 4-20-2	86.41	24.20	63.40	35.37	1892
89.	Ny 65	101.91	24.40	63.40	31.01	1563
90.	AC 1	127.18	22.60	66.44	30.79	3375
91.	AC 2	125.98	22.80	62.45	24.44	3197
92.	AC 3	136.21	22.80	60.09	26.02	2823
93.	AC 4	118.95	19.60	62.84	24.21	2410
94.	AC 5	125.98	21.60	59.01	22.86	2519
95.	AC 6	96.02	18.60	50.99	19.21	3213
96.	AC 7	88.85	19.20	56.66	15.16	3566
97.	AC 8	108.64	21.80	55.65	22.31	2399
98.	AC 9	98.30	16.60	50.54	18.26	2615
99.	AC 10	82.51	16.20	62.46	25.88	3476
100.	AC 11	103.17	20.60	61.15	27.95	3141
101.	AC 12	104.44	20.60	59.75	27.72	3029
102.	AC 13	82.05	17.20	56.26	19.50	3631
103.	AC 14	87.06	18.40	59.87	35.99	2338
104.	AC 15	80.52	19.60	51.10	25.93	3111
105.	AC 16	108.17	21.20	51.24	23.61	3106
106.	AC 17	104.78	23.00	48.25	26.90	2402
107.	AC 18	97.05	23.60	57.49	22.63	2935
108.	AC 19	87.72	24.80	63.12	29.06	1978
109.	AC 20	110.60	27.00	54.46	24.38	2951
110.	AC 21	102.08	22.80	59.88	25.60	1485
111.	A C 22	119.64	23.80	64.89	25.99	2197
112.	AC 23	116.26	24.20	59.51	24.93	1919
113.	AC 24	114.34	24.40	61.49	25.07	2338

S.No.	Genotypes	Topped plant height (cm)	Number of leaves/ plant	Leaf length (cm)	Leaf width (cm)	Cured leaf yield (kg/ha)
114.	AC 25	103.42	24.60	57.26	22.77	1986
115.	AC 26	102.98	26.40	48.70	19.80	1935
116.	AC 27	100.77	26.20	53.04	15.90	2202
117.	AC 28	98.15	23.60	58.07	23.25	3537
118.	AC 29	101.14	23.20	52.73	19.45	2525
119.	AC 30	105.45	23.00	60.35	25.48	2239
120.	AC 31	102.08	24.20	59.13	27.20	3013
121.	AC 32	109.92	23.80	56.53	26.66	3375
122.	AC 33	103.19	26.00	59.10	19.27	3197
123.	AC 34	94.22	25.40	59.43	30.73	2823
124.	AC 35	95.89	24.60	56.41	26.37	2410
125.	AC 36	93.06	24.80	63.11	23.48	2519
126.	AC 37	115.80	25.20	58.35	22.47	3213
127.	AC 38	104.14	27.00	57.38	24.11	3566
128.	AC 39	105.60	25.20	57.38	28.57	2546
129.	AC 40	91.35	27.00	59.60	26.55	3365
130.	AC 41	96.08	26.40	52.33	25.13	2018
131.	AC 42	109.60	23.60	56.50	23.79	2685
132.	AC 43	108.66	21.60	59.79	27.95	1450
133.	AC 44	95.61	23.20	53.71	27.89	1543
134.	AC 45	94.43	22.20	56.64	32.88	1442
135.	AC 46	108.34	23.60	62.25	25.84	1362
136.	AC 47	100.76	24.60	54.00	27.00	1845
137.	AC 48	102.55	26.80	53.17	26.66	2421
138.	AC 49	109.67	27.20	54.44	28.20	3039
139.	AC 50	121.17	23.60	60.98	25.29	2373
140.	BPT7 (Ch)	118.29	23.80	62.84	28.31	2944
141.	BPT 50(Ch)	105.70	26.00	55.17	24.45	2800
142.	Gajapati (Ch)	113.85	25.40	60.33	27.17	2546
143.	JPLocal (Ch)	104.86	24.60	57.93	23.93	3365

Project No.: PBBR 10

Research project title	**Evaluation of drought tolerant genotypes**
Objectives	▪ To evaluate genotypes for drought tolerance and selection of drought tolerant genotypes for use in hybridization programme
Investigators	Pavitra Mohan Mohapatra, Prasant Kumar Panda, Satyajit Behera
Year of start	2021-22
Year of completion	2024-25
Location	AINP on Tobacco, CPR, Berhampur

Design	:	RBD	Replications	:	Three
Treatments	:	22 (20 +2)	Spacing	:	75 x 50 cm
Plot size	:	5 x 3 m	Fertilizer dose	:	$N:P_2O_5:K_2O$: 80:40:40 kg/ha
Observations recorded	:	Topped plant height (cm), No. of leaves/plant Leaf length (cm), Leaf width (cm), Cured leaf yield (kg/ha)			

RESULTS

In order to assess drought tolerant genotypes, twenty pikka tobacco genotypes along with two check varieties, Gajapati and JP Local were evaluated during 2024-25 in RBD with Three replications for cured leaf yield and ancillary characters such as topped plant height (cm), no. of leaves / plant, leaf length (cm) and leaf width (cm) . Data on cured leaf yield and ancillary characters of *pikka* tobacco genotypes tested in evaluation of drought tolerant genotypes 2024-25 is given in Table 1 PBBR 10.
Topped plant height, number of leaves, leaf length, leaf width and cured leaf yield ranged from 112.04 cm (II 1068) to 70.02 cm (PEDA VITANAM),24.47(JP LOCAL) to 13.53 (NARASRAOPETA), 58.84 cm (*NATU* SPECIAL) to 67.09 cm (II 1068), 22.83 cm (NG 61) to 25.85 cm (LINE 61) and 936 kg/ha(NG 64) to 2156 kg/ha (WAF) respectively.

Salient findings/Achievements

- Four genotypes (*Natu* Special, Bhairavi, Line 61 and Talamari aku)during 2023 exhibited significantly higher cured leaf yield in tobacco than best check variety JP Local.
- Ten genotypes (Komipadu vitanam, NGP 89, *Natu* Paracharu, II 1068, Chebrolu, Line 61, Kavali, Talamari aku, WAF) during 2024 exhibited significantly higher cured leaf yield in tobacco than best check variety JP Local.
- Short topped plant height(< 90 cm): 09 genotypes
- More number of leaves/plant (>20): 11 genotypes
- Leaf length (>60 cm): 18 genotypes
- Leaf width (>25 cm):(9 genotypes
- Cured leaf yield (>1500 kg/ha): 11 genotypes

Table 1 PBBR 10: Data on pooled cured leaf yield and ancillary characters of *pikka* tobacco genotypes during 2024

Genotypes	Topped plant height (cm)	No. of leaves / plant	Leaf length (cm)	Leaf width (cm)	Cured leaf yield (kg/ha)		
					2023	2024	Pooled
Bhairavi	103.67	20.00	62.14	26.61	**1433***	1754	1593.5
Chebrolu	85.61	17.80	64.37	25.14	1301	1640	1470.5
KommipaduVitanam	97.46	20.67	59.36	24.14	1195	1576	1385.5
II 1068	112.04	21.13	67.09	24.49	1313	1621	1467
II 1873	111.29	22.47	66.19	23.43	875	1352	1113.5
Kavali	105.71	23.33	62.02	23.96	1271	1853	1562
KFC	96.71	16.53	62.54	23.81	1068	1289	1178.5
Line 61	91.24	16.73	61.89	25.85	1373*	1771	1771
Narasraopeta	84.81	13.53	59.82	25.59	1103	1412	1257.5
Natu Noonepalli	88.60	15.13	63.00	24.55	1051	1261	1156
Natu Paracheru	100.43	17.93	62.63	23.28	1223	1589	1406
Natu Special	85.33	17.20	58.84	23.48	1532*	1711	1711
NG 61	87.90	18.87	67.05	22.83	1050	1120	1085
NG 64	82.44	20.60	63.28	23.74	894	936	915
NGP 89	85.30	19.33	61.60	25.39	1278	1578	1428
Ongole	89.16	20.80	62.67	25.37	1161	1361	1261
Peda Vitanam	70.02	19.87	64.94	24.83	799	1190	994.5
Potti Vitanam	92.61	21.13	61.01	25.63	1330	1298	1314
Talamariaku	100.48	22.87	60.81	24.39	1372*	1924	1924
WAF	93.62	22.20	59.64	25.09	1252	2156	1704
Gajapati Ch	94.08	21.33	60.31	25.69	1143	1460	1301.5
JP Local	104.35	24.47	60.91	24.78	1179	1556	1367.5
Mean	93.77	19.72	62.37	24.64	1190.00	1518.54	1354.27
S.Em ±	7.71	0.52	1.19	0.66	57.40	72.38	64.69
C.D. at 5%	N/A	1.47	3.41	1.88	168.80	N/A	N/A
C. V. (%)	14.23	4.52	3.30	4.61	36.80	13.91	11.35

Project No.: PBBR 11 (A)

Research project title	**Exploratory trail on *rustica* tobacco**
Objectives	▪ To evaluate promising released genotypes of *rustica* tobacco under Odisha condition and identify suitability for general cultivation
Investigators	Pavitra Mohan Mohapatra, Prasant Kumar Panda, Satyajit Behera
Year of start	2022-23
Year of completion	2024-25
Location	AINP on Tobacco, CPR, Berhampur

Design	:	Unreplicated	Spacing	:	60 x 50 cm
Treatments	:	5 (4 +1)	Fertilizer dose	:	$N:P_2O_5:K_2O$: 80:40:40 kg/ha
Plot size	:	20.4 x 5 m (34 rows of 5m length)	Observations recorded	:	Cured leaf yield (kg/ha)

RESULTS

Four promising released *rustica* tobacco genotypes (GCT 2, GCT 3, DCT 4 and DCT 5) along with one check variety GC 1 were evaluated during 2024-25. It was found from Table 1 PBBR 11(A) that all test entries produced higher cured leaf yield than check variety GC 1 (1018 kg/ha). Maximum cured leaf yield was reported by DCT 5 (1458 kg/ha) followed by DCT 4 (1441 kg/ha), GCT 2 (1381 kg/ha) and GCT 3 (1092 kg/ha), with yield advantage of 43.3, ,42.5, 36.22 and 7.3 percent higher cured leaf yield than check variety GC 1 (1018 kg/ha) respectively.

Pooled analysis

Three years pooled data revealed that variety DCT 5 produced maximum cured leaf yield of 1972 kg/ha followed by DCT 3 (1916 kg/ha), DCT 4 (1856 kg/ha) and DCT 4 (1819 kg/ha) than check variety GC 1 (1018 kg/ha) respectively.

Conclusion: Based on the three-year data, DCT 5 emerges as the most consistent and high-yielding variety with the highest overall mean yield (1972 Kg/ha) and stable high % IOC values across all years, indicating strong adaptability and resilience. GCT 3 exhibited the highest yield in a single year (2328 Kg/ha in 2024) and the maximum % IOC (51.6% in 2023), but its % IOC dropped notably in 2024, suggesting possible environmental or management sensitivity. GCT 2 and DCT 4 performed steadily with moderate to high % IOC values, making them suitable options, though not outperforming DCT 5. GC 1, being the control, consistently yielded lower and served as a baseline for calculating improvements in other varieties.

Table 1 PBBR 11(A): Cured leaf yield of *rustica* tobacco varieties during 2024

Varieties	Cured leaf yield (Kg/ha)							Overall Mean of Three years
	2022	% IOC	2023	% IOC	Mean	2024	% IOC	
GCT 2	1548	27.9	1819	18.6	2038	1381	36.2%	1819
GCT 3	1424	17.7	1916	51.6	2328	1092	7.3%	1916
DCT 4	1513	25	1856	22.6	2063	1441	42.5%	1856
DCT 5	1684	39.2	1972	30.1	2228	1458	43.3%	1972
GC1 (C)	1210		2131		1671	1018		

Project No.: PBBR 11 (B)

Research project title	**Exploratory trail on *Jati* tobacco**
Objectives	▪ To evaluate promising released genotypes of*Jati* tobacco under Odisha condition and identify suitability for general cultivation
Investigators	Pavitra Mohan Mohapatra, Prasant Kumar Panda, Satyajit Behera
Year of start	2023-24
Year of completion	2025-26
Location	AINP on Tobacco, CPR, Berhampur

Design	:	Unreplicated			
Treatments	:	4 (3 +1)	Spacing	:	75 x 50 cm
Plot size	:	9 x 5 m	Fertilizer dose	:	$N:P_2O_5:K_2O$: 80:40:40 kg/ha
Observation recorded	:	Cured leaf yield (kg/ha)			

RESULTS

During 2024, three promising released *jati* tobacco genotypes (Podali, Manasi and Chama) along with one check variety DJ 1 were evaluated during 2025. It was found from Table 1 PBBR 11(B) that all test entries produced higher cured leaf yield than check variety DJ 1 (2760 kg/ha). Maximum cured leaf yield was reported by Podali (3287 kg/ha) followed by Chamma (3245 kg/ha) and Manasi (3156 kg/ha), with yield advantage of 25.4, 14.5 and 19.3 percent respectively higher cured leaf yield than check variety DJ 1(2760 kg/ha).

Conclusion: Over the two years of study, Chama emerged as the most consistent performer with the highest mean cured leaf yield (2977 kg/ha) and a strong % IOC in both years (38.5% in 2023 and 25.4% in 2024). Manasi also performed very well, achieving the highest % IOC in 2023 (40.5%) and maintaining competitive yields in 2024. Podali delivered the highest yield in 2024 (3287 kg/ha) but had a lower % IOC compared to Chama and Manasi, suggesting that its yield advantage may depend more on specific seasonal conditions. The control variety DJ 1 consistently yielded lower than the improved varieties, validating the effectiveness of the tested cultivars.

Table 1 PBBR 11 (B): Cured leaf yield of *jati* tobacco varieties during 2024

Varieties	Cured leaf yield (Kg/ha)2023	% IOC	Cured leaf yield (Kg/ha)2024	% IOC	MEAN
Podali	2347	20.0	3287	19.3%	2817
Manasi	2749	40.5	3156	14.5%	2952
Chama	2709	38.5	3245	25.4%	2977
DJ 1(ch)	1956		2760		2358

Project No.: PBBR 14

Research project title	**Exploratory trial on Burley tobacco**
Objectives	▪ To evaluate promising released genotypes of Burley tobacco under Odisha condition and identify suitability for general cultivation
Investigators	Pavitra Mohan Mohapatra, Prasant Kumar Panda, Satyajit Behera
Year of start	2024-25
Year of completion	2025-26
Location	AINP on Tobacco, CPR, Berhampur

Design	:	Unreplicated	Replications	:	Unreplicated
Treatments	:	2	Spacing	:	75 x 50 cm
Plot size	:	5 x 1.5 m	Fertilizer dose	:	$N:P_2O_5:K_2O$: 80:40:40 kg/ha
Observation recorded	:	1 .Topped plant height (cm) 2. No. of leaves/plant 3 .Leaf length (cm) 4. Leaf width (cm) 5. Cured leaf yield (kg/ha)			

RESULTS

During 2025, two promising Burley tobacco genotypes (YB-22 and Banket A1) were evaluated during 2025 by collecting seedlings from ICAR-NIRCA, Rajahmundry. It was found from Table 1 PBBR 12 that two test entries produced higher cured leaf. Maximum cured leaf yield was reported by YB-22 (35871 kg/ha) followed by Banket A1 (27871 kg/ha).

Salient findings/Achievements

- The two test entries produced higher plant ht, no of leaves, leaf length, leaf width and higher cured leaf

Conclusion: During 2025, two promising Burley tobacco genotypes (YB-22 and Banket A1) were evaluated during 2025. It was found from Table 1 PBBR 12 that two test entries produced higher cured leaf. Maximum cured leaf yield was reported by YB-22 (35871 kg/ha) followed by Banket A1 (27871 kg/ha). With the Mean values of plant ht, no of leaves, leaflenghth, leaf width and cured leaf wt of both the genotypes having (126.14), (22.28), (61.62), (36.37), (31871) respectively.

Table 1 PBBR 14: Data on cured leaf yield and morphological characters (2024)

Genotypes	Cured leaf yield (kg/ha)	Topped plant height (cm)	Number of leaves per plant	Leaf length (cm)	Leaf width (cm)
YB-22	3587	112.20	20.81	62.81	33.52
BANKET-A1	2787	140.08	23.76	60.44	39.22
Mean	3187	126.14	22.28	61.62	36.37

D. *RUSTICA* TOBACCO

RUABRC/RUArBRC/RULdBRC 2/RUDBRC: INITIAL VARIETAL TRIAL ON *RUSTICA* TOBACCO

Objectives: To evaluate the *rustica* tobacco entries for yield and quality at four centres *viz.,* Anand, Araul, Dinhata and Ladol along with respective check varieties under IVT

Year of start **:** 2024-25

Year of Completion **:** 2024-25

***Rustica* tobacco Centres and Investigators**

Centres	:	**Investigators**
Anand	:	D.A. Patel & D.R. Delvadiya
Araul	:	K.C. Arya & N.B. Singh
Dinhata	:	Partha Saha & Namita Das Saha
Ladol	:	D.R. Chaudhari

Design : RBD
Total treatments : 03 + checks as given above
Replications : Five

Entries: 03 (Three)

1. IET-143
2. IET-144
3. IET-145

Checks at different Centres

Anand	1. GC 1	2. GCT 2	3. GCT 3
Araul	1. Azad Kanchan	2. SK 417	
Dinhata	1. DD 437	2. Dharla	3. GCT 3
Ladol	1. GCT 3	2. DCT 4	3. GCT 5

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Anand	2.40 x 6.00 m	60 x 60 cm
Araul	4.5 x 4.5 m	45 x 45 cm
Dinhata	3.63 x 2.1 m	60 x 45 cm
Ladol	2.40 x 4.50 m	60 x 45 cm

RESULTS

In the Initial varietal trial (IVT), three entries were evaluated in randomized block design with five replications for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Tables 1 to 7 IVT *Rustica* tobacco. The results are presented centre-wise.

ANAND

Yield: Three entries were evaluated along with three checks *viz.*, GC 1, GCT 2 and GCT-3. The results revealed significant yield differences among the entries tested. Significant differences were observed among test entries for cured leaf yield. IET-143 (4004 kg/ha) and IET-144 (4648 kg/ha) were found significantly superior over the best check GC 1 (3206 kg/ha) for cured leaf yield.

Morphological characterization: All the morphological characters *i.e.* no. of leaves per plant, plant height, leaf length, leaf width, leaf thickness, days to flowering and days to maturity were comparable with check variety.

Disease /Pest incidence: TMV and leaf curl incidence were found 31 % and 27% for test entry IET 145, respectively

Salient findings/Achievements

- Line IET 143 and 144 showed significant superiority for cured leaf yield over the best check GC 1

ARAUL

Yield: Significant differences were observed among test entries for cured leaf yield. Entry IET-144 (3612 kg/ha) followed by entry IET-145 (3495 kg/ha) were found significantly superior over the best check Azad Kanchan (2980 kg/ha) with yield improvement of 21% and 17% respectively.

Salient findings/Achievements:

- The entries IET-144 and IET-145 showed significant superiority for cured leaf yield over the best check variety Azad Kanchan and may be approved for AVT-I to be conducted during *rabi* 2025-26

Conclusion: The entries IET-144 and IET-145 may be promoted for AVT-I to be conducted during *Rabi*-2025-26.

DINHATA

Yield: Significant variations were observed between the entries for cured leaf yield. Among the entries, entry IET 143 was found superior in respect of cured leaf yield, first grade leaf. The quality leaf was found to be highest in DD-437. The entry IET-145 was not superior than check DD-437.

Morphological characterization: Significant variations were observed for different morphological traits. The highest plant height (45.29 cm) was observed for the entry IET-145 followed by IET-143 (40.40 cm). The entry IET-143 had the highest leaf length (22.86) and leaf breadth (20.67).

Disease /Pest incidence: The incidence of hollow stalk was highest (17.2%) in the entry IET-144 whereas it was only 4.4% in the check Dharla.

Salient findings/Achievements:

- Among the entries, entry IET-143 was found superior in respect of cured leaf yield & first grade leaf
- The quality leaf was found to be highest in DD-437

Conclusion: Entries IET-143 and IET-144 can be promoted for AVT-I to be conducted during *Rabi*-2025-26.

LADOL

Yield: Significant differences for cured leaf yield, plant height and no. of leaves per plant, leaf length and leaf width were found for the entries tested in IVT. Entry, IET-144 (5246 kg/ha) was found significant superior and gave 11.7 per cent higher cured leaf yield over best check, GCT 5 (4696 kg/ha).

Salient findings/Achievements

- Entry, IET-144 (5246 kg/ha) was found significant superior and gave 11.7 per cent higher cured leaf yield over best check GCT 5 (4696 kg/ha)

Conclusion: The entry, IET-144 may be promoted to AVT-I trial.

Recommendation for promoting to AVT-I: Based on the result of *rustica* centres and as per the proceedings of the committee constituted for consideration of IVT proposals, met on 30th July 2025, all the 3 entires are significantly superior over better checks, hence, the three entries *viz*., IET-143, IET-144 & IET-145 were forwarded to AVT-I for the crop season 2025-26.

Table 1 IVT *RUSTICA* TOBACCO: Yield data of IVT *rustica* entries at different centres (2024-25)

Entries	Cured leaf yield at different centres (kg/ha)			
	Anand	Araul	Dinhata	Ladol
IET-143	4004*	3015	1163	4039
IET-144	4678*	3612 (21)	1067	5246* (11.7)
IET-145	2348	3495 (17)	943	3960
GC 1 (C)	3206	-	-	-
GCT 2 (C)	2764	-	-	-
GCT 3 (C)	3137	-	889	4281
DCT 4 (C)	-	-	-	4493
GCT 5 (C)	-	-	-	4696
Azad Kanchan (C)	-	2980	-	-
SK-417 (C)	-	2795	-	-
DD 437 (C)	-	-	1037	-
Dharla (C)	-	-	975	-
Grand Mean	-	-	-	4452
S.Em ±	154.7	160.15	44.64	121
C.D. at 5%	456	428.13	132	358
C.V. (%)	10.31	11.17	9.86	6.10

Figures in parenthesis are per cent increase over best check

Table 2 IVT *RUSTICA* TOBACCO: Data on morphological characters in IVT *rustica* entries at different centres (2024-25)

Entries	Leaf thickness		Days to maturity		Days to flower	Inter-nodal length	Palnt Stand
	Anand	Araul	Anand	Araul	Anand	Dinhata	Ladol
IET-143	10.95	13.82	128	126	62	3.32	38
IET-144	8.57	12.42	125	123	67	3.94	39
IET-145	11.72	11.45	117	123	44	4.14	39
GC 1 (C)	8.26	-	132	-	43	-	-
GCT 2 (C)	10.21	-	127	-	67	-	-
GCT 3 (C)	12.10	-	128	-	57	4.48	37
DCT 4 (C)	-	-	0.74	-	1.92	-	37
GCT 5 (C)	-	-	2.21	-	5.65	-	38
Azad Kanchan (C)	-	11.72	1.31	122	7.57	-	-
SK-417 (C)	-	11.18		123	-	-	-
DD 437 (C)	-	-	-	-	-	4.82	0.58
Dharla (C)	-	-	-	-	-	4.66	NS
S.Em ±	-	-	-	-	-	0.07	3.41

Table 3 IVT *RUSTICA* TOBACCO: Morphological characters of IVT entries of *rustica* tobacco at different centres (2024-25)

Entries	**No. of leaves/ plant**				**Plant height (cm)**				**Leaf length (cm)**				**Leaf Breadth (cm)**			
	A	**Ar**	**D**	**L**	**A**	**Ar**	**D**	**L**	**A**	**Ar**	**D**	**L**	**A**	**Ar**	**D**	**L**
IET-143	16	14	8.30	10	55.8	61.73	40.40	50.1	53.4	36.39	22.86	39.0	45.3	38.18	20.67	35.6
IET-144	15	15	8.32	12	49.9	62.83	35.79	51.9	51.2	35.82	21.77	38.1	37.4	41.13	20.18	35.3
IET-145	12	15	8.58	10	43.7	64.95	45.29	50.3	46.4	34.33	21.97	36.4	37.7	40.22	20.11	38.0
GC 1 (C)	14	-	-	-	52.6	-	-	-	47.8	-	-	-	42.0	-	-	-
GCT 2 (C)	14	-	-	-	51.6	-	-	-	47.0	-	-	-	36.2	-	-	-
GCT 3 (C)	13	-	8.46	11	55.8	-	32.23	56.7	48.6	-	21.36	35.0	36.8	-	19.70	31.2
DCT 4 (C)	-	-	-	11	-	-	-	51.7	-	-	-	35.5	-	-	-	33.8
GCT 5 (C)	-	-	-	12	-	-	-	45.1	-	-	-	41.1	-	-	-	42.0
Azad Kanchan (C)	-	13	-		-	62.68	-	-	-	31.22	-	-	-	28.68	-	-
SK-417 (C)	-	12	-		-	66.82	-	-	-	31.39	-	-	-	27.23	-	-
DD 437 (C)	-	-	10.11		-	-	38.61	-	-	-	23.94	-	-	-	20.47	-
Dharla (C)	-	-	7.40		-	-	33.79	-	-	-	18.55	-	-	-	17.27	-
GM	-	-			-	-	-	-	-	-		-	-	-	-	-
S.Em ±	0.41	-	0.38	0.33	2.42	-	1.08	1.46	1.11	-	1.14	0.74	2.90	-	0.82	0.78
C.D. at 5%	1.20	-	1.12	0.97	7.27	-	3.20	4.31	3.28	-	NS	2.19	NS	-	NS	2.30
C.V. (%)	6.48	-	10.02	6.74	10.7	-	6.44	6.41	5.06	-	11.81	4.41	16.52	-	9.33	4.85

A: Anand Ar: Araul D: Dinhata L: Ladol

Table 4 IVT *RUSTICA* TOBACCO: Incidence of disease and pest at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)				
		LCA	LCB	LCC	LCD	LCX
IET 143	18.0	-	-	-	Yes	-
IET 144	15.0	-	-	-	Yes	-
IET 145	31.0	-	-	-	Yes	-
GC 1(C)	12.0	-	-	-	-	Yes
GCT 2 (C)	17.0	-	-	-	-	Yes
GCT 3 (C)	15.0	-	-	-	Yes	-

Where, LCA = Low, LCB = 10%, LCC = 10-20%, LCD = 20-30%, LCX = highly affected/Severe

Table 5 IVT *RUSTICA* TOBACCO: Incidence of disease and pest and first grade leaf yields and quality leaf at Dinhata Centre (2024-25)

Entries	First grade leaf (kg/ha)	Quality leaf (%)	TMV (%)	Tobacco Leaf Curl (%)	Hollow stalk (%)
IET 143	710.51	56.75	0.5	NIL	13.3
IET 144	608.26	55.07	-	NIL	17.2
IET-145	473.80	49.81	0.5	NIL	13.3
GCT-3 (C)	531.67	59.82	-	NIL	8.8
DD-437(C)	692.88	63.72	-	NIL	5.5
Dharla (C)	552.22	56.66	-	NIL	4.4
S.Em ±	29.26	-	-	-	-
C.D. at 5%	86.32	-	-	-	-
C.V. (%)	10.99	-	-	-	-

Table 6 IVT *RUSTICA* TOBACCO: Chemical quality parameter in IVT at Anand (2024-25)

Entry	Nicotine (%)	Reducing Sugar (%)	Chloride (%)
IET 143	6.25	5.97	0.923
IET 144	6.33	5.35	0.958
IET 145	4.95	4.48	0.816
GC 1(C)	6.54	4.98	1.065
GCT 2 (C)	5.95	3.95	0.887
GCT 3 (C)	6.35	5.05	0.715

Table 7 IVT *RUSTICA* TOBACCO: Data on chemical and disease incidence in IVT *rustica* entries at Ladol Centre (2024-25)

Entries	Chemical parameters (%)			Disease (%)	
	Nicotine	Reducing Sugars	Chlorides	LCV	LMV
IET-143	4.11	2.07	0.86	1.04	0.52
IET-144	4.76	2.04	0.83	0.00	0.00
IET-145	3.71	3.70	0.83	1.03	0.00
GCT-3 (C)	4.41	2.88	0.72	0.54	0.00
DCT-4 (C)	4.71	3.05	0.94	0.54	0.00
GCT-5 (C)	4.53	2.33	1.06	0.00	0.52

COORDINATED EVALUATION OF *RUSTICA* TOBACCO GENOTYPES

RUABRC/ RUArBRC / RUDBRC/RULdBRC 1.1: ADVANCED VARIETAL TRIAL ON *RUSTICA* TOBACCO (AVT-I)

Objectives: To evaluate the *Rustica* tobacco entries for yield and quality at four centres *viz.,* Anand, Araul, Dinhata and Ladol along with respective checks under AVT-I.

Year of start **:** 2024-245

Year of Completion **:** 2024-25

***Rustica* tobacco Centres and Investigators**

Centres	:	**Investigators**
Anand	:	J. N. Patel & D.R. Delvadiya
Araul	:	A.K. Srivastava, K.C. Arya &N.B. Singh
Dinhata	:	Partha Saha, Namita Das Saha & S.K. Dam
Ladol	:	D.R. Chaudhari

Design : RBD
Total treatments : 02 + checks as given below
Replications : Five

Entries: 02 (Two)

1. IET-116
2. IET-117

Checks at different Centres

Anand	1. GC 1	2. GCT 2	3. GCT 3
Araul	1. Azad Kanchan	2. SK 417	
Dinhata	1. DD 437	2. Dharla	
Ladol	1. GCT 3	2. DCT 4	3. GCT 5

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Anand	2.40 x 6.00 m	60 x 60 cm
Araul	4.5 x 4.5 m	45 x 45 cm
Dinhata	3.3 x 2.1 m	60 x 45 cm
Ladol	3 x 4.50 m (Gross and Net)	60 x 45 cm

RESULTS

In the Advance varietal trial-I (AVT-I), two entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, *Natu*ral/ artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield and other characteristics at different centres are presented in Tables 1 to 7 IVT *Rustica* tobacco. The results are presented centre-wise.

ANAND

Yield: Two entries were evaluated along with three checks *viz*., GC-1, GCT-2 and GCT-3. The results revealed significant yield differences among the entries tested. Entry IET 116 (3647 kg/ha) was found significantly superior over the best check GC-1 (3103 kg/ha) for cured leaf yield.

Disease /Pest incidence: TMV and leaf curl incidence were found 22% and 49% for test entry IET-117, respectively.

Salient findings/Achievements

- Entry IET-116 was found significantly superior over the best check GC 1

ARAUL

Yield: Entry IET-116 (3680 Kg/ha) followed by entry IET-117 (3475 Kg/ha) found significantly superior over the best check Azad Kanchan (3045 Kg/ha) with yield improvement of 20.85% and 14.13% respectively. Therefore, these two entries may be promoted to AVT-II conducted during *Rabi* 2025-26.

Salient findings/Achievements

- The entry IET-116 and IET-117 showed significant superiority for cured leaf yield over the best check variety Azad Kanchan and may be approved for AVT-II to be conducted during rabi 2025-26.

DINHATA

Salient findings/Achievements

- Test entry IET-116 was found superior in respect of cured leaf yield, first grade leaf and quality leaf.
- The performance of test entry IET-117 was not superior compared to check DD-437 and Dharla.

Conclusion: Lines tested IET-116 can be promoted for AVT-II to be conducted during Rabi-2025-26.

LADOL

In AVT-I trial, yield difference was found significant among all the entries tested. None of the entry showed significant superiority for cured leaf yield over best check GCT-5 (4643 kg/ha). However, entry IET-117 showed numerical maximum cured leaf yield (5042 kg/ha) against best check GCT-5

Salient findings/Achievements

- None of the entry showed significant superiority for cured leaf yield over best check GCT-5 (4643 kg/ha). Entry IET-117 showed numerical maximum cured leaf yield (5042 kg/ha) against best check GCT-5

Recommendation for AVT-II: The entries will be evaluated under AVT-II at all *rustica* centers.

Table 1 AVT-I *RUSTICA* TOBACCO: Yield data of AVT-I *rustica* entries at different centres (2024-25)

Entries	Cured leaf yield at different centres (kg/ha)			
	Anand	**Araul**	**Dinhata**	**Ladol**
IET-116	3647	3680	1851.85	4530
IET-117	3358	3475	1358.02	5042
GC 1 (C)	3103	-	-	-
GCT 2 (C)	2845	-	-	-
GCT 3 (C)	2759	-	-	4208
DCT 4 (C)	-	-	-	4584
GCT 5 (C)	-	-	-	4643
Azad Kanchan (C)	-	3045	-	-
SK-417 (C)	-	2995	-	-
DD 437 (C)	-	-	1555.55	-
Dharla (C)	-	-	1382.71	-
Grand Mean	-	-		4601
S.Em ±	142.8	151.33	62.34	164
C.D. at 5%	428.3	411.68	192.09	490
C.V. (%)	10.2	10.95	9.07	6.36

Table 2 AVT-I *RUSTICA* TOBACCO: Morphological characters of AVT-I entries of *rustica* tobacco at different centres (2024-25)

Entries	No. of leaves/ plant				Plant height (cm)				Leaf length (cm)				Leaf Breadth (cm)			
	A	Ar	D	L	A	Ar	D	L	A	Ar	D	L	A	Ar	D	L
IET-116	15	17	11.16	11	63.5	66.80	39.53	52.3	48.5	34.20	20.83	38.1	38.6	31.70	22.48	36.6
IET-117	13	17	10.79	12	54.8	63.75	40.67	54.9	53.5	35.68	22.36	39.3	41.3	30.72	23.85	41.0
GC 1 (C)	14	-	-	-	46.4	-	-	-	47.7	-	-	-	39.8	-	-	
GCT 2 (C)	14	-	-	-	47.9	-	-	-	46.5	-	-	-	35.3	-	-	
GCT 3 (C)	12	-	-	11	54.4	-	-	55.9	47.1	-	-	35.6	34.3	-	-	32.6
DCT 4 (C)	-	-	-	13	-	-	-	52.6	-	-	-	36.3	-	-	-	34.5
GCT 5 (C)	-	-	-	12	-	-	-	46.3	-	-	-	39.6	-	-	-	39.4
Azad Kanchan (C)	-	13	-	-	-	63.23	-	-	-	33.22	-	-	-	27.82	-	-
SK-417 (C)	-	12	-	-	-	62.86	-	-	-	33.63	-	-	-	27.95	-	-
DD 437 (C)	-	-	10.03	-	-	-	39.44	-	-	-	22.59	-	-	-	23.19	-
Dharla (C)	-	-	7.67	-	-	-	35.70	-	-	-	15.29	-	-	-	15.59	-
GM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.Em ±	0.45	0.63	0.34	0.32	1.11	1.14	1.00	1.46	1.32	1.88	0.74	0.71	1.79	1.95	0.74	0.78
C.D. at 5%	1.34	1.36	1.06	0.96	3.34	3.05	3.08	4.38	3.97	NS	2.30	2.13	NS	5.16	2.30	2.35
C.V. (%)	7.34	4.75	7.77	6.16	4.7	3.82	5.77	6.23	6.08	4.86	8.25	4.21	10.6	7.22	7.85	4.75

A: Anand   Ar: Araul   D: Dinhata   L: Ladol

Table 3 AVT-I *RUSTICA* TOBACCO: Data on morphological characters in AVT-I *rustica* entries at different centres (2024-25)

Entries	Leaf thickness		Days to flower	Days to maturity		Inter-nodal length	Plant stand
	Anand	Araul	Anand	Anand	Araul	Dinhata	Ladol
IET-116	10.54	12.68	60	121	126	3.44	47
IET-117	11.72	12.32	46	125	124	4.12	49
GC 1 (C)	7.82	-	50	115	-	-	-
GCT 2 (C)	9.60	-	62	119	-	-	-
GCT 3 (C)	11.37	-	48	131	-	-	47
DCT 4 (C)	-	-	-	-	-	-	49
GCT 5 (C)	-	-	-	-	-	-	48
Azad Kanchan (C)	-	10.95	-	-	121	-	-
SK-417 (C)	-	11.78	-	-	123	-	-
DD 437 (C)	-	-	-	-	-	4.42	-
Dharla (C)	-	-	-	-	-	4.96	-
S.Em ±	-	-	2.26	0.34	-	0.07	0.63
C.D. at 5%	-	-	6.79	1.01	-	0.22	NS
C.V. (%)	-	-	9.51	0.62	-	3.86	2.94

Table 4 AVT-I *RUSTICA* TOBACCO: Incidence of disease and first grade leaf yields and quality leaf outturn at Dinhata (2024-25)

Entries	TMV (%)	TLCV (%)	Brown Spot	First grade leaf (kg/ha)	Quality leaf (%)
IET-116	-	-	31	1191.86	64.47
IET-117	-	-	27.7	728.22	53.64
DD-437 (C)	-	-	20	866.36	55.69
Dharla (C)	-	-	13.8	629.24	45.62
S.Em ±	-	-	-	36.953	-
C.D. at 5%	-	-	-	113.86	-
C.V. (%)	-	-	-	9.67	-

Table 5 AVT-I *RUSTICA* TOBACCO: Disease incidence and quality parameters in *rustica* entries at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)					Nicotine (%)	R. Sugars (%)	Chlorides (%)
		LCA	LCB	LCC	LCD	LCX			
IET-116	16.0	-	-	-	-	Yes	6.54	5.35	0.497
IET-117	22.0	-	-	-	-	Yes	5.83	5.25	0.710
GC -1 (C)	15.0	-	-	-	Yes	-	6.15	5.15	0.674
GCT -2 (C)	17.0	--	-	-	Yes	-	5.65	4.25	0.887
GCT- 3 (C)	15.0	-	-		Yes	-	5.86	4.95	1.029

Where, LCA = Low, **LCB** = 10%, **LCC** = 10-20%, **LCD** = 20-30%, **LCX** = highly affected/Severe

Table 6 AVT-I *RUSTICA* TOBACCO: Data on chemical parameters of *rustica* entries at Dinhata Centre (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Clorides (%)
IET 116	1.77	1.00	1.06
IET 117	2.15	1.03	1.63
DD437 (Check)	3.37	1.24	0.91
Dharla (Check)	2.63	0.96	1.46

Table 7 IVT *RUSTICA* TOBACCO: Data on chemical and disease incidence in IVT *rustica* entries at Ladol Centre (2024-25)

Entries	Chemical parameters (%)			Disease (%)	
	Nicotine	Reducing Sugars	Chlorides	LCV	LMV
IET-116	4.89	2.69	1.09	0.00	0.00
IET-117	2.82	2.12	0.83	0.00	0.00
GCT-3 (C)	4.22	3.15	0.83	0.43	0.43
DCT-4 (C)	4.67	3.21	0.72	0.00	0.82
GCT-5 (C)	3.75	2.85	0.94	0.00	0.83

COORDINATED EVALUATION OF RUSTICA TOBACCO GENOTYPES

RUABRC/ RUArBRC / RUDBRC/RULdBRC 1.2: ADVANCED VARIETAL TRIAL ON *RUSTICA* TOBACCO (AVT-II)

Objectives: To evaluate the *Rustica* tobacco entries for yield and quality at four centres *viz.,* Anand, Araul, Dinhata and Ladol along with respective checks under AVT-II.

Year of start **:** 2024-245

Year of Completion **:** 2024-25

***Rustica* tobacco Centres and Investigators**

Centres	:	Investigators
Anand	:	J. N. Patel & D.R. Delvadiya
Araul	:	A.K. Srivastava, K.C. Arya &N.B. Singh
Dinhata	:	Partha Saha, Namita Das Saha & S.K. Dam
Ladol	:	D.R. Chaudhari

Design : RBD
Total treatments : 03 + checks as given above
Replications : Five

Entries: 03 (Three)

1. AR-182
2. AR-184
3. ArR-105

Checks at different Centres

Anand	1. GC 1	2. GCT 2	3. GCT 3
Araul	1. Azad Kanchan	2. SK 417	
Dinhata	1. DD 437	2. Dharla	
Ladol	1. GCT 3	2. DCT 4	3. GCT 5

Plot size and spacing at the respective centres

Centre	Plot size	Spacing
Anand	2.40 m x 6.00 m	60 cm x 60 cm
Araul	4.5 x 4.5 m	45x45 cm
Dinhata	3.3 x 2.1 m	60 x 45 cm
Ladol	3.0 m x 4.50 m	60 cm x 45 cm

RESULTS

In the Advanced varietal trial-II (AVT-II), three entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, Natural/artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Yield data and morphological characters at different centres are presented in Table 1 to 7 AVT-II *Rustica* tobacco. The results are presented centre-wise.

ANAND

Yield: Three entries were evaluated along with three checks *viz.*, GC 1, GCT 2 and GCT 3. The results showed non-significant yield differences among the entries tested. In the pooled analysis also none of the entry was found significantly superior over checks for cured leaf yield.

Disease/Pest incidence: TMV and leaf curl incidence were found 35 % and 30 % for test entry AR 182, respectively

Salient Findings/Achievements

- None of the entries was found significantly superiorfor cured leaf yield over checks.

ARAUL

Three entries *viz.* AR-182, AR-184 and ArR-105 with two checks Azad Kanchan & SK-417 were evaluated in randomized block design with five replications in AVT-II. On the basis of combined statistical analysis over two season (*Rabi* 2023-24 and 2024-25), entry ArR-105 (3965 kg/ha) found to be significantly superior over the check, Azad Kanchan (3280 kg/ha) and SK-417 (3165 kg/ha).

Salient findings/Achievements

- Entry ArR-105 found to be significantly superior over the check. Azad Kanchan and SK-417 may be forwarded to on-farm trial during *rabi* 2025-26

DINHATA

Salient findings/Achievements

- Among the 3 entries, AR-182 was found superior in terms of yield
- AR-184 and ArR 105 were found superior to the check DD 437 and Dharla in terms of cured leaf yield

Conclusion: Test entry AR-182 was found best in respect of cured leaf yield

LADOL

In AVT-II trial, yield difference was found significant among all the entries tested. None of the entry showed significant superiority for cured leaf yield over best check GCT 5 (4533 kg/ha).

Salient findings/Achievements

- None of the entry showed significant superiority for cured leaf yield over best check GCT 5 (4643 kg/ha)

Table 1 AVT-II *RUSTICA* TOBACCO: Yield data of AVT-II *rustica* entries at different centres (2024-25)

Entries	Cured leaf yield at different centres (kg/ha)			
	Anand	Araul	Dinhata	Ladol
AR-182	2936	3390	1704	3986
AR-184	3009	3795	1565	4252
ArR-105	2938	4250	1588	4033
GC 1 (C)	3082	-	-	-
GCT 2 (C)	2842	-	-	-
GCT 3 (C)	3120	-	-	4185
DCT 4 (C)	-	-	-	4231
GCT 5 (C)	-	-	-	4533
Azad Kanchan (C)	-	3465	-	-
SK-417 (C)	-	3220	-	-
DD 437 (C)	-	-	1370	-
Dharla (C)	-	-	1309	-
Grand Mean	-	-	-	4241
S.Em ±	129.3	155.15	45.72	169
C.D. at 5%	NS	562.35	137.08	497
C.V. (%)	9.7	11.27	6.78	6.37

Figuresin parenthesis is percent increase over best control

Table 2 AVT-II *RUSTICA* TOBACCO: Morphological characters of *rustica* tobacco at different centres (2024-25)

Entries	Plant height (cm)				No. of leaves/ plant				Leaf length (cm)				Leaf Breadth (cm)			
	A	Ar	D	L	A	Ar	D	L	A	Ar	D	L	A	Ar	D	L
AR-182	55.4	-	42.15	52.5	15	-	11.18	10	43.0	-	18.19	37.4	33.1	-	18.68	35.8
AR-184	54.6	-	41.94	49.8	15	-	10.87	11	47.4	-	16.51	37.8	37.5	-	17.11	37.5
ArR-105	61.6	-	50.30	53.7	14	-	10.55	11	50.1	-	21.33	38.2	39.0	-	20.05	38.6
GC 1 (C)	44.0	-	-	-	14	-	-	-	45.8	-	-	-	41.4	-	-	-
GCT 2 (C)	60.6	-	-	-	14	-	-	-	45.7	-	-	-	36.0	-	-	-
GCT 3 (C)	63.1	-	-	59.7	14	-	-	11	49.1	-	-	35.2	36.6	-	-	32.6
DCT 4 (C)	-	-	-	54.2	-	-	-	12	-	-	-	36.1	-	-	-	34.0
GCT 5 (C)	-	-	-	47.2	-	-	-	11	-	-	-	42.0	-	-	-	43.3
Azad Kanchan (C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SK-417 (C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DD 437 (C)	-	-	42.09	-	-	-	9.34	-	-	-	18.01	-	-	-	13.41	-
Dharla (C)	-	-	38.04	-	-	-	8.07	-	-	-	12.49	-	-	-	11.43	-
S.Em ±	1.66	-	1.15	1.63	0.43	-	0.31	0.35	1.38	-	0.45	0.93	1.29	-	0.69	0.90
C.D. at 5%	4.91	-	3.449	4.79	NS	-	0.94	1.02	4.08	-	1.364	2.73	3.81	-	2.07	2.65
C.V. (%)	6.58	-	5.995	6.32	6.70	-	7.07	6.28	6.59	-	5.878	4.91	7.74	-	9.57	4.86

A: Anand Ar: Araul D: Dinhata L: Ladol

Table 3 AVT-II *RUSTICA* TOBACCO: Data on morphological characters in AVT-II *rustica* entries at different centres (2024-25)

Entries	Leaf thickness	Days to flower	Days to maturity	Inter-nodal length	Plant stand
	Anand	Anand	Anand	Dinhata	Ladol
AR-182	9.48	65	130	3.42	46
AR-184	13.81	56	130	4.52	48
ArR-105	11.82	47	117	4.12	46
GC 1 (C)	10.34	48	124	-	-
GCT 2 (C)	11.49	53	116	-	-
GCT 3 (C)	13.88	51	131	-	46
DCT 4 (C)	-	-	-	-	46
GCT 5 (C)	-	-	-	-	47
DD 437 (C)	-	-	-	3.86	-
Dharla (C)	-	-	-	4.90	-
S.Em ±	-	1.90	1.41	0.15	0.77
C.D. at 5%	-	5.61	4.15	0.45	NS
C.V. (%)	-	7.95	3.2	8.09	3.29

Table 4 AVT-II *RUSTICA* TOBACCO: Disease incidence and quality parameters in *rustica* entries at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)					Nicotine (%)	R. Sugars (%)	Chlorides (%)
		LCA	LCB	LCC	LCD	LCX			
AR 182	35.0	-	-	-	Yes	-	6.35	4.85	0.887
AR 184	19.0	-	-	-	Yes	-	5.85	4.45	0.923
ArR 105	28.0	-	-	-	Yes	-	6.15	5.25	0.816
GC-1 (C)	29.0	-	-	-	Yes	-	5.35	4.65	0.927
GCT -2 (C)	34.0	--	-	Yes	-	-	5.95	4.35	0.994
GCT- 3 (C)	40.0	-	-	Yes	-	-	6.25	5.15	0.745

Where, LCA = Low, LCB = 10%, LCC = 10-20%, LCD = 20-30%, LCX = highly affected/Severe

Table 5 AVT-II *RUSTICA* TOBACCO: Data on chemical quality parameters at Ladol Centre (2024-25)

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
AR 182	4.43	2.10	1.16
AR 184	4.59	2.32	1.37
ArR 105	3.35	2.80	1.01
GCT 3 (C)	3.89	2.31	1.35
DCT 4 (C)	3.10	2.20	1.44
GCT 5 (C)	3.18	2.76	1.26

Table 6 AVT-II *RUSTICA* TOBACCO: Performance of different entries for cured leaf yield (kg/ha) in AVT-I (2023-24) and AVT-II (2024-25) at Anand centre

Entries	**Cured Leaf**		**Pooled mean**
	2023-24	**2024-25**	
AR 182	2505	2936	2721
AR 184	2802	3009	2906
Ar R 105	2213	2938	2575
GC 1(C)	2406	3082	2744
GCT 2 (C)	2397	2842	2620
GCT 3 (C)	3078	3120	3099
T			
S. Em. ±	181.9	129.3	111.6
C.D.@ 5 %	536.7	NS	319.0
Y			
S. Em. ±	-	-	64.4
C.D.@ 5 %	-	-	184.2
Y x T			
S. Em. ±	-	-	157.8
C.D.@ 5 %	-	-	NS
CV%	15.85	9.68	12.70

Table 7 AVT-II *RUSTICA* TOBACCO: Performance of different entries for cured leaf yield (kg/ha) in AVT-I (2023-24) and AVT-II (2024-25) at Araul centre

Entries	**Cured leaf yield (Kgs/ha)**			**% increase over check**	
	2023-24	**2024-25**	**Mean**	**Azad Kanchan**	**SK-417**
AR-182	3390	3010	3200		
AR-184	3795	3375	3585		
ArR-105	4250	3680	3965	20.88	25.27
Azad Kanchan (C)	3465	3095	3280		
SK-417 (C)	3220	3110	3165		
SE(m) ±	155.15	180.33	130.18		
CD (p=0.05)	562.35	533.44	390.45		
CV%	11.27	11.17	10.98		
Season					
SE(m) ±			197.13		
CD (P=0.05)			NS		
Season x Treatments					
SE(m) ±			180.10		
CD (P=0.05)			NS		

ANAND

Project No.: ON FARM TRIAL (OFT)

Research project title	**On farm trial**
Objectives	▪ To evaluate the performance of promising *Rustica* tobacco entries under Gujarat conditions under OFT
Investigators	D.A. Patel & D. R. Delvadiya
Year of start	2024-25
Year of completion	2024-25
Location	BTRS, AAU, Anand

Treatments	:	3 (1+2)	Spacing	:	60 x 60 cm
Design	:	R B D	Plot size	:	6 x 18 m
Replications	:	Four			

RESULTS

AR-184 genotype tested under OFT recorded lower cured leaf yield (2918 kg/ha) over better checks GC-1 and GCT-3.

Table 1 OFT: Yield and morphological characters during 2024-25

Entries	Yield (kg/ha)	No. of leaves/ plant	Days to flower	Days to maturity	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Leaf thickness
AR-184	2918	15	58	128	46.4	36.5	55.6	12.72
GC 1 (C)	2840	14	47	120	44.8	40.4	43.0	11.32
GCT 3 (C)	3102	15	52	130	48.2	36.4	64.2	12.82

Table 2 OFT: Chemical quality parameters during 2024-25

Entries	Nicotine (%)	Reducing Sugar (%)	Chlorides (%)
AR-184	5.75	4.55	0.903
GC 1(C)	5.25	4.35	0.910
GCT 3 (C)	6.04	5.15	0.790

ARAUL

Project No.: RUArBR 5

Research project title	**Preliminary Yield Evaluation Trial-I on *rustica* tobacco**
Objectives	▪ To identify the high yielding advanced breeding line with good quality leaf for their inclusion in co-ordinated trial
Investigators	K.C. Arya &N.B. Singh
Year of start	2023-24
Year of completion	2024-25
Location	Tobacco Research Station, Araul

Treatments	:	10 (8+2)	Spacing	:	45 x 45 cm
Replications	:	Three	Plot size	:	4.5 x 4.5 m
Design	:	R B D			

RESULTS

Ten entries were evaluated including two check viz. Azad Kanchanand SK-417 in randomized block design with three replications. The result revealed that entry ArR-137 (3830 Kg/ha) followed by entry ArR-138 (3575 Kg/ha) found significantly superior over check Azad Kanchan (2975 Kg/ha) for cured leaf yield with yield improvement of 28.74% and 20.17% respectively

Salient findings/achievements

- Entry ArR-137 followed by entry ArR-138 found significantly superior over check Azad Kanchan (2975 Kg/ha) for cured leaf yield with yield improvement of 28.74% and 20.17% respectively.

Table 1 RUArBR 5: Performance of *Hookah* tobacco lines in PYET-I during *rabi* 2024-25

Entries	**Days to Maturity**	**Av. Curable leaves/ plant**	**Plant Height (cm)**	**Leaf (cm)**		**Yield (kg/ha)**
				Length	**Width**	
ArR-135	124	14	63.22	33.22	29.10	2533
ArR-136	122	14	65.66	30.28	22.65	2475
ArR-137	120	16	63.30	35.12	30.18	3830 (28.74)
ArR-138	119	17	60.95	21.35	28.35	3575 (20.17)
ArR-139	126	15	64.90	30.12	22.10	2910
ArR-140	121	16	64.71	29.10	20.13	3145
ArR-141	124	16	63.33	26.55	20.10	3110
ArR-142	125	14	62.10	28.70	21.33	2065
Azad Kanchan (C)	120	13	60.31	28.35	32.10	2975
SK-417 (LC)	120	13	61.71	29.10	35.30	2950
S. Em. ±						185.35
C.D. at 5%						480.12
C.V. (%)						11.17

Figures in parenthesis are pecent increase over best check

Project No.: RUArBR 5A

Research project title	Preliminary Yield Evaluation Trial-II on *rustica* tobacco
Objectives	▪ To identify the high yielding advanced breeding line with good quality leaf for their inclusion in co-ordinated trial
Investigators	K.C. Arya & N.B. Singh
Year of start	2023-24
Year of completion	2024-25
Location	Tobacco Research Station, Araul

Treatments	:	10 (8+2)	Spacing	:	45 x 45 cm
Replications	:	Three	Plot size	:	4.5 x 4.5 m
Design	:	R B D			

RESULTS

Ten entries were evaluated with two check viz. Azad Kanchan and SK-417 were evaluated in randomized block designed with three replications. Combined statistical analysis of the data collected over two seasons (*rabi* 2023-24 & 2024-25) was done for identifying most promising lines. Results indicated significant differences among the entries for cured leaf yield. Entry ArR-129 (3943 kg/ha) followed by entry ArR-131 (3735 kg/ha) showed significant superiority over check Azad Kanchan (3190 kg/ha) with yield improvement of 23.60% & 17.08% respectively.

Salient research /achievements

- Entry ArR-129 and ArR-131 showed significant superiority over check, Azad Kanchan with yield improvement of 23.60% & 17.08% respectively and nominated for IVT conducting during *Rabi* 2025-26.

Table 1 RUArBR 5A: Pooled results of *rustica* tobacco in PYET II during *rabi* 2023-24 to 2024-25

Entries	Cured leaf yield (kgs/ha)			% increase over Azad Kanchan
	2023-24	2024-25	Mean	
ArR-127	2630	2910	2770	
ArR-128	2210	2845	2528	
ArR-129	4210	3675	3943	23.60
ArR-130	2775	3110	2943	
ArR-131	3820	3650	3735	17.08
ArR-132	2335	2115	2225	
ArR-133	2050	2010	2030	
ArR-134	2995	2450	2723	
Azad Kanchan (C)	3350	3030	3190	
SK-417 (LC)	2930	2910	2920	
Mean	2931	2871	2901	
S. Em. ±	135.35	115.10	188.65	
C.D. at 5%	410.42	305.15	380.10	
C.V. (%)	10.95	11.25	11.11	
Season				
S. Em. ±			176.12	
C.D. at 5%			305.28	
Season x Treatments				
C.D. at 5%			361.05	

LADOL

Project No.: RULdBRS 1

Research project title	**Initial Evaluation Trial on *rustica* tobacco**
Objectives	▪ To identify the high yielding advanced breeding line with good quality leaf for their inclusion in co-ordinated trial
Investigators	D. R. Chaudhari
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Ladol

Treatments	:	12 (9+3)	Spacing	:	60 x 45 cm
Replications	:	Three	Plot size	:	2.4 x 4.5 m
Design	:	R B D			

RESULTS

In IET (ST-1) trial, twelve entries were included in which Entry LR 22-5 was found significantly superior and gave 10.67 per cent higher cured leaf yield than best check GCT 5 (4730 kg/ha).

Salient findings/Achievements

- Entry LR 22-5 was found significantly superior and gave 10.67 per cent higher cured leaf yield than best check GCT 5 (4730 kg/ha).

Table 1 RULdBRS 1: Data on yield (kg/ha), morphological characters & Disease incidence (2024-25)

Entries	Yield kg/ha	Plant Stand	Plant height (cm)	Leaf Length (cm)	Leaf Width (cm)	No. of leaves/ plant	Disease LCV (%)	Disease LMV (%)
LR 22-2	4724	39	58.1	34.9	37.7	12	0.86	0.00
LR 22-5	5235 (10.7)	40	53.1	39.0	36.6	12	0.00	0.00
LR 23-10	4905	39	52.1	38.3	40.6	11	0.86	0.00
LR 23-7	4597	36	60.8	35.5	36.5	12	0.93	0.93
LR 23-9	4316	37	53.4	33.5	40.1	10	1.82	0.00
LR 23-5	4718	39	68.1	37.6	39.1	13	0.00	0.00
LR 23-3	4534	39	48.7	40.3	36.6	12	0.86	0.00
LR 23-4	4435	38	53.3	36.6	39.0	12	0.00	0.88
LR 23-8	4050	38	50.0	32.7	38.3	10	0.00	0.00
GCT-3 (C)	4460	39	62.6	36.7	34.5	12	0.00	0.00
DCT-4 (C)	4592	39	55.3	37.7	36.0	13	0.86	0.86
GCT-5 (C)	4730	39	47.0	40.4	40.9	12	0.00	0.00
GM	4608							
S. Em. ±	161	0.73	1.93	0.99	1.04	0.45		
C.D. at 5%	473	NS	5.67	2.90	3.05	1.31		
C.V. (%)	6.06	3.31	6.07	4.63	4.73	6.55		

Figures in parenthesis are percent increase over better control; * *Significant at 5%*

Table 2 RULdBRS 1: Data on quality parameters in 2024-25

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
LR 22-2	4.44	2.53	0.94
LR 22-5	4.35	3.72	.83
LR 23-10	3.37	4.29	.78
LR 23-7	4.61	3.25	.97
LR 23-9	4.18	3.48	1.17
LR 23-5	3.96	3.42	1.00
LR 23-3	4.29	3.02	1.07
LR 23-4	3.85	3.08	1.04
LR 23-8	4.91	2.76	1.23
GCT-3 (C)	3.69	3.22	1.03
DCT-4 (C)	4.20	3.55	1.22
GCT-5 (C)	3.00	3.27	1.26

Project No.: RULdBRS 2

Research project title	**Preliminary Yield Trial-I on *rustica* tobacco**
Objectives	▪ To identify the high yielding advanced breeding line with good quality leaf for their inclusion in co-ordinated trial
Investigators	D. R. Chaudhari
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Ladol

Treatments	:	14 (11+3)	Spacing	:	60 x 45 cm
Replications	:	Three	Plot size	:	2.4 x 4.5 m
Design	:	R B D			

RESULTS

In PYT (ST-2) trial, Out of fourteen entries, three entries were found significantly superior and gave better performance than best check GCT 5. Entry LR 24-10, LR 24-06 and LR 24-4 were gave 13.17, 11.94 and 10.80 per cent respectively higher cured leaf yield than best check GCT 5 (4572 kg/ha).

Salient findings/Achievements

- Entry LR 24-10, LR 24-06 and LR 24-4 were gave 13.17, 11.94 and 10.80 per cent respectively higher cured leaf yield than best check GCT 5 (4572 kg/ha).

Table 1 RULdBRS 2: Data on yield (kg/ha), morphological characters & Disease incidence (2024-25)

Entries	Yield kg/ha	Plant Stand	Plant height (cm)	Leaf		No. of leaves/ plant	Disease	
				Length (cm)	Width (cm)		LCV (%)	LMV (%)
LR 24-1	4497	39	43.0	37.1	33.1	12	1.71	0.00
LR 24-2	4994	39	44.3	41.1	41.0	12	0.85	0.85
LR 24-3	3539	38	50.1	31.0	36.0	10	0.88	0.00
LR 24-4	5065 (10.8)	40	45.9	39.9	40.1	11	0.83	0.00
LR 24-5	4259	37	51.2	40.1	41.0	10	0.00	0.90
LR 24-6	5118 (11.94)	40	55.9	39.9	38.4	11	0.00	0.83
LR 24-7	4256	39	38.7	34.2	34.2	11	0.00	0.86
LR 24-8	4461	38	45.8	36.4	38.2	11	0.88	1.77
LR 24-9	4155	38	42.2	37.0	39.3	10	3.48	0.87
LR 24-10	5147 (13.17)	39	62.2	37.3	35.9	14	0.00	0.00
LR 24-11	4209	37	55.4	39.9	38.7	11	0.00	0.00
GCT-3 (C)	4331	38	58.9	35.8	34.2	12	0.00	0.88
DCT-4 (C)	4484	37	54.0	37.1	34.8	12	2.68	0.00
GCT-5 (C)	4572	38	43.9	41.0	43.5	12	1.77	0.00
GM	4506							
S. Em. ±	159	0.70	1.82	1.09	0.96	0.42		
C.D. at 5%	463	NS	5.30	3.15	2.80	1.21		
C.V. (%)	6.13	3.16	6.40	4.99	4.43	6.48		

Figures in parenthesis are percent increase over better control; ** Significant at 5%*

Table 2 RULdBRS 2: Data on quality parameters in 2024-25

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
LR 24-1	4.16	3.01	0.88
LR 24-2	4.05	2.51	0.62
LR 24-3	3.88	2.98	0.57
LR 24-4	3.67	2.70	0.63
LR 24-5	3.55	1.29	0.61
LR 24-6	4.82	1.34	1.24
LR 24-7	5.04	1.31	1.10
LR 24-8	4.13	1.45	1.10
LR 24-9	5.00	1.72	1.20
LR 24-10	3.77	1.48	0.77
LR 24-11	3.06	1.45	0.76
GCT-3 (C)	4.56	1.27	0.93
DCT-4 (C)	5.17	1.18	0.86
GCT-5 (C)	3.49	1.49	0.92

Project No.: RULdBRS 3

Research project title	**Large Scale Evaluation Trial on *rustica* tobacco**
Objectives	▪ To evaluation and identify of high yielding advanced breeding lines superior to the local check varieties with respect to yield, quality and disease reactions. ▪ To carry out detailed studies with the promising entries for possible release of variety.
Investigators	D. R. Chaudhari
Year of start	2024-25
Year of completion	2024-25
Location	ARS, Ladol

Treatments	:	6 (3+3)	Spacing	:	60 x 45 cm
Replications	:	Four	Plot size	:	2.4 x 4.5 m
Design	:	R B D			

RESULTS

In LSVT trial, six entries were included in which significant differences among all the entries were noticed for cured leaf yield. None of the entry showed significant superiority for cured leaf yield over best check GCT 5 (4622 kg/ha). However, entry LR 101 showed numerical maximum cured leaf yield (4871 kg/ha) against best check GCT 5.

Salient findings/Achievements

- None of the entry showed significant superiority for cured leaf yield over best check GCT 5 (4622 kg/ha). Entry LR-101 showed numerical maximum cured leaf yield (4871 kg/ha) against best check GCT 5

Table 1 RULdBRS 2: Data on yield (kg/ha), morphological characters & Disease incidence (2024-25)

Entries	Yield kg/ha	Plant Stand	Plant height (cm)	Leaf		No. of leaves/ plant	Disease	
				Length (cm)	Width (cm)		LCV (%)	LMV (%)
LR 96	4871	38	56.4	38.1	40.2	12	0.66	1.32
LR 97	4487	37	47.9	37.4	36.8	11	0.00	0.00
LR 101	4112	38	45.2	37.5	38.8	11	0.00	0.67
GCT-3 (C)	4311	39	57.6	36.0	34.4	12	0.00	1.30
DCT-4 (C)	4516	39	50.5	36.9	34.9	13	0.00	0.00
GCT-5 (C)	4622	39	46.8	41.6	43.5	12	0.00	0.00
GM	4487							
S. Em. ±	138	0.58	1.70	0.75	0.80	0.39		
C.D. at 5%	415	NS	5.13	2.27	2.41	1.19		
C.V. (%)	6.14	3.04	6.70	3.97	4.21	6.72		

Table 2 RULdBRS 3: Data on quality parameters in 2024-25

Entries	Nicotine (%)	Reducing Sugars (%)	Chlorides (%)
LR 96	2.84	2.85	1.02
LR 97	4.82	2.00	1.01
LR 101	5.13	1.81	1.15
GCT-3 (C)	4.73	1.95	0.98
DCT-4 (C)	4.72	1.38	0.96
GCT-5 (C)	5.31	1.53	0.82

A. Maintenance and evaluation rustica germplasm:

Two hundred ninety five accessions of rustica germplasm were maintained for next season during 2024-25 and high cured leaf yield and resistant lines were utilized in crossing program.

B. Crosses made:

During the year 2024-25, germplasm involving the 295 genotypes/varieties comprising both indigenous and exotic materials were raised. Using these materials six single and two multiple crosses were made. All single and multiple crosses were obtained.

C. Generation advancement and evaluating segregating materials:

To develop high cured leaf yield, medium duration lines with resistance to Leaf mosaic virus and Leaf curl disease, following breeding/segregating materials were grown for further selection and generation advancement. The details of selection made are given as under.

Sr. No.	Generation	No of crosses grown	Number of progenies		
			Grown	Selected	
			No. of progenies	No. of progenies	Bulk
1	F_1	7	6	6	
2	F_2	8	8	130	
3	F_3	15	109	69	
4	F_4	11	63	37	
5	F_5	10	38	20	
	Promising bulk	9	24		12
TOTAL		60	248	262	12

E. CHEWING TOBACCO

COORDINATED EVALUATION OF *CHEWING* TOBACCO GENOTYPES

IVT ON CHEWING TOBACCO (REPEAT)

CHABRC/ CHDBRC/ CHVBRC 2: INITIAL VARIETAL TRIAL ON CHEWING TOBACCO (REPEAT)

Objectives: To evaluate the Chewing Tobacco entries for yield and quality at three centres *viz.,* Anand, Dinhata and Vedasandur along with respective checks.

Year of start : **2024-25**
Year of Completion : **2024-25**

Chewing tobacco Centres and Investigators

Centres	**:**	**Investigators**
Anand	:	D. A. Patel & D. R. Delvadiya
Dinhata	:	Partha Saha & Namita Das Saha,
Vedasandur	:	P. Manivel, M. Kumaresn, M. Karthick, V. Annadurai & JK Roy Barman

Design **:** RBD
Total treatments : 2 + checks as given above
Replications : 5

Entries: 2 (Two)

1. IET-122
2. IET-123

Checks at different Centres:

Anand	**:**	1. GT 6	2. GT 8	3. A 145
Dinhata	**:**	1. Chama	2. Manasi	3. Podali
Vedasandur	**:**	1. Meenakshi (CR)	2. Bhagyalakshmi	3. Abirami

Plot size and spacing at the respective centres

Centre	**Plot size**	**Spacing**
Anand	3 x 3 m	75 cm x 60 cm
Dinhata	3.3 x 2.1 m	90 x 75 cm
Vedasandur	32.4 m^2	90 x 75 cm

RESULTS

In the Initial varietal trial (repeat) (IVT repeat), two entries were evaluated for their yield potential against respective checks at different centres. Observations recorded leaf yield, Natural/artificial incidence of pest and diseases. Cured leaf quality parameters (Nicotine, Reducing sugars and chloride) were estimated. Yield data was subjected to statistical analysis and yields were expressed in terms of kg/ha. Data on yield characteristics at different centres are presented in Tables 1 to 6 IVT(R) Chewing Tobacco. The results are discussed centre-wise.

ANAND

Yield: Two entries were tested with three checks *viz*., GT 6, GT 8 and A 145. The results indicated significant yield differences among the entries tested. None of the entry was found significantly superior over better check GT 6 (2434 kg/ha) for Chopadia yield.

Disease/Pest incidence: In the entry IET-122, TMV incidence were found 54% whereas in IET-123 it was recorded 39%

Salient findings/Achievements

- None of the entries was found significantly superior for chopadia yield over checks.

Conclusion: None of the entries were promoted to AVT-I to be conducted in 2025-26.

DINHATA

Yield: Significant variations were observed between the entries. Among the 2 entries, IET-122 was found best in respect of cured leaf yield (1539), first grade leaf (756). The highest quality leaf (52.85%) was obtained in IET-123

Morphological characterization: Significant variations were observed for different morphological characters. The highest plant height (62.64 cm) was observed for the check Manasi. The number of leaves per plant was maximum in the entry IET-123 (11.49) followed by the entry IET-122 (11.13). The maximum leaf length and leaf width was observed for IET-123 (45.04 cm & 27.97 cm).

Disease/Pest incidence: No incidence of LCV was observed in all the entries tested whereas highest incidence of TMV was observed in the entry, IET-122 (10%) followed by the entry, IET-123 (6.66%). Incidence of brown spot disease was not observed in the entry IET-123.

Salient findings/Achievements

- The highest cured leaf yield (1539 kg//ha) was obtained in the entry, IET-122
- No incidence of LCV was observed in all the entries tested

Conclusion: The test entries, IET-122 and IET-123 can be promoted for AVT-I to be conducted during 2025-26.

VEDASANDUR

Yield: The highest total yields of 3362 kg/ha (IET-122) followed by 3063 kg/ha (IET-123) were recorded by test entries as compare to the check varieties Meenakshi (CR) (2685 kg/ha), Bhagyalakshmi (2694 kg/ha), Abirami (2621 kg/ha).

Morphological characterization: The leaf length was significantly higher in the test entry IET-122 (76.3 cm) as compared to the best check Meenakshi (CR) (71.07 cm). However, the test entry IET-123 had 65 cm which was the lowest among the all entries. Similarly, the leaf width was also the highest in IET-122 (49.47 cm) than all check varieties. Both the test entries had significantly higher leaf thickness than the all the three check varieties.

Among all the genotypes tested, the test entry IET-123 is the early maturing (110 days) followed by IET-122 (115 days) than all check varieties Bhagyalakshmi (121 days), Abirami (125 days) and Meenakshi (130 days). For inter-nodal length test entries had statistically on par values.

Disease /Pest incidence: For leaf curl incidence both test entries and checks showed similar reactions (scores 2.0 to 2.1). For TMV test entries showed lower scores than the check varieties.

Salient findings/Achievements

- IET-122 and IET-123 had significantly higher total and first grade cured leaves than the check varieties.
- The test entry IET-123 is early maturing and matures in 110 days
- Pest and disease incidence was low in test entries as compared to the check varieties.

Conclusion: Based on the merits, IET-122 and IET-123 can be promoted to AVT-I.

Recommendation for promoting to AVT-I: Based on the result of chewing centres and as per the proceedings of the committee constituted for consideration of IVT proposals, met on 30th July 2025, both the 2 entires are significantly superior over better checks, hence, both the entries *viz.*, IET-122 & IET-123 were forwarded to AVT-I for the crop season 2025-26.

Table 1 IVT (R) CHEWING TOBACCO: Cured Leaf yield (kg/ha) of IVT entries at different centres (2024-25)

Entries	Yield (kg/ha)			First Grade leaf Yield (kg/ha)		Quality leaf (%)	Total leaf Yield (kg/ha)
	Chopadia Anand	Dinhata	Vedasandur	Dinhata	Vedasandur	Dinhata	Vedasandur
IET-122	2610	1539*	3367*	756	2944	49.21	3367*
IET-123	2064	1222	3063	642	2375	52.85	3063*
GT 6 (C)	2434	-	-	-	-	-	-
GT 8 (C)	2010	-	-	-	-	-	-
A 145 (C)	1450	-	-	-	-	-	-
Chama (C)	-	1185	-	539	-	45.45	-
Manasi (C)	-	1176	-	539	-	45.83	-
Podali (C)	-	1373	-	686	-	50.38	-
Meenakshi (CR) (C)	-	-	2685	-	2211	-	2685
Bhagyalakshmi (C)	-	-	2695	-	2210	-	2695
Abirami (C)	-	-	2622	-	2109	-	2622
G. Mean	-	-	2866	-	2370	-	2866
S. Em±	152.0	41.39	122.46	17.78	109.13	-	122.46
C.D. at 5%	456	122	361	52	322	-	361
C.V. (%)	16.1	7.80	14.41	6.88	17.49	-	14.41

*Significant at 5%

Table 2 IVT (R) CHEWING TOBACCO: Morphological characters of IVT entries at different centres (2024-25)

Entries	Plant Height (cm)			No. of leaves/ Plant		Leaf length (cm)			Leaf Breadth (cm)			Inter-nodal Length (cm)	
	A	D	V	A	D	A	D	V	A	D	V	D	V
IET-122	112	56.19	175	23	11.13	59.9	42.62	76.3	32.4	27.01	49.47	4.15	3.26
IET-123	95.8	61.53	184	18	11.49	48.9	45.04	65.00	29.9	27.97	44.97	3.68	2.86
GT 6 (C)	114.9	-	-	21	-	53.0	-	-	24.3	-	-	-	-
GT 8 (C)	119.5	-	-	20	-	47.0	-	-	26.3	-	-	-	-
A 145 (C)	65.4	-	-	13	-	55.1	-	-	24.4	-	-	-	-
Chama (C)	-	59.15	-	-	10.10	-	36.39	-	-	27.73	-	4.46	-
Podali (C)	-	61.19	-	-	10.53	-	39.26	-	-	22.85	-	4.18	-
Manasi (C)	-	62.64	-	-	10.38	-	40.31	-	-	26.89	-	5.31	-
Meenakshi (CR) (C)	-	-	163	-	-	-	-	71.07	-	-	43.57	-	2.92
Bhagyalakshmi (C)	-	-	144.50	-	-	-	-	70.30	-	-	41.37	-	3.59
Abirami (C)	-	-	160	-	-	-	-	70.47	-	-	43	-	3.4
G. Mean	-	-	165.30	-	-	-	-	70.63	-	-	44.47	-	3.21
S. Em±	6.98	1.60	3.50	0.66	0.31	1.67	1.15	1.13	1.01	1.17	0.81	0.07	0.2
C.D. at 5%	20.94	NS	10.20	1.98	0.93	5.02	3.40	3.33	3.02	3.45	2.38	0.22	0.59
C.V. (%)	15.4	6.52	12.10	7.76	7.26	7.09	6.93	6.70	8.21	10.82	8.02	4.34	16.99

A: Anand **D: Dinhata** **V: Vedasandur**

Table 3 IVT (R) CHEWINGTOBACCO: Other morphological characters of IVT entries at Anand & Vedasandur centres (2024-25)

Entries	Days to flower		Days to Maturity		Leaf Thickness	Plant stand
	Anand	Vedasandur	Anand	Vedasandur	Vedasandur	Vedasandur
IET-122	96	70	163	115.25	0.4	50.00
IET-123	84	65	163	110.33	0.4	52.33
GT 6 (C)	77	-	161	-	-	-
GT 8 (C)	76	-	159	-	-	-
A 145 (C)	52	-	157	-	-	-
Chama (C)	-	-	-	-	-	-
Podali (C)	-	-	-	-	-	-
Manasi (C)	-	-	-	-	-	-
Meenakshi (CR) (C)	-	70	-	130.55	0.35	40.17
Bhagyalakshmi (C)	-	62	-	121.55	0.37	48.83
Abirami (C)	-	67	-	125.45	0.36	51.33
G. Mean	-	66.8	-	120.62	**0.37**	48.53
S. Em±	2.02	2.04	0.95	6.01	0.01	2.02
C.D. at 5%	6.06	6.02	2.86	2.50	0.03	5.95
C.V. (%)	5.87	9.00	1.33	12.55	9.25	13.66

Table 4 IVT (R) CHEWING TOBACCO: Incidence of pest and diseases in the entries of IVT at Anand (2024-25)

Entries	TMV (%)	Leaf curl (%)				
		LCA	LCB	LCC	LCD	LCX
IET 122	54.0	-	-	-	Yes	-
IET 123	39.0	-	-	-	-	Yes
GT 6 (C)	40.0	-	-	-	-	Yes
GT 8 (C)	45.0	-	-	-	Yes	-
A 145 (C)	30.0	-	-	Yes	-	-

Where, LCA = Low, LCB = 10%, LCC = 10-20%, LCD = 20-30%, LCX = highly affected/Severe

Table 5 IVT (R) CHEWINGTOBACCO: Incidence of pest and diseases in the entries of IVT at Dinhata (2024-25)

Entries	Leaf curl (%)	TMV (%)	Brown spot (%)
IET-122	Nil	10.0	0
IET-123	Nil	6.66	3.3
Chama (C)	Nil	1.11	5.5
Manasi (C)	Nil	3.33	5.5
Podali (C)	Nil	0.0	24

Table 6 IVT (R) CHEWINGTOBACCO: Incidence of pest and diseases in the entries of IVT at Vedasandur (2024-25)

Entries	*Spodoptera*	Leaf curl	TMV	Aphid	Caterpillar
IET-122	0	2.0	1.0	0	1.0
IET-123	0	2.0	1.0	0	1.0
Meenakshi (CR) (C)	0	2.0	2.0	0	1.5
Bhagyalakshmi (C)	0	2.1	1.5	0	1.0
Abirami (C)	0	2.1	1.5	0	2.0

CROP PRODUCTION

CROP PRODUCTION

A. VFC TOBACCO

RAJAHMUNDRY

Project No.: VFRAGC/ VFSAGC /CHVsAGC 2

Research project title	**Effect of integration of natural farming inputs on the performance of tobacco**
Objectives of the project	To study the performance of tobacco with the incorporation of natural farming components
Investigators	T. Kiran Kumar, S. Kasturi Krishna
Location	ICAR-NIRCA, Rajahmundry
Year of start	2024-25 for Rajahmundry and Vedasandur centres 2025-26 (**Modified**) for Shivamogga Centre
Duration	02 years

Experimental details:

Design	:	RCBD
Replications	:	Three
Treatments	:	Seven
Gross plot size	:	6.3 m × 5.6 m
Net plot size	:	4.9 m × 4.2 m
Variety	:	FCR-15
Season	:	*Rabi*
Date of transplanting	:	18.12.2025
Number of pickings	:	6

Treatments

T_1	FYM 12.5 t ha^{-1} + RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting (DBP)
T_2	FYM 12.5 t ha^{-1} + RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + KNO_3 @ 2% at 45 DAP and 55 DAP
T_3	RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting)
T_4	RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + Jeevamrutha @ 500 liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP)
T_5	RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500 liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP)
T_6	RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500 liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP)+ KNO_3 @ 2% at 45 DAP and 55 DAP
T_7	FYM 12.5 t ha^{-1} 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500 l ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP) + KNO_3 @ 2% at 45 DAP and 55 DAP

Treatment imposition

- Application of Ghana jeevamrutha**:** Ghana jeevamrutha at the rate of 1 t ha^{-1} (3.024 kg per 30.24 m^2) to be applied to the well-prepared soil at the time of planting of FCV tobacco to the plots as per the treatment.
- Application of Jeevamrutha: Jeevamrutha was applied at the rate of 500 l ha^{-1} (1.512 liters per 30.24 m^2) was applied to soil at the time of planting and at 15, 30 and 45 days after planting as per the treatment. Jeevamrutha is to be diluted by adding water to make it to apply @ 100 ml per plant.

<u>Procedure to prepare 100 kg Ghana Jeevamrutha</u>

Initially 100 kg of dried desi cow dung is spread on the polythene sheet, two litres of desi cow urine, 2 kg of powdered jaggery and 2 kg pulse flour is added to the desi cow dung. All the materials are thoroughly mixed with desi cow dung and the mixture is kept under shade by covering with wet gunny bag to maintain 60% moisture for 24 hours. On next day, this mixture is to be made into small balls or cakes and to be kept for drying under shade for 21days. Ghana jeevamrutha is applied to the soil by powdering the balls or cakes as one-time application at the time of planting as per the treatment.

<u>Procedure to prepare 200 litres of Jeevamrutha</u>

Jeevamrutha is prepared by mixing 10 kg desi cow dung, 10 litres of cow urine, 2 kg jaggery, 2 kg pulse flour and hand full of soil collected from the field near bund. All these are put in 200 litres plastic or cement drum and mixed thoroughly by adding water until volume is made up to 200 litres. The mixture is stirred well in clock wise direction thrice a day using wooden stick until the mixture becomes homogeneous. Plastic drum is kept under shade covered with wet gunny bag. Turning of the mixture is done twice a day up to 7 days to improve the aeration and microbial population. After 7 days of turning jeevamrutha is ready for its application in the field. Well fermented jeevamrutha is applied manually at 15 DAP, 30 DAP and at 45 DAP as in the treatment. Prepared jeevamrutha could be used used for two to seven days.

Observations to be recorded

- Plant height (cm) at 30 DAP &, 60 DAP and at first picking
- Number of leaves per plant at 30 DAP & 60 DAP and at first picking
- Cumulative number of leaves harvested per plant
- Leaf area of X and L position leaves
- Green leaf yield (kg /ha)
- Cured leaf yield (kg/ha)
- Microbial count (Initial and after harvest of the crop)
- Nutrient content and soil chemical properties pH, EC, OC, N, P and K content (Initial and after harvest of the crop)

RESULTS

Results of the experiment on performance of FCV tobacco indicated that natural farming inputs significantly influenced the growth and yield parameters of FCV tobacco. Significantly higher plant height (156 cm), number of leaves (30) are recorded in RDF (50:50:50 kg NPK ha^{-1}) at 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500-liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP) + KNO_3 @ 2% at 45 DAP and 55 DAP. Highest green leaf yield (13341 kg/ha), cured leaf yield (1860 kg/ha) and bright grade leaf yield (1239 kg/ha) were recorded under the same treatment.

The chemical constituents in tobacco leaves were also significantly differ among the treatments, highest nicotine content was recorded under RDF (50:50:50 kg NPK ha^{-1}) 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500 liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP) + KNO_3 @ 2% at 45 DAP and 55 DAP followed by T_5, T_2 and T_1 treatments. Significantly lowest nicotine and highest reducing sugars were recorded under FYM 12.5 t ha^{-1} 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP) + KNO_3 @ 2% at 45 DAP and 55 DAP.

Conclusion: Application of 100% RDF(50:50:50 kg NPK ha^{-1}) at 15 days before planting + Ghanajeevamrutha @ 1 t ha^{-1} (Soil application at the time of planting) + Jeevamrutha @ 500 liter ha^{-1} (Soil application for 03 times at an interval of 15 days from 15 DAP)+ KNO_3 @ 2% at 45 DAP and 55 DAP performed significantly superior over other treatments.

Table 1 VFRAGC 2: Growth parameters of FCV tobacco as influenced by integration of natural farming inputs at different growth stages

Treatments	Plant height (cm)			No. of leaves per plant		
	30 DAP	60 DAP	Final pick	30 DAP	60 DAP	Final pick
T_1	43	66	145	12	20	25
T_2	44	70	148	13	20	26
T_3	39	66	145	12	18	24
T_4	33	62	139	12	17	23
T_5	44	73	152	13	21	28
T_6	46	76	156	14	23	30
T_7	11	30	72	6	12	16
Sem±	1.80	2.68	4.17	0.61	1.35	1.44
CD (p=0.05)	5.54	7.30	12.84	1.87	4.17	4.43

Table 2 VFRAGC 2: Yield parameters of FCV as influenced by integration of natural farming components

Treatments	Green leaf yield (kg/ha)	Cured leaf yield (kg/ha)	Bright grade yield
T1	12899	1712	1080
T2	13092	1770	1126
T3	11042	1448	905
T4	11102	1441	896
T5	12892	1771	1139
T6	13341	1860	1239
T7	4127	611	387
S.Em.±	392.2	46.08	29.18
C.D. (p=0.05)	1208	141.9	89.9

Table 3 VFRAGC 2: Chemical quality constituents (%) of tobacco leaves as influenced by integration of natural farming components

Treatments	Nicotine	Reducing sugars	Chlorides
T1	2.69	11.17	2.32
T2	2.70	11.55	2.52
T3	2.58	13.53	2.41
T4	2.55	13.26	2.39
T5	2.71	10.37	2.42
T6	2.73	10.22	2.47
T7	2.24	15.26	2.71
S.Em.±	0.03	0.05	0.04
C.D. (p=0.05)	0.08	0.16	0.11

SHIVAMOGGA

Project No.: VFSAG 74

Research project title	**Feasibility of crop intensification through relay-intercropping in FCV tobacco**
Objectives of the project	▪ To study the feasibility of different relay inter-crops and their influence on growth and yield of FCV tobacco ▪ To know the economic viability of relay inter-cropping in FCV tobacco under rainfed condition of KLS region
Investigators	T. M. Soumya, Shashikala S Kolakar & Prashantha C.
Location	AINP (T), ZAHRS, Navile, Shivamogga
Year of start	2023-2024
Year of completion	2024-2025 (**Concluded**)
Duration	02 years

Experimental details

Design	:	RCBD	
Replications	:	3	
Treatments	:	8	
Gross plot size	:	7.2 m × 4.2 m	
Variety	:	KST-28 (Sahyadri)	
Season	:	*Kharif*	
Date of transplanting of tobacco	:	13-07-2024	
Date of sowing of relay crop	:	04-09-2024 {45 days after planting of FCV Tobacco (After completion of last inter-cultivation)}	
Date of harvest	:	**First harvest**	**Final harvest**
FCV tobacco		11.09.2024	06.11.2024
Radish		13.10.2024	25.10.2024
Amaranthus		04.10.2024	26.10.2024
Fenugreek		-	-
Palak		-	26.10.2024
Marigold		-	28.10.2024
Number of pickings	:	FCV Tobacco	08
		Amaranthus	02
		Radish	02
		Palak and Marigold	01

Crops and their information:

Crop	Spacing	Duration (Days)	FYM (t/ha)	Fertilizer $N:P_2O_5:K_2O$ (kg/ha)
FCV tobacco	90 cm × 60 cm	120	12.5	40:30:80
Radish	30 cm×12 cm	50-65	25	50:100:50
Amaranthus	Broadcasting	40-50	25	100:50:50
Fenugreek	Broadcasting	20-30	12.5	100:50:0
Palak	Broadcasting	42-50	25	150:100:100
Marigold	60 cm x 60 cm	120-130	20	125:60:60

Biometric Observations

Biometric observations were recorded at 30 DAP, 45 DAP,first picking and at final picking. The observations on plant height (cm), number of leaves per plant, number of leaves harvested per plant in FCV tobacco were averaged from randomly identified 5 plants in net plot. Leaf area (cm^2) was calculated using leaf length, breadth and factor (Suggs *et al.*, 1960). Weight of green leaf and cured leaf at each picking was recorded from net plot. The quality parameters *viz.*, nicotine (%), reducing sugar (%) and chlorides (%) were recorded after harvest of leaves. The yield of relay crops was recorded as and when they attained physiological maturity.

Treatments: 08

T_1	:	FCV tobacco - Radish (Skip row)
T_2	:	FCV tobacco - Amaranthus (Skip row)
T_3	:	FCV tobacco - Fenugreek (Skip row)
T_4	:	FCV tobacco - Palak (Skip row)
T_5	:	FCV tobacco - Marigold (Skip row)
T_6	:	FCV tobacco - Radish (On the ridge)
T_7	:	FCV tobacco - Marigold (On the ridge)
T_8	:	FCV tobacco (Sole)

Note: Sole crop of these intercrops tried in the experiment were sown separately in the adjacent plot and were not included in the treatment combination.

RESULTS

The results of the experiment on feasibility of crop intensification through relay-intercropping in FCV tobacco didn't show significant variation among the treatments in both the years. However, the pooled data of green leaf yield (9254.6 kg/ha) and cured leaf yield (1137.8 kg/ha) were higher with FCV tobacco-Fenugreek (Skip row) treatment. The higher tobacco equivalent yield (1467 kg ha^{-1}), gross return (Rs.3,74,874), net return (Rs. 2,24,214) and B:C ratio (2.49) were recorded with FCV tobacco-Radish (Skip row) treatment. The quality analysis of FCV tobacco didn't differ significantly during 2023, however highest nicotine content (1.21%), reducing sugar (18.15%) and chloride content (0.88%) recorded with FCV tobacco- Radish (on the ridge), FCV tobacco – Amaranthus (skip row) and FCV tobacco- Marigold (on the ridge) in X position leaf respectively. Similarly in L position leaf, highest nicotine content (1.20%), reducing sugar (18.71%) recorded with FCV tobacco-Fenugreek (Skip row) and chloride content (0.90%) recorded with FCV tobacco-Marigold (On the ridge) treatments.

Growth and yield parameters of FCV tobacco were non-significant when it was relay intercropped with radish, amaranthus, fenugreek, palak and marigold because the relay intercrops are sown one week before the last picking of FCV tobacco in the residual soil moisture. Inadequate soil moisture after harvesting of tobacco hinders the optimum growth and development of intercrops in the both the years. Relay intercropping/ delayed sowing and or planting of leafy and root vegetables *viz.*, Amaranthus, Palak, Radish and flower crop Marigold on the ridge and in alternate rows of FCV tobacco recorded additional yield of these crops without affecting the main crop yield. However, yield obtained from intercrops was low (If calculated by converting to their 100% population) compared to yield recorded in the package of practices of the university (Sole planting of respective crops).

Conclusion: FCV tobacco-radish (skip row) relay crop has given higher net return and can be recommended to farmers for higher farm returns.

Table 1 VFSAG 74: Rainfall received at different crop growth stages in (2023-24 and 2024-25)

Particulars	2023-24			2024-25		
	Date	Rainfall (mm)	No. of rainy days	Date	Rainfall (mm)	No. of rainy days
Rainfall received during the experiment (mm)	30.06.2023 to 13.10.2023	325.6	36	13.07.2024 to 06.11.2024	934.0	51
Rainfall received from planting to 30 DAP (mm)	30.06.2023 to 29.07.2023	235.6	22	13.07.2024 to 11.08.2024	316.2	19
Rainfall received between 30 and 45 DAP (mm)	29.07.2023 to 15.08.2023	33.6	2	11.08.2024 to 26.08.2024	208.4	9
Rainfall received from planting to 45 DAP (mm)	30.06.2023 to 15.08.2023	267.2	24	13.07.2024 to 26.08.2024	524.6	30
Rainfall received between 45 DAP to final harvest (mm)	15.08.2023 to 13.10.2023	81.6	11	26.08.2024 to 06.11.2024	424.0	24
Crop duration (Days)	30.06.2023 to 13.10.2023	106		30.06.2023 to 13.10.2023	117	
Crop duration receiving rainfall (%) during the experiment (Both rainy days and days with rainfall in traces)	69			92		
Crop duration not receiving any rainfall (%)	57			60		
Crop duration receiving > 2.5 mm rainfall (%)	47			70		

Table 2 VFSAG 74: Rainfall received during different stages of crop growth during 2023-24 and 2024-25

Crop growth stages	Rainfall (mm)		No. of rainy days		No. of days with rain in traces		Days without rainfall	
	2023	2024	2023	2024	2023	2024	2023	2024
Knee height stage (30 DAP)	235.4	318.2	26	20	5	6	0	6
Rapid growth and elongation (30-60 days)	87.2	262.6	13	21	6	6	19	5
Flowering stage (lower leaves ready to harvest) (60-80 days)	37.2	27.7	6	8	3	7	8	10
Upper leaves ready to harvest (80-120 days)	11.2	123.8	2	21	8	3	30	39
Total	**371.0**	**782.3**	**47**	**70**	**22**	**22**	**57**	**60**

Table 3 VFSAG 74: Effect of relay-intercropping on plant height (cm) of FCV tobacco at different growth stages

Treatment	Plant height (cm)								
	30 DAP			45 DAP			At final picking		
	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled
T_1: FCV tobacco - Radish (Skip row)	28.4	26.8	27.6	51.1	53.2	52.2	124.5	99.2	111.9
T_2: FCV tobacco - Amaranthus (Skip row)	34.9	27.9	31.4	60.3	54.8	57.6	124.4	102.9	113.7
T_3: FCV tobacco - Fenugreek (Skip row)	34.2	27.5	30.9	57.3	57.7	57.5	118.9	107.7	113.3
T_4: FCV tobacco - Palak (Skip row)	36.0	27.2	31.6	58.0	52.8	55.4	115.9	98.9	107.4
T_5: FCV tobacco - Marigold (Skip row)	32.7	27.6	30.1	64.3	50.3	57.3	112.5	93.8	103.1
T_6: FCV tobacco - Radish (On the ridge)	29.7	27.3	28.5	57.8	54.2	56.0	113.0	100.2	106.6
T_7: FCV tobacco - Marigold (On the ridge)	31.9	27.8	29.8	60.2	55.0	57.6	110.7	103.4	107.1
T_8: FCV tobacco (Sole)	30.9	27.9	29.4	49.9	55.3	52.6	124.8	102.6	113.7
S.Em.±	3.8	0.8	1.5	5.7	2.8	3.6	4.7	5.2	3.7
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 4 VFSAG 74: Effect of relay-intercropping on number of leaves plant^{-1} and total number of leaves harvested plant^{-1} at different stages of crop growth in FCV Tobacco

Treatment	Number of leaves plant^{-1}						Total number of leaves harvested plant^{-1}		
	30 DAP			45 DAP					
	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled
T_1: FCV tobacco - Radish (Skip row)	11.4	11.4	11.4	14.2	14.2	14.2	13.2	15.7	14.5
T_2: FCV tobacco - Amaranthus (Skip row)	12.3	12.3	12.3	14.0	14.0	14.0	13.3	16.5	14.9
T_3: FCV tobacco - Fenugreek (Skip row)	12.3	12.3	12.3	12.8	13.1	13.0	12.5	18.1	15.3
T_4: FCV tobacco - Palak (Skip row)	13.0	13.0	13.0	14.9	14.5	14.7	10.8	14.9	12.9
T_5: FCV tobacco - Marigold (Skip row)	12.3	12.3	12.3	14.5	14.5	14.5	13.4	15.1	14.3
T_6: FCV tobacco - Radish (On the ridge)	11.6	11.6	11.6	14.4	14.4	14.4	13.7	16.1	14.9
T_7: FCV tobacco - Marigold (On the ridge)	12.3	12.3	12.3	12.1	13.1	12.6	15.9	18.2	17.1
T_8: FCV tobacco (Sole)	12.8	12.8	12.8	13.3	13.3	13.3	14.3	16.0	15.2
S.Em.±	0.7	0.6	0.5	0.6	0.4	0.5	1.7	1.5	1.4
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS

*NS: Non-significant

Table 5 VFSAG 74: Effect of relay-intercropping on leaf area at different stages of crop growth in FCV tobacco

Treatment	Leaf area (cm^2 $leaf^{-1}$)											
	30 DAP			45 DAP			Leaf at X position			Leaf at L position		
	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled
T_1: FCV tobacco - Radish (Skip row)	410.3	303.3	356.9	670.8	859.3	765.1	874.0	917.3	895.6	710.4	776.7	743.6
T_2: FCV tobacco - Amaranthus (Skip row)	480.6	387.8	434.2	656.1	720.6	688.3	887.3	927.2	907.2	690.6	743.9	717.3
T_3: FCV tobacco - Fenugreek (Skip row)	488.5	258.7	373.6	559.9	668.3	614.1	847.5	884.7	866.1	653.0	739.4	696.2
T_4: FCV tobacco - Palak (Skip row)	534.8	291.0	412.9	737.1	684.4	710.8	889.3	908.2	898.7	713.5	779.7	746.6
T_5: FCV tobacco - Marigold (Skip row)	432.7	309.2	371.0	646.6	705.9	676.3	821.3	834.2	827.7	632.3	698.6	665.5
T_6: FCV tobacco - Radish (On the ridge)	413.6	319.8	366.7	668.4	636.7	652.6	804.8	834.1	819.4	620.2	686.2	653.2
T_7: FCV tobacco – Marigold (On the ridge)	449.1	312.5	380.8	530.0	673.7	601.9	817.3	837.8	827.6	622.6	700.3	661.4
T_8: FCV tobacco (Sole)	484.0	254.1	369.1	607.5	562.7	585.1	879.0	889.9	884.5	700.3	733.3	716.8
S.Em.±	36.6	47.1	33.6	61.8	69.4	58.4	22.2	22.2	7.8	24.8	23.6	10.0
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	24.6	NS	NS	31.1

Table 6 VFSAG 74: Effect of relay-inter cropping on green leaf and cured leaf yield and TGE of FCV tobacco

Treatment	Green leaf yield ($kg\ ha^{-1}$)			Cured leaf yield ($kg\ ha^{-1}$)			TGE ($kg\ ha^{-1}$)			Inter crop yield ($kg\ ha^{-1}$)			Tobacco equivalent yield ($kg\ ha^{-1}$)		
	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled
T_1: FCV tobacco - Radish (Skip row)	6998	10946	8971.7	959	1198	1078.7	669	779	724.0	3294	3450	3372	1340	1594	1467
T_2: FCV tobacco - Amaranthus (Skip row)	7052	10843	8947.7	994	1173	1083.6	716	763	739.4	1136	1250	1193	1126	1310	1218
T_3: FCV tobacco - Fenugreek (Skip row)	6796	11713	9254.6	959	1317	1137.8	682	856	768.8	0	0	0	959	1317	1138
T_4: FCV tobacco - Palak (Skip row)	6507	11067	8787.0	987	1273	1130.3	707	828	767.3	303	410	356.5	1034	1322	1178
T_5: FCV tobacco - Marigold (Skip row)	6863	11460	9161.7	967	1302	1134.5	710	846	778.0	629	775	702	1113	1453	1283
T_6: FCV tobacco - Radish (On the ridge)	6535	11242	8888.4	981	1295	1137.8	721	842	781.5	377	435	406	1025	1340	1182
T_7: FCV tobacco - Marigold (On the ridge)	7065	10392	8728.7	947	1127	1036.8	626	732	679.2	395	455	425	1038	1222	1130
T_8: FCV tobacco (Sole)	7270	10742	9005.8	997	1183	1090.0	733	769	751.2	-	-	-	-	-	-
S.Em.±	790	568	382.3	39	64	46.1	41	42	33.4	-	-	-	-	-	-
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	-	-	-	-	-	-

*NS: Non-significant

Table 7 VFSAG 74: Effect of relay-intercropping on economics of FCV tobacco

Treatment	Cost of cultivation (Rs. ha^{-1})			Gross returns (Rs. ha^{-1})			Net return (Rs. ha^{-1})			B:C ratio		
	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled	2023	2024	Pooled
T_1: FCV tobacco - Radish (Skip row)	1,50,125	1,51,195	1,50,660	3,47,335	4,02,413	3,74,874	1,97,210	2,51,218	2,24,214	2.31	2.66	2.49
T_2: FCV tobacco - Amaranthus (Skip row)	1,47,125	1,48,295	1,47,710	2,91,665	3,30,175	3,10,920	1,44,540	1,81,880	1,63,210	1.98	2.23	2.10
T_3: FCV tobacco - Fenugreek (Skip row)	1,40,125	1,41,195	1,40,660	2,48,515	3,28,605	2,88,560	1,08,390	1,87,410	1,47,900	1.77	2.33	2.05
T_4: FCV tobacco - Palak (Skip row)	1,48,625	1,49,795	1,49,210	267891	334026	300959	119266	184231	151749	1.80	2.23	2.02
T5: FCV tobacco - Marigold (Skip row)	1,47,685	1,48,505	1,48,095	2,88,328	3,71,362	3,29,845	1,40,643	2,22,857	1,81,750	1.95	2.50	2.23
T6: FCV tobacco - Radish (On the ridge)	1,40,545	1,41,475	1,41,010	2,65,526	3,36,165	3,00,846	1,24,981	1,94,690	1,59,836	1.89	2.38	2.13
T7: FCV tobacco - Marigold (On the ridge)	1,39,375	1,40,275	1,39,825	2,69,106	3,08,498	2,88,802	1,29,731	1,68,223	1,48,977	1.93	2.20	2.07
T8: FCV tobacco (Sole)	1,35,125	1,35,895	1,35,510	2,58,363	2,95,170	2,76,767	1,23,238	1,59,275	1,41,257	1.91	2.17	2.04

B. BIDI TOBACCO

ANAND

Project No.: BDAAG 166 (Modified)

Research project title	Evaluation of different fertilizer doses on growth, yield and quality of *bidi* tobacco grown in middle Gujarat
Objectivesof the project	▪ To study the effect of different fertilizer doses on growth and cured leaf yield of *bidi* tobacco varieties ▪ To study the effect of different fertilizer doses on leaf quality and nutrient uptake pattern of *bidi* tobacco varieties
Investigators	Jalpa Panchal & N. J. Jadav
Year of start	2023-24 **(Modified)**
Year of completion	2025-26 **(Concluded)**
Location	BTRS, AAU, Anand

Introduction: Potassium is essential for healthy normal growth of tobacco plants and is known as an element of quality in terms of leaf color, texture and combustibility. Leaf produced with high K is smooth and thin with improved fire holding capacity, compared to the one produced under low potassium supply. Maintaining an adequate P concentration in the soil solution is necessary for improved yield and quality of tobacco. In general, soils used for tobacco production in middle Gujarat are low to medium in available phosphorus. Phosphorus deficiency results in stunted growth, poor leaf expansion and unusually dark-green leaves. Research work was not explored on P and K requirement for *bidi* tobacco in middle Gujarat conditions. Hence, this study will be under taken to evaluate different fertilizer doses on growth, yield and quality of *bidi* tobacco grown in middle Gujarat.

Design	:	RBD	**Spacing**	:	90 × 75 cm
Replication	:	Three	**Fertilizer kg/ha**	:	RDF (200 kg/ha)
Crop	:	*Bidi* Tobacco	**Plot size**	:	4.5 × 6.0 m

Note: Nitrogen was applied in four equal splits; 1st as basal and remaining three splits each at 30 days interval after transplanting. Whereas, phosphorus was applied at the time of transplanting and potassium was applied in two equal splits 1st at the time of transplanting and 2nd at 30 DATP.

Treatments: 2 x 5 =10 combinations

A) Variety (V)	**(B) Fertilizer dose (F) (kg/ha)**
V_1 = GT 7	F_1 = 180-00-00 NPK
V_2 = GABTH 2	F_2 = 180-50-00 NPK
	F_3 = 180-00-50 NPK
	F_4 = 180-50-50 NPK
	F_5 = 180-100-100 NPK

Observations:

1. Plant height (cm) at Harvest
2. Leaf length (cm) at harvest
3. Leaf width (cm) at harvest
4. Cured leaf yield (kg/ha)
5. Dry weight per unit leaf area (mg/cm^2) at harvest
6. Quality parameters (Nicotine, Reducing sugar and Chloride contents)
7. Initial and final soil status (EC, pH, OC and available P and K)
8. Nutrient uptake (N, P_2O_5 and K_2O)

Year wise cultural practices:			
		First year (2023-24)	**Second year (2024-25)**
(a)	Date of Transplanting	05.09.2023	17.09.2024
(b)	Date of harvesting	09.02.2024 22.02.2024	13.02.2025 20.02.2025
(c)	No. of irrigations	06	07
(d)	No. of weeding	05	04
(e)	No. of interculturing	06	04
(f)	Annual rainfall (mm)	978.6	1188.4

RESULTS

Yield: The data presented in Table 1 BDAAG 166 revealed that *bidi* tobacco variety GABTH 2 recorded significantly the highest tobacco cured leaf yield of 3436, 3840, and 3638 kg/ha during years 2023-24 and 2024-25 as well as in pooled result. Interaction effect between variety and fertilizer was found non-significant for cured leaf yield during years 2023-24 and 2024-25 as well as in pooled result.

Yield attributes: The results depicted in Table 2, 3 and 9 BDAAG 166 indicated that *bidi* tobacco varieties exert their significant effect on leaf length, leaf width, plant height and dry weight per unit leaf area during years 2023-24, 2024-25 and its pooled results. The highest leaf length, leaf width, plant height and dry weight per unit leaf area were noticed when grown *bidi* tobacco variety GABTH-2 during both years and its pooled. While, in case of fertilizer doses, none of the yield attributes influenced significantly due to different fertilizer doses during both the years and in its pooled also. Interaction effect between varieties and fertilizers did not show their significant effect on yield attributes during 2023-24, 2024-25 and in its pooled.

Quality parameters: Two years and its pooled data presented in Table 4 BDAAG 166 and 10 revealed that significantly the highest nicotine content was recorded in variety GABTH-2 over GT 7 during years 2023-24, 2024-25 and in its pooled results. Varieties didn't affect significantly on reducing sugar and chloride contents during both the years and in its pooled. With regard to fertilizer doses, application of 180-00-00 kg NPK/ha gave significantly higher nicotine content and it was remained at par with application of 180-50-00 kg NPK/ha during year 2023. Application of 180-100-100 kg NPK/ha gave significantly higher nicotine content and it was remained at par with application of 180-00-00 kg NPK/ha and 180-00-50 kg NPK/ha during year 2024. But in pooled, nicotine content was not influenced significantly. Reducing sugar and chloride contents were not affected significantly due to fertilizer doses during both the years and also in its pooled. Interaction effect between variety and fertilizer was found non-significant for nicotine, reducing sugar and chloride content during years 2023-24 and 2024-25 as well as in its pooled.

Soil chemical parameters: Experimental results depicted in Table 5, 6 and 11 BDAAG 166 revealed that soil pH, EC, organic carbon, available phosphorus and available potash were not influenced significantly due to varieties during years 2023-24 and 2024-25. In pooled results, variety GABTH 2 recorded significantly the highest EC, organic carbon and available phosphorus content over GT 7 variety. Among fertilizer doses, application of 180-100-100 kg NPK/ha recorded significantly higher available phosphorus and it was remained at par with application of 180-50-50 kg NPK/ha in pooled of two years. Available K_2O was not affected significantly due to fertilizers in pooled of two years result. Soil pH, EC and soil organic carbon were not affected significantly due to fertilizers during both the years and in its pooled. Interaction effect between varieties and fertilizers found non-significant for all soil parameters except, EC content found significant in pooled result. Wherein, treatment combination V_2F_5 recorded significantly higher EC content of soil. It was remained at par with treatment combinations V_1F_3 and V_2F_4.

Plant nutrient contents and their uptake: Pooled results summarized in Table 7, 8 and 12 BDAAG 166 revealed that nitrogen and phosphorus contents were not influenced significantly due to both varieties and fertilizer doses. Potash content was recorded significantly the highest in variety GABTH-2 and it was not affected significantly due to fertilizer doses. However, nitrogen and potash uptake by *bidi* tobacco during pooled results found significantly the highest in GABTH-2 variety. With regards to fertilizer doses, phosphorus and potash uptake were recorded significantly higher in treatment F_5 (180-100-100 NPK) in pooled results as well as in both the years also. Same treatment was at par with treatments F_2 (180-50-00 NPK) and F_4 (180-50-50 NPK) for phosphorus uptake during pooled. Interaction effect between varieties and fertilizers showed their significant effect on nitrogen and phosphorus contents in pooled results. Wherein, treatment combination V_2F_1 recorded significantly higher nitrogen content and it was remained at par with V_1F_1, V_2F_2, V_1F_3 and V_1F_4. Significantly higher phosphorus content was noticed under treatment combination V_2F_5 and it was remained at par with V_2F_4.

Economics: Economics worked out and presented in Table 13 BDAAG 166 revealed that maximum net return and BCR value was found while grown *bidi* tobacco hybrid GABTH 2. However, application of $N:P_2O_5:K_2O$ @ 180:50:50 kg/ha gave maximum net realization closely followed by 180:100:100 NPK kg/ha.

Conclusion: Looking to the above results, it can be concluded that *bidi* tobacco hybrid GABTH 2 produced significantly the highest cured leaf yield as well as nicotine and potash contents with maximum net return and BCR. Application of different fertilizer doses did not show their significant effect on cured leaf yield, quality parameters and nutrient contents. However, application of $N:P_2O_5:K_2O$ @ 180-50-50 or 180-100-100 kg/ha gave numerically maximum cured leaf yield, nicotine, phosphorus and potash contents in *bidi* tobacco leaves. Application of fertilizers 180-50-50 and 180-100-100 kg NPK/ha found more economical with maximum net profit than rest of fertilizer doses.

Table 1 BDAAG 166: Effect of varieties and fertilizers on cured leaf yield of *bidi* tobacco

Treatment	Cured leaf yield (kg/ha)		
	2023-24	**2024-25**	**Pooled**
Varieties (V)			
V_1: GT 7	2654	2987	2820
V_2: GABTH 2	3436	3840	3638
S.Em. ±	78	119	71
C.D. (p=0.05)	233	353	204
Fertilizers (F) kg/ha			
F_1: 180-00-00 NPK	2983	3358	3170
F_2: 180-50-00 NPK	2790	3294	3042
F_3: 180-00-50 NPK	2987	3226	3106
F_4: 180-50-50 NPK	3239	3688	3463
F_5: 180-100-100 NPK	3223	3500	3362
S.Em.±	124	188	112
C.D. (p=0.05)	NS	NS	NS
V x F Int.	NS	NS	NS
CV %	10.0	13.5	12.1
Y	-	-	204
Y x V	-	-	NS
Y x F	-	-	NS
Y x V x F	-	-	NS

Table 2 BDAAG 166: Effect of varieties and fertilizers on leaf length and width of *bidi* tobacco

Treatment	leaf length (cm)			leaf width (cm)		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)						
V_1: GT 7	46.35	47.18	46.76	17.25	17.52	17.39
V_2: GABTH 2	49.24	49.37	49.91	19.35	18.61	18.98
S.Em. ±	0.86	0.61	0.53	0.56	0.36	0.33
C.D. (p=0.05)	2.56	1.82	1.52	1.65	1.08	0.95
Fertilizers (F) kg/ha						
F_1: 180-00-00 NPK	48.72	47.60	48.16	18.70	17.41	18.05
F_2: 180-50-00 NPK	45.45	47.96	46.70	16.48	17.93	17.20
F_3: 180-00-50 NPK	46.75	49.39	48.07	17.67	18.40	18.03
F_4: 180-50-50 NPK	49.84	48.12	48.98	20.33	18.37	19.35
F_5: 180-100-100 NPK	48.22	48.31	48.27	18.32	18.23	18.28
S.Em.±	1.36	0.97	0.83	0.88	0.57	0.52
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS
V x F Int.	NS	NS	NS	NS	NS	NS
CV %	7.0	4.9	6.02	11.8	7.8	10.0
Y	-	-	NS	-	-	NS
Y x V	-	-	NS	-	-	NS
Y x F	-	-	NS	-	-	NS
Y x V x F	-	-	NS	-	-	NS

Table 3 BDAAG 166: Effect of varieties and fertilizers on plant height and dry weigh per unit leaf area of *bidi* tobacco

Treatment	Plant height (cm)			Dry weight per unit leaf area (mg/cm^2)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)						
V_1: GT 7	87.44	83.29	85.37	10.93	10.45	10.69
V_2: GABTH 2	95.08	92.77	93.93	11.39	11.21	11.30
S.Em. ±	1.34	2.03	1.22	0.15	0.24	0.14
C.D. (p=0.05)	3.98	6.03	3.49	0.45	0.72	0.41
Fertilizers (F) kg/ha						
F_1: 180-00-00 NPK	89.20	85.37	87.28	11.35	10.40	10.87
F_2: 180-50-00 NPK	87.47	85.00	86.23	11.24	10.49	10.86
F_3: 180-00-50 NPK	92.87	91.00	91.93	11.12	10.65	10.88
F_4: 180-50-50 NPK	93.47	88.50	90.98	11.04	11.10	11.07
F_5: 180-100-100 NPK	93.30	90.30	91.80	11.05	11.52	11.29
S.Em.±	2.12	3.21	1.92	0.24	0.38	0.22
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS
V x F Int.	NS	NS	NS	NS	NS	NS
CV %	5.7	8.9	7.4	5.3	8.6	7.1
Y	-	-	NS	-	-	NS
Y x V	-	-	NS	-	-	NS
Y x F	-	-	NS	-	-	NS
Y x V x F	-	-	NS	-	-	1.29

Table 4 BDAAG 166: Effect of varieties and fertilizers on quality parameters of *bidi* tobacco

Treatment	Nicotine content (%)			Reducing sugar (%)			Chloride content (%)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)									
V_1: GT 7	4.40	5.82	5.11	3.73	4.30	4.01	0.98	1.01	1.00
V_2: GABTH 2	4.69	6.14	5.42	4.14	4.39	4.27	1.03	1.02	1.03
S.Em.±	0.04	0.08	0.04	0.03	0.06	0.11	0.02	0.01	0.01
C.D. (p=0.05)	0.12	0.23	0.13	0.08	NS	NS	NS	NS	NS
Fertilizers (F) kg/ha									
F_1: 180-00-00 NPK	4.76	5.76	5.26	3.94	4.32	4.13	1.02	1.02	1.02
F_2: 180-50-00 NPK	4.62	5.85	5.24	3.85	4.35	4.10	0.98	1.00	0.99
F_3: 180-00-50 NPK	4.44	5.90	5.17	3.98	4.53	4.26	1.04	1.04	1.04
F_4: 180-50-50 NPK	4.50	6.16	5.33	3.97	4.40	4.18	0.94	1.03	0.99
F_5:180-100-100 NPK	4.41	6.24	5.32	3.95	4.12	4.03	1.05	0.98	1.01
S.Em.±	0.07	0.12	0.17	0.04	0.10	0.05	0.03	0.02	0.02
C.D. (p=0.05)	0.20	0.36	NS	NS	NS	NS	NS	NS	NS
V x F Int.	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	3.5	4.9	5.1	2.7	5.5	4.4	6.3	5.1	5.7

Y	-	-	0.13	-	-	0.10	-	-	NS
Y x V	-	-	NS	-	-	0.14	-	-	NS
Y x F	-	-	0.28	-	-	NS	-	-	NS
Y x V x F	-	-	NS	-	-	NS	-	-	0.10

Table 5 BDAAG 166: Effect of varieties and fertilizers on soil chemical parameters of *bidi* tobacco

Treatment	pH			EC (ds/m)			Organic carbon (%)		
Initial Value	7.83			0.18			0.33		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)									
V_1: GT 7	8.11	8.04	8.07	0.203	0.193	0.198	0.37	0.38	0.376
V_2: GABTH 2	8.05	8.09	8.07	0.210	0.201	0.206	0.38	0.40	0.388
S.Em. ±	0.02	0.042	0.02	0.004	0.003	0.002	0.005	0.005	0.003
C.D. (p=0.05)	NS	NS	NS	NS	NS	0.007	NS	NS	0.010
Fertilizers (F) kg/ha									
F_1: 180-00-00 NPK	8.04	7.94	7.99	0.217	0.180	0.198	0.36	0.38	0.369
F_2: 180-50-00 NPK	8.11	8.09	8.10	0.202	0.173	0.187	0.38	0.40	0.386
F_3: 180-00-50 NPK	8.04	8.05	8.04	0.210	0.202	0.206	0.39	0.39	0.387
F_4: 180-50-50 NPK	8.16	8.11	8.13	0.200	0.207	0.203	0.37	0.40	0.382
F_5:180-100-100 NPK	8.06	8.14	8.10	0.207	0.222	0.214	0.38	0.39	0.387
S.Em.±	0.03	0.07	0.04	0.006	0.005	0.011	0.01	0.01	0.005
C.D. (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
V x F Int.	**NS**	**NS**	**NS**	**NS**	**NS**	**Sig.**	**NS**	**NS**	**NS**
CV %	1.1	2.0	1.6	7.3	6.0	6.7	4.8	4.7	4.8
Y	-	-	NS	-	-	0.007	-	-	0.01
Y x V	-	-	NS	-	-	NS	-	-	NS
Y x F	-	-	NS	-	-	0.016	-	-	NS
Y x V x F	-	-	NS	-	-	NS	-	-	0.03

Table 6 BDAAG: Effect of varieties and fertilizers on soil available nutrients of *bidi* tobacco

Treatment	Avail. P_2O_5 (kg/ha)			Avail. K_2O (kg/ha)		
Initial Value	24.17			216.32		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)						
V_1: GT 7	28.75	29.80	29.27	222.40	248.20	235.30
V_2: GABTH 2	30.12	30.93	30.53	226.80	253.07	239.93
S.Em.±	0.48	0.599	0.38	2.16	4.21	2.36
C.D. (p=0.05)	**NS**	**NS**	**1.10**	**NS**	**NS**	**NS**
Fertilizers (F) kg/ha						
F_1: 180-00-00 NPK	23.92	25.57	24.74	216.00	223.17	219.58
F_2: 180-50-00 NPK	29.33	33.06	31.19	216.33	239.50	227.92
F_3: 180-00-50 NPK	25.39	26.04	25.71	224.67	252.17	238.42

Treatment	Avail. P_2O_5 (kg/ha)			Avail. K_2O (kg/ha)		
Initial Value	24.17			216.32		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
F_4: 180-50-50 NPK	31.84	32.20	32.02	229.00	259.67	244.33
F_5:180-100-100NPK	36.70	34.96	35.83	237.00	278.67	257.83
S.Em.±	0.76	0.947	1.00	3.41	6.65	6.29
C.D. (p=0.05)	**2.27**	**2.81**	**3.92**	**10.15**	**19.76**	**NS**
V x F Int.	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV %	6.4	7.6	7.0	3.7	6.5	5.4
Y	-	-	NS	-	-	6.78
Y x V	-	-	NS	-	-	NS
Y x F	-	-	2.47	-	-	15.17
Y x V x F	-	-	NS	-	-	21.46

Table 7 BDAAG 166: Effect of varieties and fertilizers on nutrient contents of *bidi* tobacco

Treatment	N content (%)			P_2O_5 content (%)			K_2O content (%)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)									
V_1: GT 7	2.15	2.27	2.20	0.22	0.21	0.21	0.29	0.29	0.290
V_2: GABTH 2	2.19	2.25	2.22	0.23	0.25	0.24	0.30	0.31	0.304
S.Em. ±	0.02	0.03	0.02	0.002	0.004	0.01	0.005	0.005	0.003
C.D. (p=0.05)	**NS**	**NS**	**NS**	**0.01**	**0.01**	**NS**	**NS**	**0.01**	**0.010**
Fertilizers (F) kg/ha									
F_1: 180-00-00 NPK	2.19	2.35	2.27	0.21	0.18	0.19	0.28	0.24	0.257
F_2: 180-50-00 NPK	2.15	2.19	2.17	0.23	0.23	0.23	0.27	0.26	0.266
F_3: 180-00-50 NPK	2.14	2.32	2.23	0.21	0.22	0.22	0.31	0.30	0.307
F_4: 180-50-50 NPK	2.20	2.23	2.22	0.24	0.24	0.24	0.30	0.33	0.311
F_5:180-100-100NPK	2.16	2.21	2.18	0.25	0.26	0.25	0.32	0.37	0.345
S.Em.±	0.04	0.053	0.03	0.003	0.01	0.01	0.01	0.01	0.019
C.D. (p=0.05)	**NS**	**NS**	**NS**	**0.01**	**0.02**	**NS**	**0.02**	**0.02**	**NS**
V x F Int.	**NS**	**NS**	**Sig.**	**NS**	**NS**	**Sig.**	**NS**	**NS**	**NS**
CV %	4.2	5.7	**5.0**	3.4	6.4	**5.1**	6.0	6.6	**6.3**
Y	-	-	0.06	-	-	NS	-	-	NS
Y x V	-	-	NS	-	-	0.01	-	-	NS
Y x F	-	-	NS	-	-	0.01	-	-	0.022
Y x V x F	-	-	NS	-	-	NS	-	-	NS

Table 8 BDAAG 166: Effect of varieties and fertilizers on nutrient uptake by *bidi* tobacco

Treatment	N uptake (kg/ha)			P_2O_5 uptake (kg/ha)			K_2O uptake (kg/ha)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)									
V_1: GT 7	57.11	67.80	62.46	5.93	6.18	6.05	7.68	8.67	8.17
V_2: GABTH 2	75.36	86.40	80.88	7.94	9.54	8.74	10.33	11.94	11.14
S.Em.±	2.07	3.12	1.87	0.18	0.26	0.48	0.30	0.38	0.24
C.D. (p=0.05)	**6.15**	**9.26**	**5.37**	**0.53**	**0.77**	**NS**	**0.88**	**1.14**	**0.70**
Fertilizers (F) kg/ha									
F_1: 180-00-00 NPK	65.86	79.42	72.64	6.35	5.89	6.12	8.24	7.99	8.11
F_2: 180-50-00 NPK	60.24	72.37	66.30	6.30	7.84	7.07	7.55	8.62	8.08
F_3: 180-00-50 NPK	64.04	74.75	69.39	6.44	7.31	6.87	9.43	9.69	9.56
F_4: 180-50-50 NPK	71.34	81.90	76.62	7.68	9.02	8.35	9.56	12.10	10.83
F_5:180-100-100NPK	69.70	77.06	73.38	7.91	9.24	8.57	10.26	13.13	11.69
S.Em.±	3.27	4.93	2.96	0.28	0.41	0.40	0.47	0.61	0.24
C.D. (p=0.05)	**NS**	**NS**	**NS**	**0.84**	**1.22**	**1.59**	**1.40**	**1.81**	**0.70**
V x F Int.	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV %	12.1	15.7	**14.3**	10.0	12.8	**11.7**	12.8	14.4	**13.8**
Y	-	-	5.37	-	-	0.45	-	-	0.70
Y x V	-	-	NS	-	-	0.64	-	-	NS
Y x F	-	-	NS	-	-	1.01	-	-	1.56
Y x V x F	-	-	NS	-	-	1.43	-	-	2.21

Table 9 BDAAG 166: Effect of varieties and fertilizers on cured leaf yield and yield attributes of *bidi* tobacco (Pooled)

Treatment	Cured leaf yield (kg/ha)	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Dry weight per unit leaf area (mg/cm^2)
Varieties (V)					
V_1: GT 7	2820	46.76	17.39	85.37	10.69
V_2: GABTH 2	3638	49.91	18.98	93.93	11.30
S.Em.±	71	0.53	0.33	1.22	0.14
C.D. (p=0.05)	**204**	**1.52**	**0.95**	**3.49**	**0.41**
Fertilizers (F) kg/ha					
F_1: 180-00-00 NPK	3170	48.16	18.05	87.28	10.87
F_2: 180-50-00 NPK	3042	46.70	17.20	86.23	10.86
F_3: 180-00-50 NPK	3106	48.07	18.03	91.93	10.88
F_4: 180-50-50 NPK	3463	48.98	19.35	90.98	11.07
F_5: 180-100-100 NPK	3362	48.27	18.28	91.80	11.29
S.Em.±	112	0.83	0.52	1.92	0.22
C.D. (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**
V x F Int.	**NS**	**NS**	**NS**	**NS**	**NS**
CV %	12.1	6.02	10.0	7.4	7.1
Y	204	NS	NS	NS	NS
Y x V	NS	NS	NS	NS	NS
Y x F	NS	NS	NS	NS	NS
Y x V x F	NS	NS	NS	NS	1.29

Table 10 BDAAG 166: Effect of varieties and fertilizers on quality parameters of *bidi* tobacco (Pooled)

Treatment	Nicotine content (%)	Reducing sugar content (%)	Chloride content (%)
Varieties (V)			
V_1: GT 7	5.11	4.01	1.00
V_2: GABTH 2	5.41	4.27	1.03
S.Em.±	0.05	0.11	0.01
C.D. (p=0.05)	**0.14**	**NS**	**NS**
Fertilizers (F) kg/ha			
F_1: 180-00-00 NPK	5.40	4.13	1.02
F_2: 180-50-00 NPK	5.23	4.10	0.99
F_3: 180-00-50 NPK	5.34	4.26	1.04
F_4: 180-50-50 NPK	5.19	4.18	0.99
F_5: 180-100-100 NPK	5.15	4.03	1.01
S.Em.±	0.08	0.05	0.02
C.D. (p=0.05)	**NS**	**NS**	**NS**
V x F Int.	**NS**	**NS**	**NS**
CV %	5.1	4.4	5.7
Y	0.14	0.10	NS
Y x V	NS	0.14	NS
Y x F	NS	NS	NS
Y x V x F	NS	NS	0.10

Table 11 BDAAG 166: Effect of varieties and fertilizers on soil chemical parameters of *bidi* tobacco (Pooled)

	pH	EC (ds/m)	Organic carbon (%)	Avail. P_2O_5 (kg/ha)	Avail. K_2O (kg/ha)
Varieties (V)					
V_1: GT 7	8.07	0.198	0.376	29.27	235.30
V_2: GABTH 2	8.07	0.206	0.388	30.53	239.93
S.Em.±	0.02	0.002	0.003	0.38	2.36
C.D. (p=0.05)	**NS**	**0.007**	**0.010**	**1.10**	**NS**
Fertilizers (F) kg/ha					
F_1: 180-00-00 NPK	7.99	0.198	0.369	24.74	219.58
F_2: 180-50-00 NPK	8.10	0.187	0.386	31.19	227.92
F_3: 180-00-50 NPK	8.04	0.206	0.387	25.71	238.42
F_4: 180-50-50 NPK	8.13	0.203	0.382	32.02	244.33
F_5: 180-100-100 NPK	8.10	0.214	0.387	35.83	257.83
S.Em.±	0.04	0.011	0.005	1.00	6.29
C.D. (p=0.05)	NS	NS	NS	3.92	NS
V x F Int.	NS	Sig.	NS	NS	NS
CV %	1.6	6.7	4.8	7.0	5.4
Y	NS	0.007	0.01	NS	6.78
Y x V	NS	NS	NS	NS	NS
Y x F	NS	0.016	NS	2.47	15.17
Y x V x F	NS	NS	0.03	NS	21.46

Table 11.1 BDAAG 166: Interaction effect between varieties and fertilizers on EC content of soil (Pooled)

EC (ds/m)					
V / F	F_1	F_2	F_3	F_4	F_5
V_1	0.195	0.180	0.215	0.195	0.205
V_2	0.202	0.195	0.197	0.212	0.223
S.Em.±	0.006				
C.D. (p=0.05)	0.016				
CV %	6.7				

Table 12 BDAAG 166: Effect of varieties and fertilizers on nutrient contents and its uptake of *bidi* tobacco (Pooled)

Treatment	N Content (%)	P_2O_5 Content (%)	K_2O Content (%)	N uptake (kg/ha)	P_2O_5 uptake (kg/ha)	K_2O uptake (kg/ha)
Varieties (V)						
V_1: GT 7	2.20	0.21	0.290	62.46	6.05	8.17
V_2: GABTH 2	2.22	0.24	0.304	80.88	8.74	11.14
S.Em. ±	0.02	0.01	0.003	1.87	0.48	0.24
C.D. (p=0.05)	NS	NS	0.010	5.37	NS	0.70
Fertilizers (F) kg/ha						
F_1: 180-00-00 NPK	2.27	0.19	0.257	72.64	6.12	8.11
F_2: 180-50-00 NPK	2.17	0.23	0.266	66.30	7.07	8.08
F_3: 180-00-50 NPK	2.23	0.22	0.307	69.39	6.87	9.56
F_4: 180-50-50 NPK	2.22	0.24	0.311	76.62	8.35	10.83
F_5: 180-100-100 NPK	2.18	0.25	0.345	73.38	8.57	11.69
S.Em. ±	0.03	0.01	0.019	2.96	0.40	0.24
C.D. (p=0.05)	NS	NS	NS	NS	1.59	0.70
V x F Int.	Sig.	Sig.	NS	NS	NS	NS
CV %	5.0	5.1	6.3	14.3	11.7	13.8
Y	0.06	NS	NS	5.37	0.45	0.70
Y x V	NS	0.01	NS	NS	0.64	NS
Y x F	NS	0.01	0.022	NS	1.01	1.56
Y x V x F	NS	NS	NS	NS	1.43	2.21

Table 12.1 BDAAG 166: Interaction effect between varieties and fertilizers on N and P_2O_5 contents of *bidi* tobacco (Pooled)

N content (%)				P_2O_5 content (%)		
F / V	V_1	V_2		F / V	V_1	V_2
F_1	2.21	2.34		F_1	0.19	0.20
F_2	2.11	2.23		F_2	0.22	0.24
F_3	2.28	2.19		F_3	0.19	0.24
F_4	2.27	2.16		F_4	0.23	0.25
F_5	2.18	2.19		F_5	0.24	0.26
S.Em.±	0.05			S.Em.±	0.01	
C.D. (p=0.05)	0.13			C.D. (p=0.05)	0.01	
CV %	5.0			CV %	5.1	

Table 13 BDAAG 166: Economics as influenced by varieties and fertilizers (2023-24 to 2024-25)

Treatment	Cured leaf yield (kg/ha)	Gross income (₹/ha)	Common cost (₹/ha)	Treatment cost (₹/ha)	Total cost (₹/ha)	Net income (₹/ha)	BCR
Varieties (V)							
V_1: GT 7	2820	242701	64880	22371	87251	155450	2.78
V_2: GABTH 2	3638	313060	64880	23703	88583	224477	3.53
S.Em. ±	71	--	--	--	--	--	--
C.D. (p=0.05)	204	--	--	--	--	--	--
Fertilizers (F) kg/ha							
F_1: 180-00-00 NPK	3170	272839	64880	19003	83883	188956	3.25
F_2: 180-50-00 NPK	3042	261830	64880	21825	86705	175125	3.02
F_3: 180-00-50 NPK	3106	267345	64880	21223	86103	181242	3.10
F_4: 180-50-50 NPK	3463	298076	64880	24045	88925	209151	3.35
F_5: 180-100-100 NPK	3362	289312	64880	29088	93968	195344	3.08
S.Em.±	112	--	--	--	--	--	--
C.D. (p=0.05)	NS	--	--	--	--	--	--
V x F Int.	NS	--	--	--	--	--	--
CV %	12.1	--	--	--	--	--	--

Project No.: BDAAGC/ BDNAGC/ BDNyAGC 1

Research project title	**Evaluation of pre and post emergence herbicides for weed management in *Bidi* tobacco**
Objectives of the project	▪ To identify the suitable pre- and post-emergence herbicides for *bidi* tobacco ▪ To study the performance of pre- and post-emergence herbicides on weed dynamics and crop growth and yield of *bidi* tobacco
Investigators	Jalpa Panchal
Year of start	2024-25
Year of completion	2025-26
Location	*Bidi* Tobacco Research Station

Experimental details:

Design	:	RBD (Factorial)
Replications	:	Three
Treatments	:	Seven
Plot size	:	3.75 x 7.2 m
Spacing	:	75 x 90 cm
Crop & Variety	:	*Bidi* Tobacco; A 119
Fertilizer (kg/ha)	:	180 kg N/ha

Note: Nitrogen was applied in four equal splits; 1st as basal and remaining three splits each at 30 days interval after transplanting.

Treatments: Ten treatments as below

1. Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre)
2. Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)
3. Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (1.5 g/litre)
4. Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (2.0 g/litre)
5. T_1 + Post-emergence application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP
6. T_2 + Post-emergence application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP
7. T_3 + Post-emergence application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP
8. T_4 + Post-emergence application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP
9. Weed Free check (IC *fb* HW at 20 and 40 DATP)- Farmers practice
10. Un-weeded check

Observations

Weed parameters:

- Weed species identified monocots & dicots throughout season
- Weed flora and their relative density in weedy check at 30 DATP
- Weed density (no./m^2) at 30 & 60 DATP and at harvest
- Weed dry weight (g/m^2) at 30 & 60 DATP and at harvest
- Weed control efficiency (%)
- Weed index (%)
- Phyto-toxicity scoring, if any (0-10 scale)

Growth and Yield parameters

- Plant height (cm) at harvest
- Leaf length (cm) at harvest
- Leaf width (cm) at harvest
- Dry weight per unit leaf area (mg/cm^2) at harvest
- Cured leaf yield (kg/ha)

RESULTS

Weed flora: In the experimental field *Cyperus rotundus, Eragrostis major, Echinocloa colona* and *Digitaria Sanguinalis* as monocot weed while *Phylanthus niruri, portulaca oleracea, Argemone Mexicana, Oldenlandia umbellate, Heliotropium indicum, Euphorbia hirta, Boerhavia erecta Chenopodium album* and *Orobanche spp.* as dicot weed dominated in the field during experimentation (Table 1 & 2 BDAAG 167).

Phyto-toxicity: Data predicted in Table 3 revealed that pre-plant application of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre), Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre), Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (1.5 g/litre) and Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (2.0 g/litre) as well as post-emergence application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP did not show any phytotoxic effect of tobacco plant.

Density & dry biomass of monocot, dicot and total weed and Weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at 30 DATP

The data presented in Table 4 BDAAG 167 revealed that significantly lower density and dry biomass of monocot weed and total weed at 30 DATP were observed under treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} but it was remained at par with treatment T_2 (Pre-plant application of sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha). Significantly lower density and dry biomass of dicot weed at 30 DATP was observed under treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} and it was remained at par with treatments T_2, T_3, $T_4$and T_8. Weed control efficiency at 30 DATP was observed maximum (93.7%) in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} followed by treatment T_2.

Density & dry biomass of monocot, dicot and total weed and Weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at 60 DATP

Experimental results depicted in Table 5 BDAAG 167 revealed that density of monocot weed at 60 DATP was observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} but it was remained at par with treatments $T_{1,}$ $T_{2,}$ T_4 andT_6. Dry biomass of monocot weed at 60 DATP was observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} but it was remained at par with treatments T_2 and T_6. Density and dry biomass of dicot weed at 60 DATP were observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} and it was remained at par with treatment T_2. Density and dry biomass of total weed at 60 DATP were observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice}. It was remained at par with treatments T_2 and T_6 for total weed density and treatment T_2 for total weed dry biomass. Weed control efficiency at 60 DATP was observed maximum (93.4%) in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} followed by treatment T_2.

Density & dry biomass of monocot, dicot and total weed and Weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at harvest

Experimental results summarized in Table 6 BDAAG 167 revealed that density and dry biomass of monocot weed at harvest were observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} but it was remained at par with treatments T_2 andT_6. Density and dry biomass of dicot weed at harvest were observed significantly lower in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} and it was remained at par with treatment T_2. Density and dry biomass of total weed at harvest were observed significantly the lowest in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice}. Weed control efficiency at harvest was observed maximum (91.2%) in treatment T_9 {Weed free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice} followed by treatment T_2.

Yield attributes, cured leaf yield and weed index (WI) as influences by different treatments in *bidi* tobacco

Experimental results depicted in Table 7 BDAAG 167 revealed that none of yield attributes as well as cured leaf yield of *bidi* tobacco observed significantly influenced due to different weed management treatments. However, weed index (WI) means yield reduction due to presence of weed was observed minimum under treatment T_2 {Pre-plant application (3 DBP) of sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)} closely followed by treatments T_6 {Pre-plant application (3 DBP) of sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre) + PoE application of quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP} and T_8 {Pre-plant application (3 DBP) of sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (2.0 g/litre) + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP}.

Salient findings

- Weed free check gave significantly lower density and dry biomass of monocot, dicot and total weed at 30 & 60 DATP and at harvest but it was remained at par with Pre-plant application of sulfentrazone 39.6% SC @ 0.30 kg a.i./ha
- Weed control efficiency (WCE) was also observed maximum in Weed free check and closely followed by Pre-plant application of sulfentrazone 39.6% SC @ 0.30 kg a.i./ha

Conclusion: None of herbicidal treatments showed significant effect on *bidi* tobacco yield attributes and cured leaf yield. Weed index (WI) was observed minimum under Pre-plant application (3 DBP) of sulfentrazone 39.6% SC @ 0.30 kg a.i./ha (1.5 ml/litre).

Table 1 BDAAG 167: Weed species (monocots & dicots) identified throughout season

Monocots	**Dicots**
Cyperus rotundus	*Phyllanthus niruri*
Eragrostis major	*Portulaca oleracea*
Echinocloa colona	*Argemone mexicana*
Digitaria Sanguinalis	*Oldenlandia umbellata*
Chloris barbata	*Heliotropium indicum*
	Euphorbia hirta
	Boerhavia erecta
	Chenopodium album
	Orobanche spp.

Table 2 BDAAG 167: Weed flora and their relative density in weedy check at 30 DATP

Sr. no.	**Weed flora**	**Relative density (%)**
1	*Cyperus rotundus*	28.15 (47.00)
2	*Eragrostis major*	4.79 (8.00)
3	*Echinocloa colona*	12.57 (21.00)
4	*Digitaria Sanguinalis*	10.78 (18.00)
	Total Monocots	56.29 (94.00)
1	*Phyllanthus niruri*	2.39 (4.00)
2	*portulaca oleracea*	1.80 (3.00)
3	*Argemone mexicana*	22.15 (37.00)
4	*Oldenlandia umbellata*	6.59 (11.00)
5	*Heliotropium indicum*	6.59 (11.00)
6	*Boerhavia erecta*	2.39 (4.00)
7	*Chenopodium album*	1.80 (3.00)
	Total Dicots	43.71 (73.00)
	Total Weed	100 (167.00)

Table 3 BDAAG 167: Phyto-toxicity of applied herbicides on *bidi* tobacco (Mean)

Trt	Leaf injury		Wilting		Vein cleaning		Necrosis		Epinasty		Hyponasty	
T_1	0	0	0	0	0	0	0	0	0	0	0	0
T_2	0	0	0	0	0	0	0	0	0	0	0	0
T_3	0	0	0	0	0	0	0	0	0	0	0	0
T_4	0	0	0	0	0	0	0	0	0	0	0	0
T_5	0	0	0	0	0	0	0	0	0	0	0	0
T_6	0	0	0	0	0	0	0	0	0	0	0	0
T_7	0	0	0	0	0	0	0	0	0	0	0	0
T_8	0	0	0	0	0	0	0	0	0	0	0	0
T_9	0	0	0	0	0	0	0	0	0	0	0	0
T_{10}	0	0	0	0	0	0	0	0	0	0	0	0

Table 4 BDAAG 167: Density and dry biomass of monocot, dicot, total weed and weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at 30 DATP

Sr no.	Treatments	Weed density (No./m^2)			Weed dry biomass (g/m^2)			WCE (%)
		Monocot	Dicot	Total	Monocot	Dicot	Total	
1	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre)	3.36 (10.33)	2.37 (4.67)	3.99 (15.0)	4.38 (18.24)	2.06 (3.32)	4.74 (21.56)	81.6
2	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)	3.05 (8.33)	1.52 (1.33)	3.26 (9.67)	3.53 (11.52)	1.66 (1.79)	3.78 (13.31)	88.7
3	Pre-plant application (3 DBP) of Sulfentrazone 28% +Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (1.5g/litre)	3.93 (14.67)	1.80 (2.33)	4.22 (17.0)	6.17 (37.04)	1.78 (2.17)	6.34 (39.21)	66.6
4	Pre-plant application (3 DBP) of Sulfentrazone 28% +Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (2.0 g/litre)	3.83 (13.67)	1.63 (1.67)	4.04 (15.3)	4.71 (21.28)	1.72 (1.98)	4.92 (23.26)	80.2
5	T_1 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.7 (21.33)	2.56 (5.67)	5.27 (27.0)	5.27 (26.88)	2.83 (7.03)	5.90 (33.91)	71.1
6	T_2 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	3.40 (11.00)	1.72 (2.00)	3.70 (13.0)	4.63 (20.48)	1.88 (2.56)	4.90 (23.04)	80.4
7	T_3 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.73 (21.67)	2.23 (4.00)	5.14 (25.6)	5.29 (27.92)	2.57 (5.63)	5.80 (33.55)	71.4
8	T_4 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.30 (18.00)	1.75 (2.33)	4.54 (20.3)	4.96 (23.68)	1.58 (1.53)	5.11 (25.21)	78.5
9	Weed Free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice	2.37 (4.67)	1.38 (1.00)	2.55 (5.67)	2.70 (6.4)	1.42 (1.02)	2.88 (7.42)	93.7
10	Un-weeded check	6.45 (40.67)	8.00 (63.0)	10.22 (103.)	7.99 (63.04)	7.43 (54.4)	10.87 (117.44)	--
--	S.Em.±	0.28	0.19	0.26	0.31	0.13	0.31	--
--	C.D. (p=0.05)	**0.83**	**0.55**	**0.77**	**0.92**	**0.39**	**0.93**	**--**
--	C.V. %	12.1	12.9	9.6	10.8	9.1	10.0	--

Data subjected to √(x +1) transformation. Figures in parentheses are means of original values

Table 5 BDAAG 167: Density and dry biomass of monocot, dicot, total weed and weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at 60 DATP

S. No.	Treatments	Weed density (No./m^2)			Weed dry biomass (g/m^2)			WCE (%)
		Monocot	Dicot	Total	Monocot	Dicot	Total	
1	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre)	3.42 (11.00)	2.85 (7.33)	4.34 (18.33)	4.50 (19.92)	2.67 (6.26)	5.13 (26.18)	81.8
2	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)	3.22 (9.67)	2.19 (4.00)	3.78 (13.67)	3.74 (13.04)	1.92 (2.68)	4.08 (15.72)	89.1
3	Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (1.5g/litre)	4.02 (15.33)	4.11 (16.00)	5.68 (31.33)	5.84 (33.2)	4.86 (22.6)	7.54 (55.83)	61.2
4	Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT)(2.0 g/litre)	3.52 (11.67)	3.05 (8.33)	4.56 (20.00)	5.65 (30.96)	3.90 (14.2)	6.80 (45.21)	68.6
5	T_1 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	6.32 (39.33)	3.85 (14.00)	7.36 (53.33)	5.03 (24.64)	5.04 (24.4)	7.05 (49.06)	65.9
6	T_2 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	3.01 (8.33)	2.72 (6.67)	4.00 (15.00)	3.68 (12.64)	4.80 (22.2)	5.96 (34.88)	75.8
7	T_3 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.64 (20.67)	3.67 (12.67)	5.86 (33.33)	5.98 (34.8)	4.44 (18.8)	7.39 (53.66)	62.7
8	T_4 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.40 (19.00)	3.36 (10.33)	5.47 (29.33)	4.59 (21.28)	4.61 (20.4)	6.48 (41.73)	71.0
9	Weed Free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice	2.75 (6.67)	1.73 (2.33)	3.13 (9.00)	2.76 (7.12)	1.73 (2.37)	3.11 (9.49)	93.4
10	Un-weeded check	7.3 (52.33)	7.97 (62.67)	10.76 (115.0)	8.02 (63.44)	9.02 (80.5)	12.04 (143.98)	--
--	S.Em.±	0.34	0.30	0.32	0.37	0.25	0.39	--
--	C.D. (p=0.05)	**1.02**	**0.90**	**0.94**	**1.10**	**0.74**	**1.15**	**--**
--	C.V. %	13.98	14.86	9.96	12.89	9.97	10.23	--

Data subjected to $\sqrt{(x+1)}$ transformation. Figures in parentheses are means of original values.

Table 6 BDAAG 167:Density and dry biomass of monocot, dicot, total weed and weed control efficiency (WCE) as influences by different treatments in *bidi* tobacco at harvest

S. No.	Treatments	Weed density (No./m^2)			Weed dry biomass (g/m^2)			WCE (%)
		Monocot	Dicot	Total	Monocot	Dicot	Total	
1	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre)	3.81 (13.67)	5.16 (26.00)	6.34 (39.67)	8.46 (70.72)	9.82 (95.88)	12.93 (166.6)	51.5
2	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)	2.72 (6.67)	3.43 (11.00)	4.27 (17.67)	3.83 (14.23)	7.73 (60.96)	8.63 (75.19)	78.1
3	Pre-plant application (3 DBP) of Sulfentrazone 28% +Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT)(1.5g/litre)	4.28 (17.67)	5.47 (29.33)	6.92 (47.00)	9.63 (93.13)	12.68 (161.06)	15.92 (254.19)	26.0
4	Pre-plant application (3 DBP) of Sulfentrazone 28%+Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT)(2.0g/litre)	3.77 (13.33)	4.22 (18.00)	5.65 (31.33)	4.74 (21.7)	13.56 (183.18)	14.34 (204.88)	40.4
5	T_1 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	3.82 (14.00)	6.07 (36.33)	7.14 (50.33)	4.96 (23.64)	12.15 (148.34)	13.09 (171.98)	50.0
6	T_2 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	2.85 (7.33)	3.83 (14.00)	4.70 (21.33)	3.81 (13.61)	9.12 (82.93)	9.84 (96.55)	71.9
7	T_3 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	7.49 (55.33)	5.53 (30.00)	9.28 (85.33)	7.06 (49.02)	13.46 (180.96)	15.18 (229.98)	33.1
8	T_4 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	4.14 (16.33)	4.63 (21.33)	6.18 (37.67)	6.07 (36.02)	10.82 (131.39)	12.49 (167.42)	51.3
9	Weed Free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice	2.02 (3.67)	2.23 (4.00)	2.89 (7.67)	2.76 (6.75)	4.95 (23.60)	5.60 (30.36)	91.2
10	Un-weeded check	8.14 (65.33)	7.53 (56.00)	11.05 (121.33)	7.62 (57.31)	16.93 (286.31)	18.55 (343.63)	--
	S.Em.±	0.37	0.49	0.41	0.39	1.09	0.99	--
	C.D. (p=0.05)	**1.11**	**1.45**	**1.22**	**1.15**	**3.24**	**2.94**	**--**
	C.V. %	15.01	17.57	11.01	11.35	16.97	13.56	--

Data subjected to $\sqrt{(x+1)}$ transformation. Figures in parentheses are means of original values.

Table 7 BDAAG 167: Yield attributes, cured leaf yield and weed index (WI) as influences by different treatments in *bidi* tobacco

Sr no.	Treatments	Plant height (cm)	Leaf length (cm)	Leaf width (cm)	Leaf thickness (gm/cm^2)	Cured leaf yield (kg/ha)	Weed Index (%)
1	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.25 kg a.i./ha (1.25 ml/litre)	86.87	54.45	25.16	14.63	2653	9.3
2	Pre-plant application (3 DBP) of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg a.i./ha (1.5 ml/litre)	88.33	55.40	27.13	16.14	2762	5.6
3	Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (1.5 g/litre)	84.13	55.20	25.80	15.41	2646	9.5
4	Pre-plant application (3 DBP) of Sulfentrazone 28% + Clomazone 30% WP @ 0.28 kg + 0.30 kg a.i./ha (Authority NXT) (2.0 g/litre)	84.07	54.80	26.02	14.87	2667	8.8
5	T_1 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	84.73	53.33	24.31	15.94	2648	9.5
6	T_2 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	86.73	52.27	25.09	16.39	2735	6.5
7	T_3 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	85.47	53.51	24.89	16.13	2244	23.3
8	T_4 + PoE application of Quizalofop ethyl 5 EC @ 50 g a.i./ha at 30 DATP	85.40	54.33	26.16	14.79	2729	6.7
9	Weed Free check (IC *fb* HW at 20 and 40 DATP) - Farmer's practice	90.87	56.53	27.80	16.57	2925	--
10	Un-weeded check	83.87	48.89	21.20	14.68	2105	28.0
	S.Em.±	2.81	2.31	1.63	0.74	182	--
	C.D. (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**--**
	C.V. %	5.7	7.4	11.2	8.2	12.1	--

NIPANI

Project No.: BDNAG 58

Research project title	**Integrated management of *Orobanche* in *bidi* tobacco**
Objectives of the project	▪ To find out the effect of integrated management practices on *Orobanche* infestation and growth ▪ To study the effect of integrated management practice of *Orobanche* on tobacco yield and quality
Investigators	Shivamurthy D, Sanjay B. Patil and Geeta Dandin
Year of start	2023-24 (Modified)
Year of completion	2025-26
Location	Agricultural Research Station, Nipani.

Treatment details: 10 (Ten)

S. No.	**Name of the Treatment**
1	Fallow-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*
2	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Neem oil on *Orobanche* spikes
3	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Pongamia oil on *Orobanche* spikes
4	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Paraquat on *Orobanche* spikes
5	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Imazethapyr on *Orobanche* spikes
6	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Glyphosate on *Orobanche* spikes
7	Green manuring of Black sesamum-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*
8	Green manuring of Sunnhemp-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*
9	Fallow-tobacco + Hand removal of *Orobanche*
10	Fallow-tobacco + Non removal of *Orobanche*

Design : RBD
Replications : Three
Plot size : 10 × 5 m

MATERIALS AND METHODS

A field experiment was conducted at ARS Nipani farm during the rainy (*kharif*) seasons of 2024-25. The soil was deep black soil having available N is medium, available phosphorus is low and available potassium is high and pH 7.2 to 7.5. The experiment was laid out in Randomized Complete Block Design, consisting of ten treatments and the treatments were replicated thrice. The tobacco variety NBD-316 was planted with a spacing pattern of 100 cm x 75 cm by using 25-30 days old seedling on 2nd September, 2024. The green Manure crops like Black sesamum and Sunnhemp crop grown one month prior to tobacco planting. The 50 per cent nitrogen and full dose of Phosphorus and potassium were applied during planting time and remaining 50 per cent applied 30-35 days after planting. The spike observation is taken after 75 days after planting.

RESULTS

There was a significant impact (Table 1 BDNAG) on the *bidi* tobacco leaf yield due to various treatment combinations. The application of neem cake or neem oil, pongamia or Imazethapy or glyphosate on *Orobanche* had significant effect in controlling *Orobanche* in tobacco as compared to treatment fallow-tabacco + non removal of *Orobanche* (T10). The treatment where Sunhemp was green manured before planting tobacco applied with neem cake at 30 DAP followed by hand removal of *Orobanche* produced maximum leaf yield of 1602 kg/ha as compared to fallow tobacco + Non removal of *Orobanche* (1127 kg/ha). This may be due to lesser number of *Orobanche* spikes and their weight. However, it was on par with the treatment where tobacco was planted on Green manuring of Black sesamum-tobacco + Neem cake application at 30 DAP + Hand removal of Orobanche (1554 kg/ha), Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Pongamia oil on *Orobanche* spikes (1509 kg/ha), Fallow-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche* (1469 kg/ha). Similar trend was followed in growth and yield parameters of *bidi* tobacco. The per cent spike reduction in treatment (T8) green manured before planting tobacco applied with neem cake at 30 DAP followed by hand removal of *Orobanche* over treatment (T10) Fallow-tobacco + Non removal of Orobanche is 64.4%.

Salient findings/Achievements

- In integrated management of *Orobanche* in *bidi* tobacco the treatment where Sunnhemp was green manured before planting tobacco with neem cake application to tobacco at 30 DAP followed by hand removal of *Orobanche* produced maximum leaf yield of 1602 kg/ha as compared to fallow tobacco + Non removal of *Orobanche* (1127 kg/ha).

Table 1 BDNAG 58: Growth, yield and yield components of *bidi* tobacco influenced by different treatments to control *Orobanche*

S. No.	Treatments	Tobacco leaf yield (kg/ha)	No. of *Orobanche* spikes /plant	No. of *Orobanche* spikes /ha	*Orobanche* weight (kg/ha)	Plant height (cm)	No. of leaves/ plant	Leaf length (cm)	Leaf width (cm)
T1	Fallow-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*	1469	4.5	5963	18.4	182.20	17	60.5	29.8
T2	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Neem oil on *Orobanche* spikes	1368	5.5	7288	22.8	175.0	17	56.8	26.5
T3	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Pongamia oil on *Orobanche* spikes	1509	3.3	4373	13.5	185.4	16	62.2	30.5
T4	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Paraquat on *Orobanche* spikes	1422	4.8	6360	20.5	181.0	17	58.3	29.0
T5	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Imazethapy on *Orobanche* spikes	1410	5.1	6758	21.2	178.3	17	58.0	28.7
T6	Fallow-tobacco + Neem cake application at 30 DAP + Post emergence application of Glyphosate on Orobanche spikes	1405	4.9	5818	22.0	179.2	16	57.5	27.7
T7	Green manuring of Black sesamum-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*	1554	3.5	4651	13.4	187.0	17	61.7	31.0
T8	Green manuring of Sunnhemp-tobacco + Neem cake application at 30 DAP + Hand removal of *Orobanche*	1602	3.1	4002	12.0	189.7	17	63.70	31.5
T9	Fallow-tobacco + Hand removal of *Orobanche*	1350	5.5	7288	23.5	168.0	16	55.47	25.9
T10	Fallow-tobacco + Non removal of *Orobanche*	1127	8.5	11263	35.5	152.5	14	48.6	21.5
	Mean	**1416.6**	**4.9**	**6576.4**	**20.3**	**176.9**	**16.4**	**58.2**	**28.0**
	S.Em.±	**65.1**	**0.65**	**166.5**	**4.21**	**6.5**	**0.98**	**1.61**	**0.71**
	C.D. (p=0.05)	**191.13**	**1.88**	**512.00**	**12.50**	**19.6**	**NS**	**4.22**	**2.26**
	CV (%)	**11.2**	**15.30**	**15.27**	**13.46**	**12.4**	**7.5**	**6.20**	**5.72**

Project No.: BDNAG 59 (a)

Research project title	**To study the impact of water logging on tobacco yield and quality**
Objectives of the project	▪ To find out the effect of water logging on growth and yield of tobacco ▪ To study the Impact of water logging on quality of tobacco
Investigators	Shivamurthy D, Sanjay B. Patil and Geeta Dandin
Year of start	2024-25
Year of completion	2025-26
Location	Agricultural Research Station, Nipani.

Treatment details:

I. Main Plot (Water stagnation period) (M)	II. Sub Plot (Ameliorative measures / Control measures) (S)
M_1: 2 days	S_1: Urea spray @1% after water stagnation
M_2: 4 days	S_2: Ammonium sulphate spray @1% after water stagnation
M_3: 6 days	S_3: KNO_3 spray @1% after water stagnation
	S_4: KNO_3 spray @2 % after water stagnation
	S_5: Control (No Control Measures)

MATERIALS AND METHODS

A field experiment was conducted at ARS Nipani farm during the rainy (kharif) seasons of 2024-25. The soil was deep black soil having available N is medium, available phosphorus is low and available potassium is high and pH 7.2 to 7.5. The experiment was laid out in split plot design, consisting of three main plot (Water stagnation period) (M) *viz.*, M_1: 2 days , M_2: 4 days and M_3: 6 days and five subplot (Control measures) viz., S1: Urea spray @1% after water stagnation, S2: Ammonium sulphate spray @1% after water stagnation, S3: KNO3 spray @1% after water stagnation, S4: KNO3 spray @2 % after water stagnation and S5: Control (No Control Measures) with three replications. The tobacco crop was NBD-316, planted with a spacing pattern of 100 cm x 75 cm by using 25-30 days old seedling. 50 per cent nitrogen and full dose of Phosphorus and potassium were applied during planting time and remaining 50 per cent applied 30-35 days after planting. The water logging treatment is given at 50-60 days after planting of tobacco and water given up to 2-3 inch height from ground continuously for 2, 4 and 6 days to M_1, M_2, and M_3 plot, respectively. Ameliorative measures / Control measures were taken after 2-3 days of water logging periods.

RESULTS

There was a significant impact on the *bidi* tobacco leaf yield due to water logging and various foliar sprays. Among the water logging treatment, the tobacco yield significantly reduces when the plants water logged for 6 days (1611 kg/ha) continuously as compared to water logging 2 days (1795 kg/ha) and 4 days (1750 kg/ha). The other growth parameters showed similar trends. With respect to foliar sprays, S_3: KNO_3 spray @1% after water stagnation and S_4: KNO_3 spray @2 % after water stagnation recorded significantly higher *bidi* tobacco yields (1768 kg/ha and 1755 kg/ha) as compared to control (no spray) treatment (1615 kg/ha). It was on par with foliar application of urea spray @1% after water stagnation and ammonium sulphate spray @1% after water stagnation. Similar trend were observed in other parameters.

Salient findings/Achievements

- The *bidi* tobacco yield significantly reduced when tobacco plant is water logged for 6 days continuously and less yield observed when tobacco crop under water logged either 2 days or 4 days. Among foliar sprays, KNO_3 foliar spray @1% after water stagnation and KNO_3 spray @ 2 % after water stagnation significantly recorded more yield as compared to control.

Table 1 BDNAG 59 (a): Response of water logging on Growth, yield and yield components of *bidi* tobacco.

Treatments	Tobacco leaf yield (kg/ha)	Plant height (cm)	No.of. leaves/ plant	Leaf length (cm)	Leaf width (cm)
Main Plot (M)					
M_1: 2 days	1795	195	17	68.5	34.5
M_2: 4 days	1750	190	17	66.5	34.2
M_3: 6 days	1611	184	17	64.5	34.0
Mean	1718.7	189.7	17.0	66.5	34.2
S.Em	56.1	2.4	0.8	2.1	0.8
C.D. (p=0.05)	169	7.3	NS	NS	NS
Sub Plot (S)					
S_1: Urea spray @1% after water stagnation	1680	188.5	17	67.0	33.9
S_2: Ammonium sulphate spray @1% after water stagnation	1712	189.9	17	67.7	33.7
S_3: KNO_3 spray @1% after water stagnation	1755	192.5	17	66.5	33.5
S_4: KNO_3 spray @2 % after water stagnation	1768	193.7	17	66.3	33.6
S_5: Control (No Control Measures)	1615	185.5	15	63.5	31.5
Mean	1706.0	190.0	16.6	66.2	33.2
S.Em.±	147.9	2.2	1.1	0.8	0.6
C.D. (p=0.05)	NS	6.8	NS	2.5	1.9
Interaction M x S					
S.Em.±	123.3	6.5	1.1	2.4	1.4
C.D. (p=0.05)	NS	NS	NS	NS	NS

Project No.: BDNAG 59 (b)

Research project title	**Response of tobacco to different Sowing windows**
Objectives of the project	▪ To find out the effect of different sowing windows on growth and yield of tobacco. ▪ To study the effect of different sowing windows on pest and disease incidence and economics of tobacco cultivation
Investigators	Shivamurthy D., Sanjay B. Patil and Geeta Dandin
Year of start	2024-25
Year of completion	2025-26
Location	Agricultural Research Station, Nipani

Treatment details:

S. No.	Treatments
1	T_1: Planting I fort night of August
2	T_2: Planting II fort night of August
3	T_3: Planting I fort night of September
4	T_4: Planting II fort night of September
5	T_5: Planting I fort night of October
6	T_6: Planting II fort night of October
7	T_7: Planting I fort night of November
8	T_8: Planting II fort night of November

MATERIALS AND METHODS

A field experiment was conducted at ARS Nipani farm during the rainy (kharif) seasons of 2024-25. The soil was deep black soil having available N is medium, available phosphorus is low and available potassium si high and pH 7.2 to 7.5. The experiment was laid out in Randomized Complete Block Design, consisting of eight treatments and the treatments were replicated thrice. Tobacco variety planting is NBD-316. The tobacco crop was planted with a spacing pattern of 100 cm x 75 cm by using 25-30 days old seedling. The first planting taken on 9thAugust and last planting was taken on 22nd November. The 50 per cent nitrogen and full dose of Phosphorus and potassium were applied during planting time and remaining 50 per cent applied 30-35 days after planting. During crop at initial period not observe the any pest or disease. However when crop at grand growth stage leaf curl and TMV disease is observed.

RESULTS

There was a significant impact on the *bidi* tobacco leaf yield due to various sowing window. The *bidi* tobacco planted during IInd fort night of August produced maximum leaf yield of 1710 kg/ha as compared to T5: Planting I fort night of October (1430 kg/ha), T6: Planting II fort night of October (1310 kg/ha), T7: Planting I fort night of November (900 kg/ha) and T8: Planting II fort night of November (750 kg/ha). The significant least yield observed in *bidi* tobacco planted during IInd fort night of November. This may be due to lesser number of leaves and plant height or intermodal length. It was on par with the treatment where tobacco was planted during Ist fort night of August (1675 kg/ha), Ist fort night of September (1690 kg/ha) and IInd fort night of September (1650 kg/ha). The per cent decrease in yield of tobacco when tobacco was plated during October and November month over planting of tobacco on August and September month is ranged 23to 56% less. The disease incidence was more when *bidi* tobacco planted during October and November month. Similar trend was followed in growth and yield parameters of *bidi* tobacco.

Salient findings/Achievements

- The *bidi* tobacco planted during IInd fort night of August produced maximum leaf yield of 1710 kg/ha as compared to *bidi* tobacco planted during I fort night of October (1430 kg/ha), II fort night of October (1310 kg/ha) and I fort night of November (900 kg/ha). Delayed planting of tobacco reduces the yield and increase the disease incidences.

Table 1 BDNAG-59 (b): Growth, yield and yield components of *bidi* tobacco influenced by different sowing windows

Sl. No.	Treatments	Tobacco leaf yield (kg/ha)	Plant height (cm)	No. of. leaves/ plant	Leaf length (cm)	Leaf width (cm)	Leaf curl (%)	TMV (%)
1	T1:Planting I fort night of August	1675	189.4	17	63.5	32.5	1.67	1.81
2	T2:Planting II fort night of August	1710	195	17	64.2	32.9	1.65	1.67
3	T3:Planting I fort night of September	1690	191.5	17	62.5	32.0	1.60	4.5
4	T4:Planting II fort night of September	1650	186.9	17	60.3	30.5	170	5.8
5	T5:Planting I fort night of October	1430	172.3	17	57.6	29.2	6.6	6.8
6	T6:Planting II fort night of October	1310	170.2	16	52.5	27.7	7.5	6.5
7	T7:Planting I fort night of November	900	161.8	14	48.7	25.0	11.5	10.1
8	T8:Planting II fort night of November	750	145.7	10	40.9	23.8	13.2	11.5
	Mean	1389	176.6	15.6	56.3	28.0	26.7	6.1
	S. Em.±	157.7	6.5	1.1	1.1	0.8	0.7	1.1
	C.D. (p=0.05)	475.1	19.7	NS	3.4	2.5	2.2	3.4
	CV (%)	13.2	12.4	8.5	10.2	8.5	7.5	10.1

Project No.: BDAAGC/ **BDNAGC/** BDNyAGC 1

Research project title	**Evaluation of pre and post emergence herbicides for weed management in Tobacco**
Objectives of the project	▪ To identify the suitable pre and post emergence herbicides for *Bidi* tobacco. ▪ To study the performance of pre and post emergence herbicides on weeds dynamics and crop growth and yield of *Bidi* tobacco
Investigators	Shivamurthy D., Sanjay B. Patil & Geeta Dandin
Year of start	2024-25
Year of completion	2025-26
Location	Agricultural Research Station, Nipani

Treatment details:

S.No.	Treatments
1	T_1: Pre-plant application (before 3DAP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/liter)
2	T_2: Pre- plant application of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg ai/ha (1.5 ml/liter)
3	T_3: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/liter)
4	T_4: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.40 kg ai/ha (2.0 g/liter)
5	T_5: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/liter) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha
6	T_6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha
7	T_7 :Pre-plant application of sulfentrazone28%+ Clomazone30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (1.5 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha
8	T_8 : Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha
9	T_9 :Two inter cultivation + Two hand weeding (Farmers practice)
10	T_{10} : Weed free check
11	T_{11} :Unweeded check

MATERIALS AND METHODS

A field experiment was conducted at ARS Nipani farm during the rainy (*kharif*) seasons of 2024-25. The soil was deep black soil having available N is medium, available phosphorus is low and available potassium is high and pH 7.2 to 7.5. The experiment was laid out in Randomized Complete Block Design, consisting of eleven treatments and the treatments were replicated thrice. The tobacco variety NBD-316 was planted with a spacing pattern of 100 cm x 75 cm by using 25-30 days old seedlings on 12th September. The 50 per cent nitrogen and full dose of Phosphorus and potassium were applied during planting time and remaining 50 per cent applied 30-35 days after planting. The pre emergent herbicide application is taken as per treatment and post emergent herbicide application is taken 30 days after planting.

RESULTS

There was a significant impact on the *bidi* tobacco leaf yield due to various pre and post emergence herbicides application in Tobacco. The significant highest yield was observed in weed free plot as compared to other treatments. Among herbicides treatments, The Pre- plant application of sulfentrazone 28% + Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha (T8) produced maximum leaf yield of 1654 kg/ha as compared to T11: Unweeded check (684 kg/ha), T1: Pre-plant application (before 3DAP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) (1170 kg/ha), T2: Pre- plant application of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg ai/ha (1.5 ml/litre) (1212 kg/ha), T3: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre) (1287 kg/ha) and T4: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.40 kg ai/ha (2.0 g/litre) (1328 kg/ha). It was at par with the application of Pre-plant application of sulfentrazone28%+ Clomazone30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (1.5 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha. Similar trend were followed in growth parameters.

The highest weed population and weed dry weight were observed in weedy plots as compared to other treatments. Among the herbicide treatment, lowest weed population were observed in The Pre- plant application of sulfentrazone 28% + Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha (T8) as compared to other treatments.

Salient findings/Achievements

- The Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha (T8) recorded significantly highest *bidi* tobacco yield and less number of weed population as compared to other treatments.

Table 1 BDAAGC/ **BDNAGC/** BDNyAGC 1**: Effect of weed management on growth, yield and yield components of *bidi* tobacco**

Treatments	Tobacco leaf yield (kg/ha)	Plant height (cm)	No. of leaves/ plant	Leaf length (cm)	Leaf width (cm)
T1: Pre-plant application (before 3 DBP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	1170	178.9	16	54.5	28.0
T2: Pre- plant application of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg ai/ha (1.5 ml/litre)	1212	180.0	17	55.7	28.1
T3: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	1285	180.5	17	56.1	29.0
T4: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.40 kg ai/ha (2.0 g/litre)	1328	181.0	17	57.2	29.5
T5: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	1425	183.0	17	59.2	31.2
T6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	1474	183.5	17	60.7	31.8
T7 :Pre-plant application of sulfentrazone28%+ Clomazone30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (1.5 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	1616	185.5	17	62.0	32.4
T8 : Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	1654	186.7	17	63.5	32.9
T9 :Two inter cultivation + Two hand weeding (Farmers practice)	1426	182.7	16	59.4	31.3
T10 : Weed free check	1734	187.5	17	64.7	33.6
T11 :Unweeded check	684	142.8	12	39.2	23.4
Mean	1364.4	179.3	16.4	57.5	30.1
S. Em.±	118.7	4.7	1.1	2.8	0.8
C.D. (p=0.05)	367.9	14.6	3.2	8.7	2.5
C.V. (%)	11.2	10.4	6.6	9.3	7.4

Table 2 BDAAGC/ **BDNAGC/** BDNyAGC 1**: Effect of weed management on weeds population in *bidi* tobacco**

Treatments	30 DAT			50 DAT			Weed dry weight g/m^2	
	No. Of monocots weeds/ m^2	No. of Dicots weeds/m^2	Total Weed/m^2	No. Of monocots weeds/ m^2	No. of Dicots weeds/m^2	Total Weed/m^2	30 DAT	50 DAT
T1: Pre-plant application (before 3DAP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	4.36 (18.0)	3.46 (11.0)	5.47 (29.0)	5.10 (26.)	4.69 (22.0)	6.93 (48.0)	4.95 (24.5)	6.76 (45.7)
T2: Pre- plant application of Sulfentrazone 39.6% SC (Authority) @ 0.30 kg ai/ha (1.5 ml/litre)	3.99 (15.0)	3.16 (9.0)	4.99 (24.0)	4.80 (23.)	4.47 (20.0)	6.56 (43.0)	4.49 (20.2)	6.20 (38.5)
T3: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	3.46 (11.0)	2.64 (6.0)	4.24 (17.0)	4.69 (22.)	3.61 (13.0)	5.92 (35.0)	3.54 (12.5)	5.59 (31.3)
T4: Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.40 kg ai/ha (2.0 g/litre)	2.99 (8.0)	2.22 (4.0)	3.60 (12.0)	4.47 (20.)	3.46 (12.0)	5.66 (32.0)	3.24 (10.5)	5.34 (28.5)
T5: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	4.24 (17.0)	3.31 (10.0)	5.38 (28.0)	3.61 (13.0z)	4.24 (18.0)	5.57 (31.0)	4.91 (24.1)	5.25 (27.6)
T6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3.87 (14.0)	2.99 (8.0)	4.79 (22.0)	3.32 (11.0)	4.01 (16.0)	5.20 (27.0)	4.38 (19.2)	4.91 (24.1)
T7 :Pre-plant application of sulfentrazone28%+ Clomazone30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (1.5 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3.46 (11.0)	2.44 (5.0)	4.11 (16.0)	(2.45 (6.0)	3.32 (11.0)	4.12 (17.0)	3.41 (11.6)	3.69 (13.6.)
T8 : Pre- plant application of sulfentrazone 28%+ Clomazone 30 WP (Authority NXT)@ 0.28kg +030 ai/ha (Authority NXT) ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3.1 (9.0)	1.98 (3.0)	3.60 (12.0)	2.24 (5.0)	3.02 (9.0)	3.74 (14.0)	2.86 (8.2)	3.39 (11.5)
T9 :Two inter cultivation + Two hand weeding (Farmers practice)	5.09 (25.0)	4.35 (18.0)	6.63 (43.0)	4.36 (19.0)	3.61 (13.0)	5.66 (32.0)	3.61 (13.0)	5.37 (28.8)
T10 : Weed free check	1.0 (0.0)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
T11 :Unweeded check	6.35 (39.0)	4.86 (23.0)	7.89 (62.0)	7.42 (55.0)	5.57 (31.0)	9.27 (86.0)	6.76 (45.7)	9.12 (83.1)
S.Em.±	0.8	0.6	0.9	0.8	0.5	1.1	0.7	1.1
C.D. (p=0.05)	2.5	2.0	2.8	2.6	1.8	3.4	2.2	3.2

Note: The data presented in parentheses are original value

NANDYAL

Project No.: BDNyAG 20

Research project title	**Study on identification of soil fertility status of *bidi* tobacco growing areas of Nandyal and Kurnool districts**
Objectives of the project	▪ To identify the soil fertility status of *bidi* tobacco fields Identification of deficit plant nutrients that limiting the *bidi* tobacco yield & quality ▪ To increase the overall *bidi* tobacco yield & quality in Kurnool district
Investigators	K. Satish Babu, P. Pullibai & Y.S. Satish Kumar
Year of start	2023-24
Year of completion	2026-27
Location	RARS, Nandyal

RESULTS

During 2024-25 conducted soil survey in each location of five villages and collection of 30 soil samples in each location i.e., 150 soil samples of each location. A total of 25 villages of five locations and 600 soil samples were collected of major *bidi* tobacco growing areas of Nandyal district and results revealed that

- All the soil samples were alkaline and non saline in nature.
- All the soil samples were low in organic carbon nature (O.C % <0.50 is low)
- All the samples were low in available Nitrogen.
- The soil is medium to high in available Phosphorous and hence, apply 1/4th Phosphorous less than the recommended dose of Phosphatic fertilizers.
- All the samples were high in available Potassium and hence apply 1/4th Potassium less than the recommended dose of Potassic fertilizers.
- Except Gadivemula remaining locations of soil samples were sufficient in Iron content. To correct the iron deficiencies apply 25 kg/ha as soil application and except Atmakur remaining locations of soil samples were sufficient in zinc content. To correct the zinc deficiencies apply 50 kg/ha as soil application. Manganese and copper all locations of soil samples were above the critical level.
- Nandikotkur recorded more cured leaf yield comparatively other villages and which is more or less equal to Kothapalli

Salient findings/Achievements

- During 2024-25, conducted soil survey and collected of soil samples in major *bidi* tobacco growing areas of Nandyal district and results revealed that Nandikotkur recorded more cured leaf yield comparatively other villages and which is more or less equal to Kothapalli.

Conclusion: During 2024-25, conducted soil survey and collected soil samples in major *bidi* tobacco growing areas of Nandyal district and results revealed that all the soil samples were alkaline, non saline in nature, low in organic carbon content, available nitrogen and medium to high in available phosphorous and high in available potassium. Except Gadivemula in the remaining locations of soil samples contains sufficient Iron content. Manganese and copper content in all locations soil samples were above the critical level. Nandikotkur recorded more cured leaf yield comparatively other villages and which is more or less equal to Kothapalli.

Table 1 BDNyAG 20: Physico chemical properties of soils of *bidi* tobacco growing areas of Kurnool district during 202-25

Location	pH	E.C (d s/m)	O.C (%)	N (Kg/ha)	P_2O_5 (Kg/ha)	K_2O (Kg/ha)
Gadivemula	8.16	0.07	0.30	178	58.4	537
Atmakur	7.86	0.06	0.33	166	50.2	531
Nandikotkur	8.21	0.07	0.30	189	62.2	494
Velugodu	8.02	0.06	0.36	184	60.4	521
Kothapalli	8.06	0.05	0.33	176	59.2	486

Table 2 BDNyAG 20: Micro nutrient status of soils of *bidi* tobacco growing areas of Kurnool district during 2024-25

Location	Iron (ppm)	Zinc (ppm)	Manganese (ppm)	Copper (ppm)
Gadivemula	4.62	0.55	11.67	5.88
Atmakur	5.17	0.42	9.86	7.26
Nandikotkur	5.10	0.56	8.24	6.12
Velugodu	5.13	0.67	11.23	8.22
Kothapalli	5.09	0.40	9.64	7.23

Table 3 BDNyAG 20: Location wise yields of *bidi* tobacco growing areas of Kurnool district during 2024-25

Location	Yields (kg/ha)
Gadivemula	1990
Atmakur	1950
Nandikotkur	2350
Velugodu	1950
Kothapalli	2100

Project No.: BDNyAG 21

Research project title	**Integrated Management of broomrape (*Orobanchespp*) in *bidi* tobacco**
Objectives of the project	▪ To study the effect of integrated management practices on control of *Orobanche.* ▪ To study the effect of different *Orobanche* management methods on cured leaf yield and quality of *bidi* tobacco. ▪ To study the effect of different *Orobanche* management methods on net returns.
Investigators	K. Satish Babu, P. Pullibai & Y.S. Satish Kumar
Year of start	2023-24
Year of completion	2026-27
Location	RARS, Nandyal

RESULTS

During 2024-25, the experiment conducted in randomized block design in three replications with spacing of 75 cm×75 cm using variety of Nandyal Pogaku-1 and results revealed that during *kharif* cultivation of sorghum which is sequence cropping with tobacco along with Neem cake application at 30 DAT and post-emergence application of Imazathapyr 1 ml/lit at 70 and 100 DAT on *Orobanche* spikes observed lowest number of *Orobanche* spikes per plant, higher plant height (70.9 cm), leaf length (49.6 cm), leaf width (24.2 cm),Dry weight/unit leaf area (11.8cm) and yield parameters like green leaf yield (13048 kg/ha) cured leaf yield (2425 kg/ha), net returns (Rs.161650/ha) and B:C ratio (2.14) which is significantly on par with Green manuring of black sesame- Tobacco, Neem cake application at 30 DAT and Hand removal of *Orobanche* and higher percent of *Orobanche* infestation, lower growth and yield parameters were observed in Fallow-Tobacco + Non removal of *Orobanche*. The leaf chemical parameters viz., nicotine, reducing sugars and chlorides differ significantly due to integrated management measures of *bidi* tobacco. The leaf chemical parameters were in permissible limits with nicotine ranging from 2.69 to 6.28 % whereas reducing sugars was from 1.81 to 4.43 % and chlorides from 1.56 to 2.04%.

Salient findings/Achievements

- Significantly higher growth, yield parameters, net returns and benefit cost ratio were recorded with cultivation of sorghum which is sequence cropping with tobacco along with Neem cake application at 30 DAT and post-emergence application of Imazathapyr 1 ml/lit at 70 and 100 DAT compared with fallow – tobacco and non removal of Orobanche

Conclusion: During kharif cultivation of sorghum which is sequence cropping with tobacco along with Neem cake application at 30 DAT and post-emergence application of Imazathapyr 1 ml/lit at 70 and 100 DAT on *Orobanche* spikes observed lowest number of Orobanche spikes per plant and recorded higher growth, yield parameters, high net returns and benefit cost ratio compared with fallow –tobacco and non removal of *Orobanche*.

Table 1 BDNyAG 21: *Orobanche* infestation as influenced by integrated management of broomrape in *bidi* tobacco during 2024-25

Treatments	Fresh weight (kg/plot)	Dry weight (kg/plot)	No. of spikes/plant
T1: Fallow –tobacco + neem cake application at 30 DAT+ Hand removal of *Orobanche*	1.74	0.48	6.5
T2: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of neem oil on *Orobanche* spikes	2.41	0.81	9.2
T3: Fallow –tobacco + Neem cake application at 30 DAT+ Post emergence application of pongamia oil on Orobanche spikes	2.21	0.61	9.0
T4: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	1.78	0.74	8.1
T5:Green manuring of black sesame – tobacco + Neem cake application at 30 DAT + hand removal of Orobanche	1.62	0.46	6.0
T6:Green manuring of sunhemp – tobacco + Neem cake application at 30 DAT+ hand removal of *Orobanche*	1.64	0.87	7.0
T7:Sorghum-tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	1.12	0.34	6.0.`
T8:Fallow –tobacco + Hand removal of *Orobanche*	2.08	0.75	9.1
T9: Fallow –tobacco + Non removal of *Orobanche*			
S. Em±	0.39	0.16	0.76
C.D. (P=0.05)	0.98	0.45	2.3
C.V. (%)	6.2	7.8	8.2

Table 2 BDNyAG 21: Growth parameters as influenced by Integrated Management practices of broomrape in *bidi* tobacco during 2024-25

Treatments	Plant height (cm)	Leaf length (cm)	Leaf width (cm)	Dry Wt. /unit Leaf area (mg/cm^2)
T1: Fallow –tobacco + neem cake application at30 DAT+ Hand removal of *Orobanche*	66.4	45.5	20.2	10.3
T2: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of neem oil on *Orobanche* spikes	57.7	32.3	17.6	9.3
T3: Fallow –tobacco + Neem cake application at 30 DAT+ Post emergence application of pongamia oil on *Orobanche* spikes	58.7	38.7	18.4	9.5
T4: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application ofImazathapyr on *Orobanche* spikes	61.8	41.9	19.9	9.7
T5:Green manuring of black sesame – tobacco + Neem cake application at 30 DAT + hand removal of *Orobanche*	69.7	48.9	23.6	11.5
T6:Green manuring of sunhemp – tobacco + Neem cake application at 30 DAT+ hand removal of *Orobanche*	69.3	47.3	22.4	10.9
T7:Sorghum-tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	70.9	49.6	24.2	11.8
T8:Fallow –tobacco + Hand removal of *Orobanche*	64.2	42.5	20.6	9.9
T9: Fallow –tobacco + Non removal of *Orobanche*	36.7	21.5	14.4	6.9
S. Em.±	1.8	0.6	1.4	0.8
C.D. (p=0.05)	4.5	1.9	3.9	2.1
C.V. (%)	9.2	8.8	9.6	8.4

Table 3BDNyAG 21: Yield parameters as influenced by Integrated Management of broomrape in *bidi* tobacco during 2024-25

Treatments	Green leaf Yield (kg/ha)	Cured Leaf Yield (kg/ha)
T1: Fallow –tobacco + neem cake application at30 DAT+ Hand removal of *Orobanche*	11548	2276
T2: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of neem oil on *Orobanche* spikes	9925	1848
T3: Fallow –tobacco + Neem cake application at 30 DAT+ Post emergence application of pongamia oil on *Orobanche* spikes	10327	1920
T4: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	10848	1991
T5:Green manuring of black sesame – tobacco + Neem cake application at 30 DAT + hand removal of *Orobanche*	12348	2312
T6:Green manuring of sunhemp – tobacco + Neem cake application at 30 DAT+ hand removal of *Orobanche*	12688	2205
T7:Sorghum-tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	13048	2425
T8:Fallow –tobacco + Hand removal of Orobanche	11054	2046
T9: Fallow –tobacco + Non removal of *Orobanche*	6706	1431
S. Em.±	280.5	45.6
C.D. (p=0.05)	645.6	129.2
C.V. (%)	11.8	10.6

Table 4 BDNyAG 21: Economics as influenced by integrated management of broomrape in *bidi* tobacco during 2024-25

Treatments	Cured leaf yield (kg/ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	B:C ratio
T1: Fallow –tobacco + neem cake application at30 DAT+ Hand removal of *Orobanche*	2,276	2,84,500	1,39,785	1.97
T2: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of neem oil on *Orobanche* spikes	1,848	2,31,000	8,6285	1.60
T3: Fallow –tobacco + Neem cake application at 30 DAT+ Post emergence application of pongamia oil on *Orobanche* spikes	1,,920	2,40,000	9,4900	1.65
T4: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	1991	2,48,875	1,03,875	1.72
T5:Green manuring of black sesame – tobacco + Neem cake application at 30 DAT + hand removal of *Orobanche*	2,312	2,89,000	1,47,525	2.04
T6:Green manuring of sunhemp – tobacco + Neem cake application at 30 DAT+ hand removal of *Orobanche*	2,205	2,75,625	1,31,150	1.91
T7:Sorghum-tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	2,425	3,03,125	1,61,650	2.14
T8:Fallow –tobacco + Hand removal of *Orobanche*	2,046	2,55,750	1,16,275	1.83
T9: Fallow –tobacco + Non removal of *Orobanche*	1,431	1,78,,875	53,875	1.43

Table 5 BDNyAG 21: Leaf chemical quality as influenced by Integrated Management of broomrape in *bidi* tobacco during 2024-25

Treatments	Nicotine (%)	R. Sugars (%)	Chlorides (%)
T1: Fallow –tobacco + neem cake application at30 DAT+ Hand removal of *Orobanche*	4.02	3.12	1.81
T2: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of neem oil on *Orobanche* spikes	4.90	2.11	1.90
T3: Fallow –tobacco + Neem cake application at 30 DAT+ Post emergence application of pongamia oil on *Orobanche* spikes	5.65	2.20	2.04
T4: Fallow –tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	4.37	3.55	1.70
T5:Green manuring of black sesame – tobacco + Neem cake application at 30 DAT + hand removal of *Orobanche*	6.04	1.81	1.88
T6:Green manuring of sunhemp – tobacco + Neem cake application at 30 DAT+ hand removal of *Orobanche*	6.28	1.88	1.64
T7:Sorghum-tobacco + Neem cake application at 30 DAT + Post emergence application of Imazathapyr on *Orobanche* spikes	5.76	2.53	1.84
T8:Fallow –tobacco + Hand removal of Orobanche	4.23	2.57	1.56
T9: Fallow –tobacco + Non removal of *Orobanche*	2.69	4.43	1.97
S. Em.±	0.29	0.11	0.01
C.D. (p=0.05)	0.90	0.34	NS
C.V. (%)	9.9	7.8	9.6

Project No.: BDAAGC/ BDNAGC/ **BDNyAGC 1**

Research project title	**Evaluation of pre and post emergence herbicides for weed management in *bidi* tobacco**
Objectives of the project	▪ To identify the suitable pre-and post-emergence herbicides for bidi tobacco ▪ To know the performance of pre-and post-emergence herbicides on weed dynamics and crop growth and yield of bidi tobacco
Investigators	K. Satish Babu and P. Pullibai
Year of start	2024-25
Year of completion	2026-27
Location	RARS, Nandyal

RESULTS

During 2024-25 the experiment conducted in randomized block design in three replications with spacing of 75 cm×75 cm using variety of Nandyal Pogaku-1. Weed free check recorded higher plant height (68.8 cm), leaf length (43.8 cm), leaf width (20.6 cm), Dry weight/unit leaf area (9.2) and cured leaf yield (3523 kg/ha) and also recorded lower weed density, dry weight and higher weed control efficiency. Among the herbicidal treatments Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha recorded higher plant height (65.2 cm), leaf length (41.6 cm), leaf width (18.8 cm), Dry weight/unit leaf area (8.3) and cured leaf yield (3156 kg/ha) whereas net returns (Rs.304625/ha) and B:C ratio (3.38) recorded with two inter cultivation + two hand weeding (Farmers practice). The leaf chemical parameters viz., nicotine, reducing sugars and chlorides differ significantly due to weed management practices of *bidi* tobacco. The leaf chemical parameters were in permissible limits with nicotine ranging from 2.90 to 7.11% whereas reducing sugars was from 1.43 to 2.91% and chlorides from 1.26 to 2.20%.

Sailent findings/Achievements

- Significantly higher growth, yield parameters, lower weed density, dry weight and higher weed control efficiency, whereas net returns and B:C ratio recorded with two inter cultivation + Two hand weeding (Farmers practice)

Conclusion: Weed free check recorded higher growth, yield parameters, and also recorded lower weed density, dry weight and higher weed control efficiency, whereas net returns and B:C ratio recorded with two inter cultivation + Two hand weeding (Farmers practice).

Table 1 BDAAGC/ BDNAGC/ **BDNyAGC 1: Growth parameters as influenced by weed management practices in *bidi* tobacco during 2024-25**

Treatments	Plant height (cm)	Leaf length (cm)	Leaf width (cm)	Dry Wt. /unit Leaf area (mg/cm^2)	Cured Leaf Yield (kg/ha)
T_1: Pre-plant application (before 3 DBP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	60.6	36.2	16.3	7.0	3010
T_2: Pre- plant application of Sulfentrazone 39.6% SC(Authority) @ 0.30 kg a.i/ha (1.5 ml/litre)	62.1	37.8	17.0	7.3	3019
T_3:Pre-plant application of sulfentrazone28%+Clomazone30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	52.6	31.8	14.0	6.0	2380
T_4: Pre- plant application of sulfentrazone28%+Clomazone30 WP (Authority NXT)@ 0.40 kg ai/ha(2.0 g/litre)	53.6	32.6	14.4	6.4	2573
T_5:Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Postemergence (PoE)application of Quizalofop ethyl 5 EC @ 50 g ai/ha	63.6	39.8	17.6	7.9	3036
T_6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	65.2	41.6	18.8	8.3	3156
T_7 : Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.30kgai/ha (1.5g/litre) + Post emergence (PoE)application of Quizalofopethyl 5 EC @ 50 g ai/ha	54.6	33.0	14.8	6.6	2762
T_8 : Pre- plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.40kg ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 gai/ha	56.6	34.0	15.8	6.8	2985
T_9 :Two inter cultivation + Two hand weeding (Farmers practice)	67.6	43.2	20.0	8.8	3461
T_{10} :Weed free check	68.8	43.8	20.6	9.2	3523
T_{11} :Unweeded check	34.6	25.8	10.8	4.2	885
S.Em±	3.24	1.87	0.89	0.40	175.29
CD (P=0.05)	9.56	5.51	2.63	1.18	517.11
CV(%)	9.51	9.40	9.52	9.60	10.85

Table 2 BDAAGC/ BDNAGC/ **BDNyAGC 1: Weed density (No. /m^2), weed dry weight (g/m^2) and weed control efficiency (%) as influenced by weed management practices in *bidi* tobacco during 2024-25**

Treatments	Weed density (No./m^2)		Weed dry weight (g/m^2)		Weed control efficiency (%)	
	60 DAT (No./m^2)	At Harvest (No./m^2)	60 DAT (g/m^2)	Harvest (g/m^2)	60 DAT (%)	Harvest (%)
T_1: Pre-plant application (before 3 DBP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	2.5 (6.0)	2.7 (7.0)	3.3 (9.8)	2.9 (11.0)	92.3	96.4
T_2: Pre- plant application of Sulfentrazone 39.6% SC(Authority) @ 0.30 kg ai/ha (1.5 ml/litre)	2.3 (5.0)	2.5 (6.0)	3.4 (9.2)	2.5 (7.2)	92.4	96.5
T_3:Pre-plant application of Sulfentrazone 28%+Clomazone30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	3.2 (10.0)	3.5 (12.0)	3.6 (13.2)	3.5 (9.8)	91.2	95.5
T_4: Pre- plant application of Sulfentrazone 28%+Clomazone30 WP (Authority NXT)@ 0.40 kg ai/ha(2.0 g/litre)	2.9 (8.0)	3.1 (9.0)	3.6 (9.7)	3.1 (8.6)	91.4	95.6
T_5:Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Postemergence (PoE)application of Quizalofop ethyl 5 EC @ 50 g ai/ha	2.7 (7.0)	2.9 (8.0)	3.7 (13.2)	2.7 (7.3)	89.6	94.4
T_6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	2.2 (6.0)	2.6 (7.0)	3.2 (9.9)	2.5 (7.0)	89.3	94.3
T_7:Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.30kgai/ha (1.5g/litre) + Post emergence (PoE)application of Quizalofopethyl 5 EC @ 50 g ai/ha	3.1 (9.0)	3.2 (10.0)	4.1 (16.2)	3.2 (13.1)	87.3	93.4
T_8:Pre- plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.40kg ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 gai/ha	2.9 (8.0)	3.1 (9.0)	3.9 (14.6)	3.1 (12.0)	88.5	93.9
T_9 :Two inter cultivation + Two hand weeding (Farmers practice)	2.1 (4.0)	1.6 (2.0)	0.7 (1.0)	1.6 (2.3)	100.0	98.8
T_{10} :Weed free check	1.6 (2.0)	0.7 (0.0)	0.7 (0.0)	0.7 (0.0)	100.0	100.0
T_{11} :Unweeded check	6.3 (39.0)	6.7 (44.0)	11.3 (12.73)	14.1 (19.74)	0.0	0.0
S.Em±	0.19	0.08	0.18	1.11	-	-
CD (P=0.05)	0.56	0.25	0.52	3.26	-	-
CV (%)	6.70	4.42	5.07	8.46	-	-

Table 3 BDAAGC/ BDNAGC/ **BDNyAGC 1: Economics as influenced by weed management practices in *bidi* tobacco (2024-25)**

Treatments	Cured leaf yield (kg/ha)	Gross returns (Rs./ha)	Net returns (Rs./ha)	B:C ratio
T_1: Pre-plant application (before 3 DBP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	3,010	3,76,250	2,49,600	2.97
T_2:Pre- plant application of Sulfentrazone 39.6% SC(Authority) @ 0.30 kg ai/ha (1.5 ml/litre)	3,019	3,77,375	2,50,625	2.98
T_3:Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	2,380	2,97,500	1,70,650	2.35
T_4:Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.40 kg ai/ha (2.0 g/litre)	2,573	3,21,625	1,94,675	2.53
T_5:Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Post emergence (PoE)application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3,036	3,,79,500	2,52,450	2.99
T_6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3,156	3,94500	2,69,350	3.15
T_7:Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.30kgai/ha (1.5g/litre) + Post emergence (PoE)application of Quizalofopethyl 5 EC @ 50 g ai/ha	2,762	3,45,250	2,180,00	2.71
T_8:Pre- plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.40kg ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 gai/ha	2,985	3,73,125	2,45,775	2.93
T_9 :Two inter cultivation + Two hand weeding (Farmers practice)	3,461	4,32,625	3,04,625	3.38
T_{10} :Weed free check	3,523	4,40,375	2,98,375	3.10
T_{11} :Unweeded check	885	1,10,625	-14,375	0.89

Table 4 BDAAGC/ BDNAGC/ **BDNyAGC 1: Leaf chemical quality as influenced by weed management practices in *bidi* tobacco during 2024-25**

Treatments	Nicotine (%)	Reducing sugars (%)	Chlorides (%)
T_1: Pre-plant application (before 3 DBP) of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre)	5.05	1.77	2.14
T_2:Pre- plant application of Sulfentrazone 39.6% SC(Authority) @ 0.30 kg ai/ha (1.5 ml/litre)	4.31	2.40	2.11
T_3:Pre-plant application of sulfentrazone28%+Clomazone30 WP (Authority NXT) @ 0.30 kg ai/ha (1.5 g/litre)	4.01	2.91	2.20
T_4: Pre- plant application of sulfentrazone28%+Clomazone30 WP (Authority NXT)@ 0.40 kg ai/ha(2.0 g/litre)	4.78	1.73	2.14
T_5:Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.25 ml/litre) + Post emergence (PoE)application of Quizalofop ethyl 5 EC @ 50 g ai/ha	4.49	1.52	1.81
T_6: Pre- plant application of Sulfentrazone 39.6% SC @ 0.25kg ai/ha (1.5 ml/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	3.85	1.92	2.07
T_7:Pre-plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.30kgai/ha (1.5g/litre) + Post emergence (PoE)application of Quizalofopethyl 5 EC @ 50 g ai/ha	3.83	2.09	1.70
T_8:Pre- plant application of sulfentrazone 28% + Clomazone30 WP (Authority NXT)@ 0.40kg ai/ha (2.0 g/litre) + Post emergence (PoE) application of Quizalofop ethyl 5 EC @ 50 g ai/ha	6.16	2.04	1.86
T_9 :Two inter cultivation + Two hand weeding (Farmers practice)	6.98	1.58	1.40
T_{10} :Weed free check	7.11	1.43	1.26
T_{11} :Unweeded check	2.90	2.59	1.72
S. Em±	0.22	0.11	0.10
CD (P=0.05)	0.67	0.36	0.32
CV (%)	8.3	9.6	9.1

C. *RUSTICA* TOBACCO

ANAND

Project No.: RUAAG 23

Research project title	**Evaluation of different fertilizer doses on growth, yield and quality of *rustica* tobacco grown in middle Gujarat**
Objectives of the project	▪ To study the effect of different fertilizer doses on growth and cured leaf yield of *rustica* tobacco varieties ▪ To study the effect of different fertilizer doses on leaf quality and nutrient uptake pattern of *rustica* tobacco varieties
Investigators	Jalpa Panchal & N. J. Jadav
Year of start	2023-24
Year of completion	2025-26
Location	BTRS, AAU, Anand

Introduction: Potassium is essential for healthy normal growth of tobacco plants and is known as an element of quality in terms of leaf color, texture and combustibility. Leaf produced with high K is smooth and thin with improved fire holding capacity, compared to the one produced under low potassium supply. Maintaining an adequate P concentration in the soil solution is necessary for improved yield and quality of tobacco. In general, soils used for tobacco production in middle Gujarat are low to medium in available phosphorus. Phosphorus deficiency results in stunted growth, poor leaf expansion and unusually dark-green leaves. Research work was not explored on P and K requirement for *rustica* tobacco in middle Gujarat conditions. Hence, this study will be under taken to evaluate different fertilizer doses on growth, yield and quality of *rustica* tobacco grown in middle Gujarat.

Design	:	RBD (Factorial)	**Spacing**	:	60 × 45 cm
Replication	:	Three	**Fertilizer kg/ha**	:	As per treatment
Crop	:	*Rustica* Tobacco	**Plot size**	:	3.6 × 5.4 m

NOTE: Nitrogen was applied in four equal splits; 1st as basal and remaining three splits each at 30 days interval after transplanting. Whereas, phosphorus was applied at the time of transplanting and potassium was applied in two equal splits 1st at the time of transplanting and 2nd at 30 DATP.

Treatments: 2 x 5 =10 combinations

A) Variety (V)	**(B) Fertilizer dose (F) (kg/ha)**
V1 = GC 1	F_1 = 200-00-00 NPK
V2 = GCT 3	F_2 = 200-50-00 NPK
	F_3 = 200-00-50 NPK
	F_4 = 200-50-50 NPK
	F_5 = 200-100-100 NPK

Observations:

1. Plant height (cm) at Harvest
2. Leaf length (cm) at harvest
3. Leaf width (cm) at harvest
4. Cured leaf yield (kg/ha)
5. Dry weight per unit leaf area (mg/cm^2) at harvest
6. Quality parameters (Nicotine, Reducing sugar and Chloride contents)
7. Initial and final soil status (EC, pH, OC and available P and K)
8. Nutrient uptake (N, P_2O_5 and K_2O)

9. Year wise cultural practices:			
		First year (2023-24)	**Second year (2024-25)**
(a)	Date of Transplanting	08.11.2023	12.11.2024
(b)	Date of harvesting	12.03.2024	12.03.2025
(c)	No. of irrigations	7	6
(d)	No. of weeding	3	4
(e)	No. of inter culturing	3	3
(f)	Annual rainfall (mm)	978.6	1188.4

RESULTS (Pooled)

Yield : The data presented in Table 1 RUAAG 23 revealed that *rustica* tobacco variety GCT 3 recorded significantly the highest tobacco cured leaf yield of 2796 kg/ha in year 2023-24. Variety GC 1 recorded significantly the highest tobacco cured leaf yield of 2253 kg/ha in year 2024-25. While in pooled result, cured leaf yield was not influenced significantly due to varieties. With regard to fertilizer doses, they did not show significant result on cured leaf yield during 2023-24, 2024-25 and also in its pooled. Interaction effect between variety and fertilizer was found non-significant for cured leaf yield during years 2023-24 and 2024-25 as well as in pooled result.

Yield attributes: The results depicted in Table 2, 3 and 9 RUAAG 23 indicated that *rustica* tobacco varieties exert their significant effect on leaf length during years 2023-24 and 2024-25 but not in pooled result. GCT 3 produced the highest leaf length in year 2023-24 whereas GC 1 produced the highest leaf length in year 2024-25. Leaf width was registered significantly the highest in variety GC 1 during years 2023-24, 2024-25 and its pooled results. Plant height and dry weight per unit leaf area were not affected significantly due to varieties during both the years and in its pooled. In case of fertilizer doses, none of yield attributes influenced significantly due to different fertilizer doses during both the years and in its pooled also. Interaction effect between varieties and fertilizers showed their significant effect on leaf length and plant height in pooled result. Wherein, treatment combination V_2F_5 gave significantly higher leaf length compared to V_1F_1, V_2F_2, V_1F_3 and V_1F_4. While, V_2F_3 gave higher plant height which was remained at par with V_2F_1, V_2F_4 and V_2F_5 treatment combinations.

Quality parameters: Two years and its pooled data presented in Table 4 and 10 RUAAG 23 revealed that non-significant result was found on nicotine, reducing sugar and chloride contents due to varieties during 2023-24, 2024-25 and in its pooled. With regard to fertilizer doses, nicotine content was influenced significantly during both the years and in its pooled. It was observed higher with application of 200-100-100 kg

NPK/ha and remained at par with application of 200-00-00 and 200-50-50- kg NPK/ha in pooled result. Reducing sugar was registered significantly higher with application of 200-00-00 kg NPK/ha and remained at par with 200-50-00 and 200-00-50 kg NPK/ha in pooled. Chloride content was not affected significantly due to fertilizers in pooled result. Interaction effect between varieties and fertilizers showed their significant effect on reducing sugar content in pooled result. Wherein, treatment combination V_2F_2 gave significantly higher reducing sugar content which was remained at par with V_1F_1, V_2F_1, V_1F_5 and V_2F_3.

Soil chemical parameters: Experimental results depicted in Table 5, 6 and 11 RUAAG 23 revealed that soil pH, EC and organic carbon were not influenced significantly due to varieties and fertilizer doses during years 2023-24, 2024-25 and in pooled. Available phosphorus and potash contents were not influenced significantly due to varieties during year 2023-24 and 2024-25 but in pooled results, significantly the highest available phosphorus was observed due to varieties. Among fertilizer doses, application of 200-100-100 kg NPK/ha recorded significantly the highest available phosphorus and potash during year 2023-24, 2024-25 and also in its pooled. It was remained at par with application of 200-50-50 kg NPK/ha for available phosphorus in pooled. Interaction effect between varieties and fertilizers found non-significant for all soil parameters except, organic carbon content and available potash in pooled result. Wherein, treatment combination V_1F_4 recorded significantly higher soil organic carbon content but it was remained at par with treatment combinations V_1F_5, V_2F_3 and $V_2F_{5.}$ Treatment combination V_2F_5 recorded significantly higher available potash of soil but it was remained at par with treatment combination $V_1F_{5.}$

Plant nutrient contents and their uptake: Experimental results summarized in Table 7 and 12 RUAAG 23 revealed that nitrogen content was not significantly influenced due to both varieties and fertilizer doses during year 2023-24 and 2024-25 In pooled, significantly the highest nitrogen content was registered in variety GCT 3. Significantly the highest phosphorus content was observed in GCT 3 during 2023-24, 2024-25 and in pooled. Significantly the highest potash content was observed in GCT 3 during 2024-25 and in pooled. Phosphorus and potash contents were observed significantly higher with application of 200-100-100 kg NPK/ha during both the year and in its pooled. But it was remained at par with treatments F_2 for phosphorus content and F_3 for potash content in pooled result.

Results depicted in Table 8 and 12 RUAAG 23 revealed that significantly the highest nitrogen uptake by *rustica* tobacco variety GCT 3 was observed during 2023-24 while GC 1 during 2024-25. In pooled, n uptake by tobacco variety was found non-significant. Nitrogen uptake was not influenced significantly due to fertilizers during both the year and in its pooled. Significantly the highest phosphorus and potash uptakes were observed in variety GCT 3 during 2023-24 but non-significant result found in 2024-25 and in pooled. Significantly higher phosphorus and potash uptake by tobacco varieties were found with application of 200-100-100 kg NPK/ha in 2024-25 and in pooled. Wherein, it was remained at par with application of 200-50-00 kg NPK/ha for phosphorus uptake and 200-00-50 kg NPK/ha for potash uptake in pooled. Interaction effect between varieties and fertilizers showed their significant effect on phosphorus and potash contents in pooled results. Wherein, significantly higher phosphorus content was noticed under treatment combination V_2F_2 and it was remained at par with V_2F_4, V_2F_5 andV_1F_5 while treatment combination V_2F_5 recorded significantly higher potash content and it was remained at par with V_2F_3 and V_1F_5 treatment combinations.

Economics: Economics worked out and presented in Table 13 RUAAG 23 revealed that maximum net return and BCR value was found while grown *rustica* tobacco variety GC 1. However, application of $N:P_2O_5:K_2O$ @ 200:50:00 kg/ha gave maximum net realization and BCR closely followed by 200:00:00 NPK kg/ha.

Conclusion: Looking to the above results, it can be concluded that *rustica* tobacco varieties did not show significant superiority for cured leaf yield and quality parameters but variety GCT-3 found significantly superior over GC 1 with the highest contents of N, P and K in leaves. However, application of fertilizer doses did not show their significant effect on cured leaf yield but application of $N:P_2O_5:K_2O$ @ 200-100-100 kg/ha found significantly higher nicotine, phosphorus and potash contents in *rustica* tobacco leaves. Application of fertilizers 200-50-00 and 200-00-00 kg NPK/ha found more economical with maximum net realization and BCR value than rest of fertilizer doses.

Table 1 RUAAG 23: Effect of varieties and fertilizers on cured leaf yield of *rustica* tobacco

Treatment	Cured leaf yield (kg/ha)		
	2023-24	2024-25	Pooled
Varieties (V)			
V_1: GC 1	2522	2253	2387
V_2: GCT 3	2796	1953	2374
S. Em.±	72	56	202
C.D.(p=0.05)	214	165	NS
Fertilizers (F)			
F_1: 200-00-00 NPK	2615	2101	2358
F_2: 200-50-00 NPK	2589	2338	2463
F_3: 200-00-50 NPK	2639	2021	2330
F_4: 200-50-50 NPK	2673	1962	2318
F_5: 200-100-100 NPK	2779	2092	2436
S. Em.±	114	88	72
C.D.(p=0.05)	NS	NS	NS
V x F Int.	NS	NS	NS
CV %	10.5	10.2	10.4
Y	--	--	130
Y x V	--	--	184
Y x F	--	--	NS
Y x V x F	--	--	NS

Table 2 RUAAG 23: Effect of varieties and fertilizers on leaf length and width of *rustica* tobacco

Treatment	leaf length (cm)			leaf width (cm)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)						
V1: GC 1	31.04	27.32	29.18	27.36	20.87	24.11
V2: GCT 3	**34.**99	24.48	29.73	22.26	14.68	18.47
S. Em.±	0.67	0.76	2.40	0.75	0.68	0.51
C.D. (p=0.05)	1.98	2.25	NS	2.23	2.02	1.45
Fertilizers (F)						
F1: 200-00-00 NPK	33.89	24.81	29.35	26.10	17.30	21.70
F2: 200-50-00 NPK	30.37	26.28	28.32	21.93	19.10	20.52
F3: 200-00-50 NPK	32.21	26.26	29.23	23.60	17.81	20.70
F4: 200-50-50 NPK	33.58	24.18	28.88	25.90	15.97	20.93
F5: 200-100-100 NPK	35.02	27.97	31.49	26.52	18.70	22.61
S. Em.±	1.06	1.20	0.80	1.19	1.08	1.40
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS
V x F Int.	NS	NS	Sig.	NS	NS	NS
CV %	7.8	11.3	9.4	11.7	14.8	13.0
Y	--	--	1.45	--	--	1.45
Y x V	--	--	2.05	--	--	NS
Y x F	--	--	NS	--	--	3.25
Y x V x F	--	--	NS	--	--	NS

Table 3 RUAAG 23: Effect of varieties and fertilizers on plant height and dry weight per unit leaf area of *rustica* tobacco

Treatment	Plant height (cm)			Dry weight per unit leaf area (mg/cm^2)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)						
V_1: GC 1	41.97	38.13	42.31	12.89	12.57	12.73
V_2: GCT 3	51.17	41.01	40.18	12.02	12.92	12.47
S. Em.±	1.01	1.19	2.24	0.34	0.33	0.24
C.D. (p=0.05)	3.00	NS	NS	NS	NS	NS
Fertilizers (F)						
F_1: 200-00-00 NPK	47.16	37.47	42.31	13.26	11.98	12.62
F_2: 200-50-00 NPK	42.33	38.03	40.18	12.22	13.59	12.91
F_3: 200-00-50 NPK	46.93	41.50	44.22	12.02	13.41	12.72
F_4: 200-50-50 NPK	49.47	40.87	45.17	11.31	13.06	12.18
F_5: 200-100-100 NPK	46.95	40.00	43.47	13.47	11.68	12.57
S. Em.±	1.60	1.88	1.23	0.54	0.52	0.84
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS
V x F Int.	NS	NS	Sig.	NS	NS	NS
CV %	8.4	11.6	9.9	10.6	9.9	10.2
Y	--	--	2.24	--	--	NS
Y x V	--	--	3.17	--	--	NS
Y x F	--	--	NS	--	--	1.51
Y x V x F	--	--	NS	--	--	NS

Table 4 RUAAG 23: Effect of varieties and fertilizers on quality parameters of *rustica* tobacco

Treatment	Nicotine (%)			Reducing sugar (%)			Chloride (%)		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)									
V_1: GC 1	5.78	5.52	5.65	5.30	4.66	4.98	1.07	1.01	1.04
V_2: GCT 3	5.79	5.46	5.63	5.39	4.68	5.04	1.10	1.04	1.07
S. Em.±	0.07	0.08	0.05	0.08	0.07	0.05	0.02	0.01	0.01
C.D. (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Fertilizers (F)									
F_1: 200-00-00 NPK	6.05	5.39	5.72	5.64	4.74	5.19	1.06	1.05	1.05
F_2: 200-50-00 NPK	5.56	5.20	5.38	5.48	4.76	5.12	1.01	1.03	1.02
F_3: 200-00-50 NPK	5.74	5.44	5.59	5.15	4.82	4.98	1.11	1.05	1.08
F_4: 200-50-50 NPK	5.76	5.60	5.67	5.20	4.45	4.83	1.10	1.06	1.08
F_5:200-100-100NPK	5.83	5.85	5.84	5.24	4.60	4.92	1.13	0.93	1.03
S. Em.±	0.10	0.13	0.08	0.13	0.11	0.08	0.03	0.02	0.04
C.D. (p=0.05)	**0.31**	**0.39**	**0.24**	**NS**	**NS**	**0.24**	**NS**	**0.07**	**NS**
V x F Int.	**NS**	**NS**	**NS**	**NS**	**NS**	**Sig.**	**NS**	**NS**	**NS**
CV %	4.4	5.9	5.1	5.8	5.8	5.8	7.0	5.4	6.3
Y	--	--	0.15	--	--	0.15	--	--	0.03
Y x V	--	--	**NS**	**--**	**--**	**NS**	**--**	**--**	**NS**
Y x F	--	--	**NS**	**--**	**--**	**NS**	**--**	**--**	**0.08**
Y x V x F	--	--	**NS**	**--**	**--**	**NS**	**--**	**--**	**NS**

Table 5 RUAAG 23: Effect of varieties and fertilizers on soil chemical parameters of *rustica* tobacco

Treatment	pH			EC (ds/m)			Organic carbon (%)		
Initial Value	7.61			0.19			0.37		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)									
V_1: GC 1	7.98	7.99	7.99	0.24	0.23	0.23	0.46	0.63	0.54
V_2: GCT 3	7.96	8.03	7.99	0.23	0.22	0.22	0.47	0.64	0.55
S. Em.±	0.03	0.02	0.02	0.004	0.004	0.003	0.01	0.01	0.01
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fertilizers (F)									
F_1: 200-00-00 NPK	7.99	7.99	7.98	0.23	0.23	0.23	0.48	0.52	0.50
F_2: 200-50-00 NPK	8.00	8.01	8.01	0.23	0.24	0.24	0.48	0.58	0.53
F_3: 200-00-50 NPK	7.93	8.05	7.99	0.24	0.22	0.23	0.46	0.64	0.55
F_4: 200-50-50 NPK	8.00	8.04	8.01	0.23	0.22	0.22	0.46	0.70	0.58
F_5:200-100-00NPK	7.95	7.97	7.95	0.22	0.23	0.23	0.45	0.73	0.59
S. Em.±	0.04	0.03	0.02	0.01	0.01	0.05	0.01	0.02	0.05
C.D. (p=0.05)	NS	NS	NS	NS	NS	NS	NS	0.04	NS
V x F Int.	NS	NS	NS	NS	NS	NS	NS	NS	Sig.
CV %	1.3	0.9	1.1	7.0	6.9	7.0	5.7	5.8	5.8
Y	--	--	NS	--	--	NS	--	--	0.02
Y x V	--	--	NS	--	--	NS	--	--	NS
Y x F	--	--	NS	--	--	NS	--	--	0.04
Y x V x F	--	--	NS	--	--	NS	--	--	NS

Table 6 RUAAG 23: Effect of varieties and fertilizers on soil available nutrients of *rustica* tobacco

Treatment	Avail. P_2O_5 (kg/ha)			Avail.K_2O (kg/ha)		
Initial Value	29.35			171.74		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)						
V_1: GC 1	33.55	36.03	34.69	187.20	183.47	185.33
V_2: GCT 3	34.45	38.17	36.31	188.47	186.47	187.47
S. Em.±	0.41	0.73	0.42	1.31	1.68	1.07
C.D. (p=0.05)	NS	NS	1.20	NS	NS	NS
Fertilizers (F)						
F_1: 200-00-00 NPK	28.66	27.03	27.85	170.17	162.50	166.33
F_2: 200-50-00 NPK	34.50	35.74	35.12	169.67	165.33	167.50
F_3: 200-00-50 NPK	28.90	28.79	28.84	189.67	186.17	187.92
F_4: 200-50-50 NPK	35.34	43.69	39.52	190.00	197.33	193.67
F_5:200-100-100NPK	42.12	50.25	46.18	219.67	213.50	216.58
S. Em.±	0.65	1.15	2.36	2.08	2.66	2.96
C.D. (p=0.05)	1.94	3.42	9.26	6.17	7.91	11.64
V x F Int.	NS	NS	NS	NS	NS	Sig.
CV %	4.7	7.6	6.4	2.7	3.5	3.1
Y	--	--	1.20	--	--	NS
Y x V	--	--	NS	--	--	NS
Y x F	--	--	2.68	--	--	6.85
Y x V x F	--	--	NS	--	--	NS

Table 7RUAAG 23: Effect of varieties and fertilizers on nutrient contents of *rustica* tobacco

Treatment	N content (%)			P_2O_5 content (%)			K_2O content (%)		
	2023-24	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**	**2023-24**	**2024-25**	**Pooled**
Varieties (V)									
V_1: GC 1	2.15	1.93	2.04	0.25	0.20	0.23	0.21	0.18	0.19
V_2: GCT 3	2.19	2.01	2.10	0.27	0.22	0.25	0.22	0.19	0.21
S.Em.±	0.02	0.03	0.02	0.003	0.003	0.002	0.003	0.003	0.02
C.D. (p=0.05)	**NS**	**NS**	**0.05**	**0.01**	**0.01**	**0.01**	**NS**	**0.01**	**0.01**
Fertilizers (F)									
F_1: 200-00-00 NPK	2.21	1.88	2.04	0.25	0.20	0.23	0.20	0.16	0.18
F_2: 200-50-00 NPK	2.20	1.96	2.08	0.27	0.22	0.25	0.21	0.17	0.19
F_3: 200-00-50 NPK	2.14	2.00	2.07	0.25	0.19	0.22	0.22	0.20	0.21
F_4: 200-50-50 NPK	2.13	1.98	2.05	0.26	0.22	0.24	0.22	0.19	0.20
F_5:200-100-00 NPK	2.17	2.05	2.10	0.28	0.24	0.26	0.23	0.21	0.22
S. Em.±	0.02	0.05	0.03	0.005	0.004	0.003	0.005	0.004	0.003
C.D. (p=0.05)	NS	NS	NS	0.02	0.01	0.01	0.01	0.01	0.01
V x F Int.	NS	NS	NS	NS	NS	Sig.	NS	NS	Sig.
CV %	2.7	5.9	4.5	4.9	5.2	5.0	5.9	5.5	5.7
Y	--	--	NS	--	--	0.01	--	--	0.01
Y x V	--	--	NS	--	--	NS	--	--	NS
Y x F	--	--	NS	--	--	NS	--	--	NS
Y x V x F	--	--	NS	--	--	NS	--	--	NS

Table 8 RUAAG 23: Effect of varieties and fertilizers on nutrient uptake by *rustica* tobacco

Treatment	N uptake (kg/ha)			P_2O_5 uptake (kg/ha)			K_2O uptake (kg/ha)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
Varieties (V)									
V1: GC 1	54.15	43.42	48.78	6.34	4.58	5.46	5.33	3.94	4.64
V2: GCT 3	61.29	39.37	50.33	7.51	4.38	5.95	6.16	3.74	4.95
S.Em.±	1.60	1.32	3.95	0.17	0.15	0.49	0.18	0.11	0.36
C.D. (p=0.05)	4.76	3.93	NS	0.51	NS	NS	0.55	NS	NS
Fertilizers (F)									
F_1: 200-00-00 NPK	57.73	39.65	48.69	6.48	4.29	5.39	5.18	3.41	4.29
F_2: 200-50-00 NPK	57.03	45.56	51.29	7.02	5.17	6.09	5.50	3.87	4.68
F_3: 200-00-50 NPK	56.39	40.22	48.30	6.62	3.78	5.20	5.87	3.94	4.90
F_4: 200-50-50 NPK	57.08	38.77	47.92	6.86	4.26	5.56	5.81	3.68	4.74
F_5:200-100-00 NPK	60.37	42.77	51.57	7.65	4.90	6.28	6.37	4.32	5.34
S. Em.±	2.53	2.09	1.64	0.27	0.24	0.18	0.29	0.18	0.17
C.D. (p=0.05)	NS	NS	NS	NS	0.71	0.52	NS	0.52	0.49
V x F Int.	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV %	10.8	12.4	11.5	9.7	13.1	11.01	12.4	11.2	
Y	--	--	2.98	--	--	0.47	--	--	0.31
Y x V	--	--	4.22	--	--	NS	--	--	0.44
Y x F	--	--	NS	--	--	NS	--	--	NS
Y x V x F	--	--	NS	--	--	NS	--	--	NS

Table 9 RUAAG 23: Effect of varieties and fertilizers on cured leaf yield and yield attributes of *rustica* tobacco (Pooled)

Treatment	Cured leaf yield (kg/ha)	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Dry weight per unit leaf area (mg/cm^2)
Varieties (V)					
V1: GC 1	2387	29.18	24.11	42.31	12.73
V2: GCT 3	2374	29.73	18.47	40.18	12.47
S. Em.±	202	2.40	0.51	2.24	0.24
C.D. (p=0.05)	**NS**	**NS**	**1.45**	**NS**	**NS**
Fertilizers (F)					
F_1: 200-00-00 NPK	2358	29.35	21.70	42.31	12.62
F_2: 200-50-00 NPK	2463	28.32	20.52	40.18	12.91
F_3: 200-00-50 NPK	2330	29.23	20.70	44.22	12.72
F_4: 200-50-50 NPK	2318	28.88	20.93	45.17	12.18
F_5: 200-100-100 NPK	2436	31.49	22.61	43.47	12.57
S. Em.±	72	0.80	1.40	1.23	0.84
C.D. (p=0.05)	NS	NS	NS	NS	NS
V x F Int.	NS	Sig.	NS	Sig.	NS
CV %	10.4	9.4	13.0	9.9	10.2
Y	130	1.45	1.45	2.24	NS
Y x V	184	2.05	NS	3.17	NS
Y x F	NS	NS	3.25	NS	1.51
Y x V x F	NS	NS	NS	NS	NS

Table 9.1 RUAAG 23: Interaction effect between varieties and fertilizers on leaf length and plant height of *rustica* tobacco (Pooled)

Leaf length (cm)						Plant height (cm)					
V / F	F_1	F_2	F_3	F_4	F_5	V / F	F_1	F_2	F_3	F_4	F_5
V_1	28.83	30.32	28.86	27.50	30.38	V_1	38.87	40.23	**38.23**	41.47	41.45
V_2	29.86	26.32	29.61	30.25	32.61	V_2	45.76	40.13	50.20	**48.87**	**45.50**
S. Em.±	1.13					S. Em.±	1.74				
C.D. (p=0.05)	3.24					C.D. (p=0.05)	5.01				
CV %	9.4					CV %	9.9				

Table 10 RUAAG 23: Effect of varieties and fertilizers on quality parameters of *rustica* tobacco (Pooled)

Treatment	Nicotine (%)	Reducing sugar (%)	Chloride (%)
Varieties (V)			
V_1: GC 1	5.65	4.98	1.04
V_2: GCT 3	5.63	5.04	1.07
S. Em.±	0.05	0.05	0.01
C.D. (p=0.05)	NS	NS	NS
Fertilizers (F)			
F_1: 200-00-00 NPK	5.72	5.19	1.05
F_2: 200-50-00 NPK	5.38	5.12	1.02
F_3: 200-00-50 NPK	5.59	4.98	1.08
F_4: 200-50-50 NPK	5.67	4.83	1.08
F_5: 200-100-100 NPK	5.84	4.92	1.03
S. Em.±	0.08	0.08	0.04
C.D. (p=0.05)	0.24	0.24	NS
V x F Int.	NS	Sig.	NS
CV %	5.1	5.8	6.3
Y	0.15	0.15	0.03
Y x V	NS	NS	NS
Y x F	NS	NS	0.08
Y x V x F	NS	NS	NS

Table 10.1 RUAAG 23: Interaction effect between varieties and fertilizers on reducing sugar content of *rustica* tobacco (Pooled)

Reducing sugar (%)					
V / F	F_1	F_2	F_3	F_4	F_5
V_1	5.19	4.88	4.94	4.81	5.09
V_2	5.19	5.36	5.03	4.85	4.75
S. Em.±	0.12				
C.D. (p=0.05)	**0.34**				
CV %	5.8				

Table 11 RUAAG 23: Effect of varieties and fertilizers on soil chemical parameters of *rustica* tobacco (Pooled)

Treatment	pH	EC (ds/m)	Organic carbon (%)	Avail. P_2O_5 (kg/ha)	Avail. K_2O (kg/ha)
Varieties (V)					
V_1: GC 1	7.99	0.23	0.54	34.69	185.33
V_2: GCT 3	7.99	0.22	0.55	36.31	187.47
S. Em.±	0.02	0.003	0.01	0.42	1.07
C.D. (p=0.05)	NS	NS	NS	1.20	NS
Fertilizers (F)					
F_1: 200-00-00 NPK	7.98	0.23	0.50	27.85	166.33
F_2: 200-50-00 NPK	8.01	0.24	0.53	35.12	167.50
F_3: 200-00-50 NPK	7.99	0.23	0.55	28.84	187.92
F_4: 200-50-50 NPK	8.01	0.22	0.58	39.52	193.67
F_5: 200-100-100 NPK	7.95	0.23	0.59	46.18	216.58
S. Em.±	0.02	0.05	0.05	2.36	2.96
C.D. (p=0.05)	**NS**	**NS**	**NS**	**9.26**	**11.64**
V x F Int.	**NS**	**NS**	**Sig.**	**NS**	**Sig.**
CV %	1.1	7.0	5.8	6.4	3.1
Y	NS	NS	0.02	1.20	NS
Y x V	NS	NS	NS	NS	NS
Y x F	NS	NS	0.04	2.68	6.85
Y x V x F	NS	NS	NS	NS	NS

Table 11.1 RUAAG 23: Interaction effect between varieties and fertilizers on OC (%) and avail. $K_2O$of *rustica* tobacco (Pooled)

Organic carbon content (%)						**Available K_2O (kg/ha)**					
V / F	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**	**V / F**	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**
V_1	0.483	0.508	0.538	0.600	0.590	V_1	168.50	169.17	185.83	190.00	213.17
V_2	0.515	0.550	0.562	0.555	0.588	V_2	164.17	165.83	190.00	197.33	220.00
S. Em.±	0.013					S.Em.±	2.39				
C.D. (p=0.05)	0.038					C.D. (p=0.05)	6.85				
CV %	5.8					CV %	3.1				

Table 12 RUAAG 23: Effect of varieties and fertilizers on nutrient content and its uptake of *rustica* tobacco (Pooled)

Treatment	N Content (%)	P_2O_5 Content (%)	K_2O Content (%)	N uptake (kg/ha)	P_2O_5 uptake (kg/ha)	K_2O uptake (kg/ha)
Varieties (V)						
V_1: GC 1	2.04	0.23	0.19	48.78	5.46	4.64
V_2: GCT 3	2.10	0.25	0.21	50.33	5.95	4.95
S. Em.±	0.02	0.002	0.02	3.95	0.49	0.36
C.D. (p=0.05)	**0.05**	**0.01**	**0.01**	**NS**	**NS**	**NS**
Fertilizers (F)						
F_1: 200-00-00 NPK	2.04	0.23	0.18	48.69	5.39	4.29
F_2: 200-50-00 NPK	2.08	0.25	0.19	51.29	6.09	4.68
F_3: 200-00-50 NPK	2.07	0.22	0.21	48.30	5.20	4.90
F_4: 200-50-50 NPK	2.05	0.24	0.20	47.92	5.56	4.74
F_5: 200-100-100NPK	2.10	0.26	0.22	51.57	6.28	5.34
S. Em.±	0.03	0.003	0.003	1.64	0.18	0.17
C.D. (p=0.05)	**NS**	**0.01**	**0.01**	**NS**	**0.52**	0.49
V x F Int.	**NS**	**Sig.**	**Sig.**	**NS**	**NS**	**NS**
CV %	4.5	5.0	5.7	11.5	11.01	**12.3**
Y	NS	0.01	0.01	2.98	0.47	0.31
Y x V	NS	NS	NS	4.22	NS	0.44
Y x F	NS	NS	NS	NS	NS	NS
Y x V x F	NS	NS	NS	NS	NS	NS

Table 12.1 RUAAG 23: Interaction effect between varieties and fertilizers onP_2O_5 and K_2Ocontents of *rustica* tobacco (Pooled)

P_2O_5 content (%)						**K_2O content (%)**					
V / F	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**	**V / F**	**F_1**	**F_2**	**F_3**	**F_4**	**F_5**
V_1	0.216	0.232	0.216	0.219	0.250	V_1	0.168	0.178	0.202	0.202	0.218
V_2	0.235	0.261	0.222	0.253	0.260	V_2	0.193	0.200	0.215	0.203	0.219
S. Em.±	0.005					S. Em.±	0.005				
C.D. (p=0.05)	0.014					C.D. (p=0.05)	0.013				
CV %	5.0					CV %	5.7				

Table 13 RUAAG 23: Economics as influenced by varieties and fertilizers (2023-24 to 2024-25)

Treatment	Cured leaf yield (kg/ha)	Gross income (₹/ha)	Common cost (₹/ha)	Treatment cost (₹/ha)	Total cost (₹/ha)	Net income (₹/ha)	BCR
Varieties (V)							
V_1: GC 1	2387	1,683,19	61,254	23,136	84,390	83,929	2.00
V_2: GCT 3	2374	1,673,95	61,254	23,136	84,390	83,005	1.98
S. Em.±	2022	--	--	--	--	--	--
C.D. (p=0.05)	**NS**	--	--	--	--	--	--
Fertilizers (F)							
F_1: 200-00-00 NPK	2358	1,66,216	61,254	19,102	80,356	85,860	2.07
F_2: 200-50-00 NPK	2464	1,73,677	61,254	21,925	83,179	90,498	2.09
F_3: 200-00-50 NPK	2330	1,64,271	61,254	21,322	82,576	81,695	1.99
F_4: 200-50-50 NPK	2318	1,63,401	61,254	24,145	85,399	78,002	1.91
F_5:200-100-100 NPK	2436	1,71,720	61,254	29,187	90,441	81,279	1.90
S. Em.±	72	--	--	--	--	--	--
C.D. (p=0.05)	NS	--	--	--	--	--	--
V x F Int.	NS	--	--	--	--	--	--
CV %	10.4	--	--	--	--	--	--

ARAUL

Project No.: RUArAG 31-A

Research project title	**Studies on economics of viability of tobacco / non tobacco crop of *rabi* season**
Objectives of the project	▪ Find out the best cost benefit ratio among different *Rabi* crops with comparison to *rustica* tobacco variety ArR-27 (Nath)
Investigators	K.C. Arya
Year of start	2023-24
Year of completion	2024-25
Location	Tobacco Research Station, Araul

Design : R B D Spacing : As per crop

Replications : Four Plot size : 5 x 4 m^2

Treatments: 04

T_1-Tobacco (ArR-27 (Nath))

T_2-Wheat

T_3-Barley

T_4- Mustard

RESULTS

In order to work out economics of tobacco/ non-tobacco crops of season *Rabi*, an experiment was conducted during 2024-25 at Tobacco Research Station, Araul, Kanpur, U.P. The soil of experiment site was Sandy loam. The experiments consist of four treatments. The analysis indicated that tobacco equivalent yield was significantly affected under various treatments. The higher tobacco equivalent yield recorded under the treatment-2 (Wheat) i.e. 2995 kg/ha followed by treatment-4 [Mustard] i.e. 1610 kg/ha. Economics of the treatment revealed that highest monitory return of Rs. 68,310 was recorded by treatment-2 with benefit cost ratio of 1.50.

Salient findings/achievements

- The higher tobacco equivalent yield recorded by Wheat *i.e.* 2995 kg/ha followed by Mustard *i.e.* 1610 kg/ha. Economics of the treatment revealed that highest monitory return of Rs. 68,310.00 was recorded by wheat crop with benefit cost ratio of 1.50

Table 1 RuArAG-31-A: Data on tobacco equivalent yield and morphological characters with non-tobacco crops of *Rabi* season (2024-25)

Treatments	Tobacco/ Non-tobacco yield (kg/ha)	Plant height (cm)	Leaf length (cm)	Leaf width (cm)	No. Curable leaves
T_1-Tobacco (ArR-27 (Nath))	2030	65.10	34.20	40.68	17
T_2-Wheat	5420	-	-	-	-
T_3-Barley	2520	-	-		
T_4- Mustard	1360	-	-		

Tobacco Price: Rs. 38.00/ Kg. Wheat: Rs. 21.00/Kg, Barley: Rs. 23.00/Kg, Mustard45.00/Kg

Table 2 RuArAG-31-A: Data on Cost Economics of different crops as influenced by treatments

Treatments	Tobacco equivalent yield (kg/ha)	Gross return (Rs./ha)	Cost of cultivation (Rs./ha)	Net return (Rs./ha)	B.C. Ratio
T_1-Tobacco (ArR-27 (Nath))	2030	77,140.00	40,300.00	36,840.00	0.91
T_2-Wheat	2995	1,13,810.00	45,500.00	68,310.00	1.50
T_3-Barley	1785	57,988.00	33,500.0	24,488.00	0.73
T_4- Mustard	1610	61,180.00	29,300.00	31,880.00	1.09
SE (m)±	66.16				
CD (P=0.05)	181.35				
CV%	10.86				

Table 3 RuArAG-31A-A: Cost Economics of different crops as influence by treatments (Pooled-2023-24&2024-25)

Treatments	Tobacco equivalent yield Kg/ha)	Gross Return (Rs./ha)	Cost of cultivation (Rs./ha)	Net Return (Rs./ha)	B.C. Ratio
T_1-Tobacco (ArR-27 (Nath))	1930	73,340.00	42,400.00	30,940.00	0.73
T_2-Wheat	2948	11,2030.00	46,300.00	65,730.00	1.42
T_3-Barley	1656	62,919.00	36,100.00	26,819.00	0.74
T_4- Mustard	1664	63,215.00	29,700.00	33,515.00	1.13
SE (m)±	63.81				
CD (P=0.05)	187.18				
CV%	10.33				

Tobacco Price: Rs. 38.00/ Kg., Wheat: Rs. 21.00/Kg, Barley: Rs. 23.00/Kg, Mustard45.00

Project No.: RUArAG 31-B

Research project title	**Studies on economical of tobacco-Bengal gram intercropping system of *rabi* season.**
Objectives	To assess the best ratio of Bengal gram to be grown with tobacco for high remuneration
Investigators	K.C. Arya
Year of start	2023-24
Year of completion	2025-26
Location	Tobacco Research Station, Araul

RESULTS

In order to work out best ratio of bengalgram grown with tobacco for high remuneration, during season *Rabi* 2024-25, an experiment was conducted at Tobacco Research Station, Araul, Kanpur, U.P. The soil of experiment site was Sandy loam. The experiments consist of six treatments. The analysis indicated that higher tobacco equivalent yield was recorded in treatment T-5 (Bengalgram as sole) i.e. 2310 kg/ha followed by T-3 (Tobacco+ Bengalgram 2:6) i.e. 2230 kg/ha. The economics of treatment revealed that highest monitory return of Rs. 51,388.00 was recorded by treatment T-5 with benefit cost ratio of 1.41.

Salient research findings/achievement

- The higher tobacco equivalent yield recorded by Bengal gram as sole crop i.e., 2310 kg/ha followed by tobacco + Bengal gram (2:6) 2030 kg/ha. Economics of the treatment revealed that highest monetary return of Rs. 51,388 was recorded by sole Bengal gram with benefit cost ratio of 1.41

Table 1 RuArAG-31B: Data on Tobacco and tobacco equivalent yield (2024-25)

Treatments	Tobacco equivalent yield (kg/ha)	Plant Height (cm)	Leaf Length (cm)	Leaf Width (cm)	No. Curable Levels
T_1-Tobacco + Bengal gram 2:2	1890	-	-	-	-
T_2-Tobacco+ Bengal gram 2:4	2035	-	-	-	-
T_3- Tobacco+ Bengal gram 2:6	2223	-	-	-	-
T_4- Tobacco+ Bengal gram 2:8	2285	-	-	-	-
T_5- Bengal gram as sole crop	2310	-	-	-	-
T_6- Tobacco as sole crop	1980	62.10	28.20	36.68	15
S. Em.±	78.90				
C.D. (p=0.05)	215.10				
C.V.%	11.27				

Table 2 RuArAG-31B: Cost Economics (2024-25)

Treatments	Tobacco equivalent yield (kg/ha)	Gross Return (Rs./ha)	Cost of cultivation (Rs./ha)	Net Return (Rs./ha)	B.C. Ratio
T_1-Tobacco + Bengal gram 2:2	1890	71,820.00	38,600.00	33,220.00	0.86
T_2-Tobacco+ Bengal gram 2:4	2035	76,950.00	42,800.00	34,150.00	0.80
T_3- Tobacco+ Bengal gram 2:6	2230	84,740.00	42,800.00	41,940.00	0.98
T_4- Tobacco+ Bengal gram 2:8	2285	86,830.00	43,300.00	43,530.00	1.01
T_5- Bengal gram as sole crop	2310	87,788.00	36,400.00	51,388.00	1.41
T_6- Tobacco as sole crop	1980	75,240.00	46,500.00	28,740.00	0.62
S.Em.±	78.90				
C.D. (p=0.05)	215.10				
C.V.%	11.27				

Tobacco Price: Rs. 38.00/ Kg.

Project No.: RUArAG 32

Research project title	**Evaluation of tobacco and vegetable based intercropping system.**
Objectives of the project	To find out the profitable tobacco and vegetable based intercropping system.
Investigators	K.C. Arya
Year of start	2023-24
Year of completion	2025-26
Location	Tobacco Research Station, Araul

Design & Layout Out

Design : RBD
Replication : 04
Plot Size : 5.0 X 5.0 m
Treatments : 07

Treatments	Spacing (cm)
• T1- Chilli	50 x 30
• T2- Tomato	60 x 45
• T3-Onion	20 x15
• T4- Garlic	45 x 20
• T5-Brinjal	20 x 15
• T6-Potato	45 x 45
• T7-Tobacco	50 x 30

RESULTS

In order to work out profitable tobacco and vegetable based intercropping system, an experiment was conducted during *rabi* 2024-25 at The experiments consist of seven treatments in RBD Design with four replication. The six various vegetables grown along with tobacco as intercrops showed that potato, onion and garlic recorded maximum vegetable yield and suppressed the yield and growth of tobacco drastically. However, tobacco grown along with potato onion and garlic maximum leaf yield also.

Salient research findings/achievements

- The different vegetables grown as inter crops tobacco showed that Potato (2010 kg/ha), Onion (2020 kg/ha) and garlic (2065 kg/ha) recorded maximum vegetable yield and suppressed growth and yield of tobacco

Table 1 RuArAG 32: Data on Tobacco equivalent yield with non-tobacco crops of *Rabi* season morphological characters (2024-25)

Treatments	Tobacco					Vegetable yield Q/ha
	Yield (kg/ha)	Plant Height (Cm)	No. Curable Levels	Leaf Length (Cm)	Leaf Width (Cm)	
T_1-Tobacco + Chilli 1:1	1433	63.35	13	24.15	24.33	3
T_2- Tobacco + Tomato 1:1	1850	61.13	13	26.23	24.10	33
T_3- Tobacco + Onion 1:2	2020	66.70	14	23.60	23.68	110
T_4- Tobacco + Garlic 1:2	2065	65.30	14	25.18	27.30	55
T_5- Tobacco +Brinjal 1:2	1930	62.10	12	22.30	25.95	28
T_6- Tobacco + Potato 1:1	2010	62.35	13	23.18	26.10	160
T_7- Tobacco as sole	3620	63.13	15	30.30	28.48	-
S. Em.±	68.13					
C.D. (p=0.05)	195.30					
CV%	12.10					

D. CHEWING TOBACCO

VEDASANDUR

Project No.: VFSAGC/ VFRAGC/CHVsAGC 2

Research project title	**Effect of integration of natural farming inputs on the performance of chewing tobacco**
Objectives of the project	To study the performance of Chewing tobacco with the incorporation of natural farming components
Investigators	M. Kumaresan,Kasturi Krishn, P. Manivel, Poorna Bindu , Anindita Paul, Namitha Das, V.Annadurai, and M.Seshu Madhav
Location	Vedasandur centre

Experimental details:

Design	:	RCBD
Replications	:	Three
Treatments	:	Seven
Gross plot size	:	5.6 m × 5.5 m
Variety	:	Yasini
Year of start	:	2023-24 2025-26 (**Modified**) for Shivamogga Centre 2024-25 for Rajahmundry and Vedasandur centres
Duration	:	02 years

Treatments

T_1: FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg NPK /ha)
T_2: FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg NPK /ha) + KCL @ 2% at 45 DAP and 65 DAP
T_3: RDF (125:50:50 kg NPK /ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting)
T_4: RDF (125:50:50 kg/ha) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP)
T_5: RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP)
T_6: RDF (125:50:50 kg NPK /ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP)
T_7: FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP)

Treatment imposition

- Application of Ghana jeevamrutha**:** Ghana jeevamrutha at the rate of 1 t ha^{-1} (3.024 kg per 30.24 m^2) to be applied to the well-prepared soil at the time of planting of FCV tobacco to the plots as per the treatment.
- Application of Jeevamrutha: Jeevamrutha was applied at the rate of 500 l ha^{-1} (1.512 liters per 30.24 m^2) was applied to soil at the time of sowing and at 30, 60 and 90 days after sowing as per the treatment.Jeevamrutha is to be diluted by adding water to make it to apply @ 100 ml per plant.

<u>Procedure to prepare 100 kg Ghana Jeevamrutha</u>
Initially 100 kg of dried desi cow dung is spread on the polythene sheet, two litres of desi cow urine, 2 kg of powdered jaggery and 2 kg pulse flour is added to the desi cow dung. All the materials are thoroughly mixed with desi cow dung and the mixture is kept under shade by covering with wet gunny bag to maintain 60% moisture for 24 hours. On next day, this mixture is to be made into small balls or cakes and to be kept for drying under shade for 21days. Ghana jeevamrutha is applied to the soil by powdering the balls or cakes as one-time application at the time of planting as per the treatment.

<u>Procedure to prepare 200 litres of Jeevamrutha</u>
Jeevamrutha is prepared by mixing 10 kg desi cow dung, 10 litres of cow urine, 2 kg jaggery, 2 kg pulse flour and hand full of soil collected from the field near bund. All these are put in 200 litres plastic or cement drum and mixed thoroughly by adding water until volume is made up to 200 litres. The mixture is stirred well in clock wise direction thrice a day using wooden stick until the mixture becomes homogeneous. Plastic drum is kept under shade covered with wet gunny bag. Turning of the mixture is done twice a day up to 7 days to improve the aeration and microbial population. After 7 days of turning jeevamrutha is ready for its application in the field. Well fermented jeevamrutha is applied manually at 15 DAP, 30 DAP and at 45 DAP as in the treatment. Prepared jeevamrutha could be used used for two to seven days.

Observations to be recorded

- Plant height (cm) at 30DAS, 45 DAS and at first picking
- Number of leaves per plant at 30DAS, 45 DAS and at first picking
- Cumulative number of leaves harvested per plant
- Leaf area of X and L position leaves
- Green leaf yield (kg /ha)
- Cured leaf yield (kg/ha)
- Microbial count (Initial and after harvest of the crop)
- Nutrient content and soil chemical properties pH, EC, OC, N, P and K content (Initial and after harvest of the crop)

RESULTS

Field experiment was conducted at ICAR NIRCA RS farm, Vedasandur during 2024-2025. Different Natural farming inputs viz. FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg NPK /ha), FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha) + KCL @ 2% at 45 DAP and 65 DAP, RDF (125:50:50 kg/ha) +

Ghanajeevamrutha @ 1t/ha(soil application at the time of planting), RDF (125:50:50 kg/ha) + Jeevamrutha @ 500 lit /ha (Soil application for 3 times at an interval of 15 days from 15 DAP, RDF (125:50:50 kg NPK /ha) + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP, RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP and FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @ 500 l/ha (Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45 DAP and 65 DAP were tested in a randomised block design with 3 replication.

Farm yard manure applied 15 days before planting RDF(125:50:50 NPK/ha) KCl sprayed at 2% concentration at 45and 60 DAP significantly increased the growth and yield over the control(Table 1).The TCLY increased by 6.2% with Farm yard manure applied 15 days before planting RDF(125:50:50 NPK/ha)+ KCl sprayed at a concentration of 2% at 45 and 60 DAP over the control (FYM 12.5 t/ha 15 days before planting + RDF).The other natural farming inputs treatments increased the total cured yield from 0.2 to 2.9%.FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCl @ 2% at 45DAP and 65 DAP recorded the lowest growth and yield. The yield reduction was upto 24%. The cost of cultivation was higher with FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha) + KCL @ 2% at 45 DAP and 65 DAP (Rs.154639/ha). The Gross return was higher with FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha) + KCL @ 2% at 45 DAP and 65 DAP followed by the FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha)(Control). Higher net return of Rs.125766/ha was recorded with RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @500 lit/ha (Soil application for 3 times at an interval of 15 days from 15 DAP. The net return with all the natural farming inputs treatments were comparable, except FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP (Table 2 CHVsAGC 2).The chewing quality, Microbial counts, lamina uptake, lamina chemistry are yet to be studied.

Salient findings/Achievements

- The total cured leaf yield (TCLY) increased by 6.2% with farm yard manure applied 15 days before planting+ RDF (125:50:50 kg NPK/ha)+KCl sprayed at concentration of 2% at 45 and 60 DAP over the control(FYM 12.5 t/ha 15 days before planting + RDF)

- Higher net return of Rs.1,25,766/ha was recorded with RDF (125:50:50 kg NPK /ha) + Ghanajeevamrutha @ 1t/ha (soil application at the time of planting) + Jeevamrutha @ 500 l/ha (Soil application for 3 times at an interval of 15 days from 15 DAP

Table 1 CHVsAGC 2: Effect of natural farming inputs on the growth and yield of chewing tobacco (2024-25)

Treatments	Leaf length (cm)	Leaf width (cm)	Stem girth(cm)	FGLY* (Kg/ha)	TCLY ** (Kg/ha)
FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha)	78.8	57.2	3.90	2586	2802
FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha) + KCL @ 2% at 45 DAP and 65 DAP	79.6	60.8	4.47	2700	3076
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting)	71.6	57.4	3.87	2463	2796
RDF (125:50:50 kg/ha) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP)	77.2	57.6	3.86	2488	2788
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP)	77.2	56.4	3.85	2480	2881
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP)	77.6	57.6	3.43	2472	2883
FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP)	76.7	56.0	3.79	1740	2134
S. Em.±	0.31	1.06	0.21	37.6	85.31
CD (p=0.05)	1.10	3.00	0.56	113.0	270.3

*FGLY-First grade leaf yield; **TCLY-Total cured leaf yield

Table 2 CHVsAGC 2: Effect of natural farming inputs on the Economics of chewing tobacco (2024-25)

Treatments	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha)	1,48,524	2,52,180	1,03,626	1.69
FYM 12.5 t/ha 15 days before planting + RDF (125:50:50 kg/ha) + KCL @ 2% at 45 DAP and 65 DAP	1,54,639	2,76,840	1,22,201	1.79
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting)	1,33,524	2,51,640	1,18,116	1.88
RDF (125:50:50 kg/ha) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP	1,33,524	2,50,890	1,17,366	1.88
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP	1,33,524	2,59,290	1,25,766	1.94
RDF (125:50:50 kg/ha) + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha(Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP	1,39,524	2,59,470	1,10,946	1.85
FYM 12.5 t/ha 15 days before planting + Ghanajeevamrutha @ 1t/ha(soil application at the time of planting) + Jeevamrutha @500 lit /ha (Soil application for 3 times at an interval of 15 days from 15 DAP + KCL @ 2% at 45DAP and 65 DAP	1,30,225	1,93,530	57,305	1.42
S.Em.±			9,530	0.07
C.D.(p=0.05)			29,692	0.21

DEMONSTRATION PLOT AT VEDASANDUR CENTRE

RESULTS

Field demonstration was conducted with Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche at* 90 DAP and with the control (without *Orobanche* removal). The demonstration was conducted in a sick plot.

The growth attributes viz. leaf length, leaf width, stem girth were higher with Sesame -Tobacco with neem cake application at 30 DAP +hand removal of *Orobanche* at 90 DAP. The FGLY and TCLY were also higher with this treatment. The TCLY increased by 11% with Sesame -Tobacco with neem cake application at 30 DAP + hand removals of Orobanche at 90 DAP over control. The TCLY recorded was 2697 kg/ha. The *Orobanche* biomass was lower with Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche* at 90 DAP (165 g/m^2), which is 82% lesser than the control (Table 1). The *Orobanche* infestation percent was lesser (24%) with Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche at* 90 DAP as compared to control (75%). Higher gross return, net return and B:C ratio was recorded with the treatment, Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche at* 90 DAP. Net return increased by 20% with Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche* at 90 DAP over the control (Table 2)

Table 1: Effect of Integrated Orobanche management on the growth, and yield of tobacco and *Orobanche* infestation

Treat-ments	Leaf length (cm)	Leaf width (cm)	Stem girth (cm)	FGLY* (kg/ha)	TCLY** (kg/ha)	No of spikes /plant	*Orobanche* biomass (g/m^2)	*Orobanche percent* of infestation
Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche* at 90 DAP	54.2	27.4	2.85	2264	2697	2.8	165	24
Control	51.7	28.9	2.81	2004	2421	4.7	929	75

Table 2: Effect of Integrated *Orobanche* management treatments on the Economics

Treatments	**Cost of cultivation (Rs/ha)**	**Gross returns (Rs/ha)**	**Net returns (Rs/ha)**	**B:C ratio**
Sesame -Tobacco with neem cake application at 30 DAP + hand removal of *Orobanche* at 90 DAP	1,48,524	2,42,730	94,206	1.63
Control	1,40,024	2,17,890	77,866	1.56

CROP CHEMISTRY AND SOIL SCIENCE

CROP CHEMISTRY AND SOIL SCIENCE

Project No.: VFRCHC 1

Research project title	Leaf quality evaluation of different tobaccos
Objectives of the project	▪ Analysis of chemical quality parameters of tobacco leaf samples related to different experiments
Investigators	L. K. Prasad
Year of start	1999-2000
Year of completion	Long Term
Location	ICAR-NIRCA, Rajahmundry

I. Executive Summary of the project for 2024-25

A total no. of 715 (FCV and Non-FCV) tobacco leaf samples received from different AINPT centres were processed and analyzed for chemical quality parameters viz., nicotine, reducing sugars and chlorides.

A. FCV TOBACCO

A total of **496** FCV tobacco leaf samples and received from different centres and were analysed for chemical quality parameters. The centre wise results are presented below:

1. **ICAR-NIRCA, Rajahmundry:** FCV tobacco leaf samples (31) pertaining to IVT and AVT were analyzed. The leaf nicotine varied from 0.43 to 1.96 % with a mean value of 1.09%, while reducing sugars varied from 4.58 to 17.79 % with a mean value of 10.19%. The values of chlorides ranged from 1.29 to 3.32 % with a mean value of 2.34%.

2. **ICAR-NIRCA RS, Jeelugumilli:** FCV tobacco leaf samples (28) pertaining to FCV AVT-1 were analyzed. The leaf nicotine varied from 1.04 to 3.29 % in 'X' position with a mean value of 1.92% and it varied from 1.28 to 3.46 % in 'L' position with a mean value of 2.63%, while reducing sugars varied from 1.78 to 9.61 % in 'X' position with a mean value of 3.26% and it varied from 1.02 to 12.43 % in 'L' position with a mean value of 5.01%. Chlorides ranged from 1.61 to 3.95 % in 'X' position with a mean value of 2.56% and it ranged from 1.38 to 2.53 % in 'L' position with a mean value of 1.99%.

3. **ICAR-NIRCA RS, Guntur:** Analysis was conducted on 19 FCV tobacco leaf samples representing AVT-1 FCV and AVT-1 *Natu*. Nicotine content ranged from 1.08% to 2.91%, with a mean of 2.15%. Reducing sugars were measured between 1.34% and 14.63%, with a mean value of 7.09%. Chloride levels ranged from 0.19% to 0.90%, and the mean was 0.41%.

4. **ICAR-NIRCA RS, Kandukur:** FCV tobacco leaf samples (62) pertaining to AVT-1, AVT-II, Bulk Trial and Aphid Experiments were analysed. The nicotine content varied from 0.41 to 2.05 % with a mean value of 1.21%, while the reducing sugars found between 2.21 to 17.65 % with a mean value of 7.70% and the chloride content varied from 0.10 to 1.56 % with a mean value of 0.66%.

5. **ICAR-NIRCA RS, Hunsur:** Analysis of 142 FCV tobacco leaf samples from various trials showed nicotine levels ranged from 0.55–1.73% ('X' position) and 0.62–2.67% ('L' position). Mean nicotine values were 0.99% and 1.48%, respectively. Reducing sugars ranged from 2.75–12.39% ('X') and 2.04–12.89% ('L'), with means of 7.59% and 9.03%. Chloride content ranged from 0.10–2.28% ('X') and 0.10–2.03% ('L'), averaging 0.85% and 0.82%.

6. **Shivamogga:** A total of 214 FCV tobacco leaf samples from the Agronomy Experiment titled "Performance of FCV tobacco var. FCS-4 as influenced by spacing and fertilizer level," along with Plant Breeding Experiments VFSBR3-03, VFSEN-37, and VFSEN-38, were analyzed. The nicotine content of the leaves ranged from 0.55% to 1.59%, with an average of 1.01%. Reducing sugar content varied between 7.75% and 24.90%, averaging 13.61%. Chloride levels ranged from 0.10% to 0.60%, with a mean value of 0.27%.

B.NON-FCV TOBACCO

A total No. of **219** leaf samples of non-FCV tobacco were analysed for quality parameters. The centre wise results are presented below:

1. **Nandyal:** *Bidi* tobacco leaf samples (25) pertaining to "Integrated Management of broomrape (*Orobanche* spp) in *bidi* tobacco, Evaluation of pre and post emergence herbicides for weed management in *bidi* tobacco and Field evaluation and demonstration of nematode antagonists enriched coco-peat technology root knot nematodes in tobacco main field crop" and *bidi* tobacco samples (123) pertaining to "AINPT Breeding trails and *BIDI* tobacco germplasm lines" were analysed. The leaf nicotine varied from 0.28 to 6.28 % with a mean value of 1.79%, while the reducing sugars varied from 0.30 to 10.15 % with a mean value of 3.99%. The chloride content varied from 1.21 to 4.96 % with a mean value of 2.34%.

2. **Nipani:** *BIDI* tobacco leaf samples (15) pertaining to AVT-II, collected during the year 2024-25 were analyzed. The leaf nicotine content varied from 0.97 to 1.66 % with a mean value of 1.39%, while the reducing sugars between 4.27 & 7.61 % with a mean value of 5.81%. The chloride content varied from 0.19 to 1.63 % with a mean value of 0.43%.

3. **Ladol:** A total number of 51 *rustica* tobacco leaf samples pertaining to the projects IVT, AVT-I, AVT-II, IET (ST-1), PYT (ST-2) and LSVT of ARS, Ladol were analyzed. The leaf nicotine varied from 2.82 to 5.35 % with a mean value of 4.19%, while the reducing sugars varied from 1.18 to 4.29 % with a mean value of 2.49%. The chloride content varied from 0.57 to 1.44 % with a mean value of 0.99%.

4. **NIRCA RS, Jeelugumilli:** *Natu* Tobacco leaf samples (5) pertaining to *Natu* AVT-1 were analyzed. The leaf nicotine varied from 0.57 to 1.93 % with a mean value of 1.17%, while reducing sugars varied from 0.85–1.33 % with a mean value of 1.05%. The values of chlorides ranged from 2.08 to 2.53 % with a mean value of 2.34%.

Table 1 VFRCHC 1: Summary of Chemical Quality Parameters (%) of FCV tobacco in different tobacco centres (2024-25)

Centre / Zone	Nicotine (%)	Red. Sugars (%)	Chlorides (%)
ICAR-NIRCA, Rajahmundry (31)	0.43 - 1.96 (1.09)	4.58 - 17.79 (10.19)	1.29 - 3.32 (2.34)
ICAR-NIRC RS, Jeelugumilli (33)	1.04 - 3.29 (X) (1.92) 1.28 - 3.46 (L) (2.63)	1.78 - 9.61 (X) (3.26) 1.02 - 12.43 (L) (5.01)	1.61 - 3.95 (X) (2.56) 1.38 - 2.53 (L) (1.99)
ICAR-NIRCA RS, Guntur (19)	1.08 -2.91 (2.15)	1.34 – 14.63 (7.09)	0.19 -0.90 (0.41)
ICAR-NIRCA RS, Kandukur (62)	0.41-2.05 (1.21)	2.21-17.65 (7.70)	0.10-1.56 (0.66)
ICAR-NIRCA RS, Hunsur (142)	0.55 - 1.73 (X) (0.99) 0.62 - 2.67 (L) (1.48)	2.75 - 12.39 (X) (7.59) 2.04 - 12.89 (L) (9.03)	0.10 - 2.28 (X) (0.85) 0.10 - 2.03 (L) (0.82)
Shivamogga (214)	0.55 - 1.59 (1.01)	7.75 - 24.90 (13.61)	0.10 - 0.60 (0.27)

**Figures in parentheses in column 1 represent the total number of samples analysed*
**Figures in parentheses in columns 2, 3, 4 represent the mean values of respective quality parameters*

Findings as per the leaf quality across the FCV tobacco growing locations:

The chemical quality of FCV tobacco samples varied distinctly across centres. FCV tobacco from Rajahmundry (NBS) produced mild to medium tobacco with moderate sweetness but relatively higher chlorides, while Jeelugumilli (NLS) tobacco is stronger, with variable sugar levels and moderately high chlorides, making it more suitable for blending. FCV tobacco from Guntur (CBS) stands out with medium to strong nicotine, moderate sugars, and very low chlorides, ensuring excellent burning quality while FCV tobacco quality of the samples under Kandukur (SLS) found mild to medium with balanced sugars and low chlorides, offering good smoking properties (Table 1 VFRCHC 1).

Hunsur (KLS) produced mild, sweet tobacco with generally low chloride, ideal for light blends, though some samples show higher values. FCV tobacco samples from Shivamogga (KLS) showed premium quality characterized by mild nicotine, very high sugars, and very low chlorides, making it highly suitable for flavorful, light cigarette blends.

Table 2 VFRCHC 1: Summary of Chemical Quality Parameters (%) in Non-FCV tobacco centres (2024-25)

Centre / Type of Tobacco	Nicotine (%)	Red. Sugars (%)	Chlorides (%)
Nandyal (*Bidi*-148)	0.28 - 6.28 (1.79)	0.30 - 10.15 (3.99)	1.21 - 4.96 (2.34)
Nipani (*Bidi* -15)	0.97 - 1.66 (1.39)	4.27 - 7.61 (5.81)	0.19 - 1.63 (0.43)
Ladol (*Rustica*-51)	2.82 - 5.35 (4.19)	1.18 - 4.29 (2.49)	0.57 - 1.44 (0.99)
Jeelugumilli (*Natu* -5)	0.57 to 1.93 (1.17)	0.85-1.33 (1.05)	2.08-2.53 (2.34)

*Figures in parentheses in column 1 represent the total number of samples analyzed
*Figures in parentheses in columns 2, 3, 4 represent the mean values of respective quality parameters

The chemical quality of non- FCV tobacco across centres shows clear differences by type and location. Nandyal, A.P. (*Bidi*) tobacco samples had medium strength with variable nicotine, moderate sugar levels, and relatively high chlorides, which may affect burning quality (Table 2 VFRCHC 1).

Nipani (*Bidi*), Karnataka produced mild to medium tobacco with moderate sweetness and very low chlorides, making it smooth and favourable for good combustion. Ladol, Gujarat (*Rustica*) was characterized by very high nicotine, low sugars, and moderate chlorides, indicating a strong type more suited for robust blends or traditional uses. *Natu* tobacco from Jeelugumilli, A.P., was mild in nicotine but has very low sugars and moderately high chlorides, which limit its sweetness and burning properties.

Overall, Nipani stands out for smooth and balanced smoking quality, Ladol for strength, Nandyal for variability in *Bidi*, and *Natu* from Jeelugumilli for mildness but with weaker flavor and burn.

CROP PROTECTION

CROP PROTECTION

I.ENTOMOLOGY

A. FCVTOBACCO

GUNTUR

Project No.: VFGENC/VFJENC/ VFSENC 3

Research project title	**Validation of IPM module against sucking pests of FCV tobacco**
Objectives of the project	▪ To identify best insecticide for the management of tobacco aphid (*Myzus persicae*)and whitefly (*Bemisia tabaci*)in FCV tobacco
Investigators	P. Venkateswarlu
Year of start	2024-25
Year of completion	2025-26
Location	ICAR-NIRCA RS,Guntur

Experimental details

Design	RBD
Replications	7
Variety	CTRI Sreshta
Season	2024-25 (*Rabi*)
Treatments	3 modules
Plot size	0.75 acres (0.25 acres for each module)
spacing	70x 70 cm

Modules

IPM Module (M1): Sowing two rows of sorghum as border/barrier crop one week before planting of tobacco; setting up of yellow sticky traps @ 25/ha; one spray of NSKE 2% at 30 days of planting (DAP); one spray of *Lecanicillium lecanii*@ $3X10^{12}$ CFU/ha at 45 DAP and one spray of afidopyropen 50 DC (sefina) @ 0.03% at 60 DAP.

Chemical Module (M2): One spray of imidacloprid 17.8 SL @ 0.03% at 30 DAP; one spray of pymetrozine 50 WG @ 0.04% at 45 DAP and one spray of flonicamid50 WG @ 0.04% at 60 DAP

Control (M3): No border crop and no spray

Observations

- Percent leaf curl infested plants in 10 rows in each plot at 30, 40, 50, 60 and 70 DAP
- Percent aphid infested plants in 10 rows in each plot at 30, 40, 50, 60 and 70 DAP
- Aphid population (score) on ten randomly infested plants on top middle and bottom leaf in each plot at 30, 40, 50, 60 and 70 DAP
- Percent sooty mold infested plants (low, medium & high) in 10 rows in each plot at 70 DAP
- Natural enemy population on tobacco and border crop
- Yield parameters (green leaf, cured leaf, bright leaf and grade index) in each plot

RESULTS

Leaf curl infested plants : Leaf curl virus-infected plantswere more during 2024-25 season. Leaf curlvirus plants in different modules were recorded and presented in Table 1 VFGENC 3). Inthe control plot, the percent ofleaf curl virus-infected plants was 9.4 at 70 days after planting. In both IPM applied plot and the chemical plot, leaf curl infestations were 1.9 and 2.3% at 70 days after planting, respectively. Both the IPM module and chemical module were superior in reducing curl infested plants over control, where the percent reduction of infestations was 79.78 and 75.53, respectively. The IPM module is comparatively superior tothe chemical module.

Aphid infested plants: Aphid infestation was very less in all 3 modules. Aphid incidence was recorded only in control plot at 60 days of planting and continued even after 70 DAP (Table 2 VFGENC 3). Due to application of IPM methods and also chemical pesticides, aphid incidence was nil in these two plots (cent percent reduction). In the control plot, aphid infested plants were 2.0 and 3.6% at 60 and 70 days of planting, respectively.

Aphid population: Aphid population was measured from 0 to 5 scale depending on the number present on top leaf and the middle leaf (Table 3 VFGENC 3). The aphid population is more on top leaves and less on the middle and bottom leaves. Up to 50 DAP, aphid population was not found in any module and at 60 DAP, aphid population was recorded in the control plot, and the score was 2.0 and 1.0 on the top and middle leaf, respectively. The population increased at 70 DAP and reached to 2.8 and 2.0 scores on the top and middle leaves, respectively. In both IPM and chemical plots, aphid population was nil.

Sooty mold incidence

Sooty mold incidence was recorded in the control plot at 70 days of planting (Table 4 VFGENC3). Out of 3.6% mold infested plants, 1.8% plants showed a low level of incidence, and the remaining 2.8% plants showed a medium incidence. As the population of aphids less, the sooty mold incidence was also less.

Predator population: Natural enemy population in sorghum& tobacco was recorded in each module and presented in Table 5 VFGENC3). The modules with chemical spray schedules showed a drastic reduction in the population of natural enemies in tobacco. Predator population on tobacco was more (31.8/plant) in the control plot. In pesticide applied plots, i.e., IPM module and chemical module, predator populations on tobacco were 9.6 and 7.1 per plant, respectively. The natural enemy population on the sorghum border indicated that coccinellid predators were dominant, followed by spiders, wasps, and syrphid flies. The total predator population on sorghum in the IPM module was more (8. 3/plant).

Yield: As leaf curl virus plants were more during the season, there was a significant difference in yield among different modules. Maximum yields of 14,870, 2,310 and 1,580 kg/ha of green, cured, and bright leaf were recorded in the IPM module, followed by the chemical module with 14,760, 2,250, 1,510 kg/ha, respectively (Table VFGENC 3-6). In the control plot, 14,080, 2,040, and 1,200 kg/ha of green, cured, and bright leaf, respectively were recorded. There was an increase of 13.24 and 10.29% cured leaf was recorded in IPM and chemical plots, respectively.

Table 1 VFGENC 3: Validation of IPM module against sucking pests of FCV tobacco - Percent leaf curl virus plants

S. No	Module	Leaf curl virus plants (%)					Percent reduction of infestation over control at 70 DAP
		30 DAP	40 DAP	50 DAP	60 DAP	70 DAP	
M1	IPM module	0.8	0.9	1.3	1.6	1.9	79.78
M2	Chemical module	0.7	1.0	1.1	1.9	2.3	75.53
M3	Control	0.8	2.8	5.7	8.8	9.4	---

Table 2 VFGENC 3: Validation of IPM module against sucking pests of FCV tobacco - Percent aphid infested plants

S.No	Module	Aphid infested plants (%)					Percent reduction of infestation over control at 70 DAP
		30 DAP	40 DAP	50 DAP	60 DAP	70 DAP	
M1	IPM module	0.0	0.0	0.0	0.0	0.0	100.00
M2	Chemical module	0.0	0.0	0.0	0.0	0.0	100.00
M3	Control	0.0	0.0	0.0	2.0	3.6	---

Table 3 VFGENC.3: Validation of IPM module against sucking pests of FCV tobacco-Percent aphid population (score)

S.No	Module	Aphid population (score)						Percent reduction of aphid population over control at 70 DAP
		50 DAP		60 DAP		70 DAP		
		Top leaf	Middle leaf	Top leaf	Middle leaf	Top leaf	Middle leaf	
M1	IPM module	0.0	0.0	0.0	0.0	0.0	0.0	100.00
M2	Chemical module	0.0	0.0	0.0	0.0	0.0	0.0	100.00
M3	Control	0.0	0.0	2.0	1.0	2.8	2.0	---

Aphid score:

Score	*Aphid population / leaf*
0	*0*
1	*1-50*
2	*51-250*
3	*251-500*
4	*501-1000*
5	*>1000*

Table 4 VFGENC 3: Validation of IPM module against sucking pests of tobacco – sooty mold incidence

S. No	Module	Percent sooty mold infested plants at 70 DAP			
		Total	Low level	Medium level	High level
M1	IPM module	0.0	0.0	0.0	0.0
M2	Chemical module	0.0	0.0	0.0	0.0
M3	Control	3.6	1.8	2.8	0.0

Table 5 VFGENC 3: Validation of IPM module against sucking pests of FCV tobacco natural enemy population

S.no	Module	Predator population on sorghum/plant					Predator population on tobacco/plant			
		cocci-nellids	Spid-ers	was-ps	others	total	Nesid-iocoris	cocci-nellids	others	total
M1	IPM module	3.2	2.6	0.8	1.7	8.3	16.7	1.4	1.5	19.6
M2	Chemical module	--	--	--	--	--	3.8	1.5	1.8	7.1
M3	Control	--	--	--	--	--	26.0	2.5	3.3	31.8

--Not Recorded

Table 6 VFGENC 3: Validation of IPM module against sucking pests of FCV tobacco yield parameters

S.no	Module	Green leaf kg/ha	Cured Leaf kg/ha	Bright Leaf kg/ha	Grade index kg/ha	Percent increase of cured leaf over control
M1	IPM module	14870	2310	1580	1850	13.24
M2	Chemical module	14760	2250	1510	1790	10.29
M3	Control	14080	2040	1200	1510	---

JEELUGUMILLI

Project No.:VFGENC/ **VFJENC** / VFSENC**3**

Research project title	**Validation of IPM module against sucking pests of FCV tobacco**
Objectives of the project	▪ To identify best insecticide for the management of tobacco aphid (*Myzuspersicae*)and whitefly (*Bemisiatabaci*)in FCV tobacco
Investigators	V. Venkateswarulu, K. Rajasekhara Rao, M. Venkatesan & B. Sailaja Jayasekharan
Year of start	2024-25
Year of completion	2025-26
Location	ICAR-NIRCA RS, Jeelugumilli

Experimental details

Design	RBD
Replications	7
Variety	CTRI Naveena (FCJ-11)
Season	2024-25 (*Rabi*)
Treatments	3 modules
Plot size	10 X 50 m
spacing	100 x 60 cm

An experiment was conducted during 2024-25 crop season at ICAR-NIRCA RS, Jeelugumilli to evaluate IPM module for the management of tobacco aphids *Myzus nicotianae* Blackman, whitefly *Bemisia tabaci* Gennadius and the whitefly transmitted leaf curl virus disease in FCV tobacco.

Observations recorded: The number of aphids, whiteflies per plantand the number of leaf curl affected plants were counted from 30 to 70 DAP at 10 day interval. The green leaf yield and cured leaf yield were also recorded.

Salient research findings

- Among the different modules evaluated against sucking pests, IPM module (Sorghum border crop + setting up of yellow sticky traps @ 25/ha + one spray of NSKE 2% at 30 DAP + one spray of *Lecanicillium lecanii* @ 3 x 10^{12} CFU/ha at 45 DAP + one spray of afidopyropen 50 DC @ 0.03% at 60 DAP) was found to be superior in aphid management (63.60 aphids/plant) compared to chemical module (One spray of imidacloprid 17.8 SL @ 0.03 % at 30 DAP + one spray of pymetrozine 50 WG @ 0.04 % at 45 DAP + one spray of flonicamid 50 WG @ 0.04 % at 60 DAP) which recorded 71.08 aphids/ plant in comparison with untreated control plots (182.84 aphids/plant) as seen in (Table 1 VFJENC 3).
- For the management of whitefly also, IPM module recorded least whitefly population (3.80/ plant) over chemical module (5.60/plant) and untreated control (16.80/plant). In case of leaf curl management also IPM module was found to be superior with lowest TLCV incidence (6.08%) in comparison with chemical module (7.80%) and the untreated control (16.60%) (Table 2 VFJENC 3).
- The highest cured leaf yield was also observed in IPM module (1825 kg/ha) followed by chemical module (1719 kg/ha). The lowest cured leaf yield was recorded in untreated control (1431 kg/ha) (Table 3 VFJENC 3).

Table 1VFJENC 3: Tobacco aphid, *Myzus nicotianae* infestation in FCV tobacco during 2024-25

Modules		Tobacco aphids per plant (no.)					Mean
		30 DAP	40 DAP	50 DAP	60 DAP	70 DAP	
Module-1 (IPM)	Sowing of Sorghum as border crop; setting up of yellow sticky traps @ 25/ha; one spray of NSKE 2% at 30 DAP; one spray of *Lecanicillium lecanii*@ 3X10^{12} CFU/ha at 45 DAP and one spray of afidopyropen 50 DC @ 0.03% at 60 DAP.	-	-	58.40	102.60	28.40	63.60
Module-2 (Chemical)	One spray of imidacloprid 17.8 SL @ 0.03% at 30 DAP; one spray of pymetrozine 50 WG @ 0.04% at 45 DAP and one spray of flonicamid50 WG @ 0.04% at 60 DAP	-	-	65.40	111.00	30.00	71.08
Module-3 (Control)	No border crop and no spray	-	-	73.80	135.80	284.80	182.84
	SEm±			16.11	11.797	10.361	15.492
	C.D. at 5%			NS	NS	33.803	46.03
	C.V. (%)			9.11	10.56	19.37	25.33

DAP- Days after planting

Table 2 VFJENC 3: Whitefly *Bemisia tabaci* infestation and Tobacco Leaf Curl Virus (TLCV) incidence in FCV tobacco during 2024-2025

Modules		White flies per plant (no)					Mean white flies per plant	Percent TLCV incidence					Mean
		30 DAP	**40 DAP**	**50 DAP**	**60 DAP**	**70 DAP**		**30 DAP**	**40 DAP**	**50 DAP**	**60 DAP**	**70 DAP**	
Module-1 (IPM)	Sowing of Sorghum as border crop; setting up of yellow sticky traps @ 25/ha; one spray of NSKE 2% at 30 DAP; one spray of *Lecanicillium lecanii* @ $3X10^{12}$ CFU/ha at 45 DAP and one spray of afidopyropen 50 DC @ 0.03% at 60 DAP.	2.40	4.20	2.00	9.40	2.20	**03.80**	2.00	2.60	6.40	9.20	10.20	**06.08**
Module-2 (Chemical)	One spray of imidacloprid 17.8 SL @ 0.03% at 30 DAP; one spray of pymetrozine 50 WG @ 0.04% at 45 DAP and one spray of flonicamid50 WG @ 0.04% at 60 DAP	4.02	2.40	4.0	13.80	4.04	**05.60**	2.80	4.40	5.20	12.97	17.40	**07.80**
Module-3 (Control)	No border crop and no spray	10.20	10.00	15.00	18.00	31.22	**16.80**	4.00	10.60	15.08	20.80	32.60	**16.60**
	SEm±	0.26	0.454	0.500	0.509	0.09	0.062	1.116	0.27	0.24	0.484	1.0033	0.07
	C.D. at 5%	NS	1.482	1.6306	1.662	14.133	NS	NS	NS	NS	1.579	3.2719	0.17
	C.V. (%)	17.31	16.61	15.97	8.30	22.04	6.39	17.63	16.44	19.79	7.56	11.18	5.81

DAP- Days after planting

Table 3 VFJENC 3: Green Leaf and Cured leaf yield of FCV tobacco during 2024-2025

Modules		**Tobacco leaf yield**	
		Green leaf (kg/ha)	**Cured leaf (kg/ha)**
Module-1 (IPM)	Sowing of Sorghum as border crop; setting up of yellow sticky traps @ 25/ha; one spray of NSKE 2% at 30 DAP; one spray of *Lecanicillium lecanii*@ 3X10^{12} CFU/ha at 45 DAP and one spray of afidopyropen 50 DC @ 0.03% at 60 DAP.	11787.60	1825.00
Module-2 (Chemical)	One spray of imidacloprid 17.8 SL @ 0.03% at 30 DAP; one spray of pymetrozine 50 WG @ 0.04% at 45 DAP and one spray of flonicamid50 WG @ 0.04% at 60 DAP	11641.00	1719.00
Module-3 (Control)	No border crop and no spray	10022.00	1431.00
	SEm±	497.33	76.05
	C.D. at 5%	1532.57	234.37
	C.V. (%)	10.59	10.93

Conclusion: The experiment will be repeated during 2025-26 at Jeelugumilli.

SHIVAMOGGA

Project No.: Project No.: VFSENC /VFGENC/VFJENC 3

Research project title	**Evaluation of different insecticides against sucking pests of FCV tobacco**
Objectives of the project	▪ To identify best insecticide for the management of tobacco aphid (*Myzus persicae*)and whitefly (*Bemisia tabaci*)in FCV tobacco under Karnataka Light Soil region.
Investigators	Prashantha C, T. M. Soumya & Santosh Pattanashetti
Year of start	2024
Year of completion	2025
Location	AINP (T),ZAHRS, Shivamogga

Experiment details:

Design	RBD
Replications	3
Variety	Sahyadri
Season	*Kharif*2024
Treatments	8
Plot size	5m X 5 m

Treatments	Insecticides	Dose (ml or gm/lit)
T_1	Afidopyropen 50 DC	0.3 ml/lit
T_2	Imidacloprid 17.8 SL	0.2 ml/lit
T_3	Acetamiprid 20 SP	0.1 gm/lit
T_4	Thiamethoxam 25 WG	0.2 gm/lit
T_5	Pymetrozine 50 WG	0.4 gm/lit
T_6	Flonicamid 50 WG	0.4 gm/lit
T_7	Cyantraniliprole 10.26 w/w OD	0.3 ml/lit
T_8	Control	-

RESULTS

The overall mean population of aphids indicated that, the Flonicamid 50 WG has recorded lowest aphid population of 22.67 per leaf which was followed by Afidopyropen 50 DC with 25.11 aphids per plant followed by Pymetrozine 50 WG with 27.67 aphids per plant (Table 1 VFSENC 3). However, untreated control recorded highest mean aphid population of 369.67 per plant.

The overall mean population of whiteflies indicated that, the Flonicamid 50 WG has recorded lowest whiteflies population of 1.37 per leaf which was followed by Afidopyropen 50 DC with 1.48 whiteflies per plant followed by Pymetrozine 50 WG with 1.64 whiteflies per plant. However, untreated control recorded highest mean whiteflies population of 6.06/ plant (Table 2 VFSENC 3).

Significant differences in the leaf yield were noticed among all the treatments Flonicamid 50 WG recorded highest green and cured leaf yield of 12889 and 1520 kg/ha, respectively, followed by Afidopyropen 50 DC (12132 kg/ha and 1451 kg/ha) (Table 3 VFSENC 3). Lowest green and cured leaf yield was recorded in untreated control (6574 kg/ha and 812 kg/ha).

The higher cost benefit ratio of 1:2.2 was recorded in Flonicamid 50 WG treatment followed by Afidopyropen 50 DC (1: 2.1) and Pymetrozine 50 WG (1:2.0). However, lowest cost benefits ratio of 1: 1.2 was recorded in untreated control (Table 4 VFSENC 3).

Salient research findings

- Among the different insecticides evaluated, the Flonicamid 50 WG was found to be most promising with lowest incidence of aphids and whiteflies incidence and highest percent reduction over control followed by Afidopyropen 50 DC and Pymetrozine 50 WG. These insecticides can be used as alternatives for recommended insecticides to reduce development of insecticide resistance.

Table 1 VFSENC 3: Efficacy of different insecticides against aphid population FCV tobacco during *kharif* -2024

Treatments	Insecticides	Dose (ml or gm/lit)	Mean number of aphids/ leaf										Mean
			First spray					Second spray					
			1 DBT	3 DAT	7 DAT	11 DAT	15 DAT	1 DBT	3 DAT	7 DAT	11 DAT	15 DAT	
T_1	Afidopyropen 50 DC	0.3 ml/lit	260	12 (3.54)^{d}	17 (4.18)^{b}	31 (5.61)^{bcd}	56 (7.52)^{c}	56 (7.52)^{c}	8 (2.92)^{cd}	12 (3.54)^{c}	13 (3.67)^{d}	21 (4.64)^{c}	25.11
T_2	Imidacloprid 17.8 SL	0.2 ml/lit	264	48 (6.96)^{b}	26 (5.15)^{b}	39 (6.28)^{b}	68 (8.28)^{bc}	68 (8.28)^{bc}	16 (4.06)^{b}	32 (5.70)^{b}	46 (6.82)^{bc}	50 (7.11)^{b}	43.67
T_3	Acetamiprid 20 SP	0.1 gm/lit	263	34 (5.87)^{c}	20 (4.53)^{b}	36 (6.04)^{bc}	60 (7.78)^{c}	60 (7.78)^{c}	13 (3.67)^{bcd}	31 (5.61)^{b}	49 (7.04)^{bc}	39 (6.28)^{b}	38.00
T_4	Thiamethoxam 25 WG	0.2 gm/lit	234	31 (5.61)^{c}	26 (5.15)^{b}	29 (5.43)^{cd}	80 (8.97)^{b}	80 (8.97)^{b}	14 (3.81)^{bc}	36 (6.04)^{b}	56 (7.52)^{b}	46 (6.82)^{b}	44.22
T_5	Pymetrozine 50 WG	0.4 gm/lit	250	18 (4.30)^{d}	26 (5.15)^{b}	31 (5.61)^{bcd}	54 (7.38)^{c}	54 (7.38)^{c}	12 (3.54)^{bcd}	14 (3.81)^{c}	19 (4.42)^{d}	21 (4.64)^{c}	27.67
T_6	Flonicamid 50 WG	0.4 gm/lit	260	10 (3.24)^{d}	15 (3.94)^{b}	26 (5.15)^{d}	49 (7.04)^{c}	49 (7.04)^{c}	6 (2.55)^{d}	10 (3.24)^{c}	16 (4.06)^{d}	23 (4.85)^{c}	22.67
T_7	Cyantraniliprole 10.26 OD	0.3 ml/lit	240	51 (7.18)^{b}	25 (5.05)^{b}	29 (5.43)^{cd}	59 (7.71)^{c}	59 (7.71)^{c}	10 (3.24)^{bcd}	16 (4.06)^{c}	39 (6.28)^{c}	50 (7.11)^{b}	37.56
T_8	Control	-	230	246 (15.70)^{a}	269 (16.42)^{a}	300 (17.33)^{a}	306 (17.51)^{a}	306 (17.51)^{a}	360 (18.99)^{a}	450 (21.22)^{a}	510 (22.59)^{a}	580 (24.09)^{a}	369.67
F value			NS	*	*	*	*	*	*	*	*	*	-
SEm±			-	3.78	4.38	3.15	6.29	6.29	2.51	4.91	4.99	5.04	-
CD@5%			-	11.46	13.29	9.55	19.07	19.07	7.60	14.89	9.25	15.29	-

DBT: Day before treatment; DAT: Day after treatment; Numbers in the parenthesis are square root transformed value of $\sqrt{x+0.5}$; NS: Non-significant ($p>0.05$); * Mean followed by different letters are significantly different at $\alpha=0.05$ ($p<0.05$); mean of 30 leaves

Table 2 VFSENC 3: Efficacy of different insecticides against whitefly population FCV tobacco during *kharif* -2024

Treatments	Insecticides	Dose (ml or gm/li)	Mean number of whiteflies/ leaf										Mean
			First spray					Second spray					
			1 DBT	3 DAT	7 DAT	11 DAT	15 DAT	1 DBT	3 DAT	7 DAT	11 DAT	15 DAT	
T_1	Afidopyropen 50 DC	0.3 ml/lit	3.60	0.60 (1.05)^{d}	0.10 (0.77)^{e}	1.10 (1.26)^{e}	2.60 (1.76)^{d}	2.60 (1.76)^{d}	0.56 (1.03)^{de}	0.80 (1.14)^{de}	1.20 (1.30)^{de}	1.60 (1.45)^{e}	1.48
T_2	Imidacloprid 17.8 SL	0.2 ml/lit	4.10	1.20 (1.30)^{b}	1.60 (1.45)^{b}	2.90 (1.84)^{c}	4.60 (2.26)^{bc}	4.60 (2.26)^{bc}	1.00 (1.22)^{d}	2.30 (1.67)^{bc}	3.16 (1.91)^{c}	4.56 (2.25)^{c}	3.00
T_3	Acetamiprid 20 SP	0.1 gm/lit	3.50	0.90 (1.18)^{c}	1.00 (1.22)^{cd}	1.60 (1.45)^{d}	2.90 (1.84)^{d}	2.90 (1.84)^{d}	1.60 (1.45)^{c}	2.10 (1.61)^{c}	3.80 (2.07)^{b}	4.50 (2.24)^{c}	2.48
T_4	Thiamethoxam 25 WG	0.2 gm/lit	4.20	0.60 (1.05)^{d}	0.70 (1.10)^{d}	3.60 (2.02)^{b}	3.90 (2.10)^{c}	3.90 (2.10)^{c}	2.00 (1.58)^{c}	2.60 (1.76)^{b}	4.10 (2.14)^{b}	5.96 (2.54)^{b}	3.16
T_5	Pymetrozine 50 WG	0.4 gm/lit	3.40	0.70 (1.10)^{cd}	0.30 (0.89)^{e}	1.60 (1.45)^{d}	2.10 (1.61)^{d}	2.10 (1.61)^{d}	0.70 (1.10)^{de}	1.20 (1.30)^{d}	1.40 (1.38)^{de}	2.90 (1.84)^{d}	1.64
T_6	Flonicamid 50 WG	0.4 gm/lit	3.30	0.30 (0.89)^{e}	0.10 (0.77)^{e}	0.90 (1.18)^{e}	2.90 (1.84)^{d}	2.90 (1.84)^{d}	0.40 (0.95)^{e}	0.70 (1.10)^{e}	0.96 (1.21)^{e}	1.20 (1.30)^{e}	1.37
T_7	Cyantraniliprole 10.26 OD	0.3 ml/lit	3.50	0.90 (1.18)^{c}	1.20 (1.30)^{c}	2.80 (1.82)^{c}	4.90 (2.32)^{b}	4.90 (2.32)^{b}	2.90 (1.84)^{b}	0.90 (1.18)^{de}	1.50 (1.41)^{d}	2.96 (1.86)^{d}	2.65
T_8	Control	-	4.00	4.12 (2.15)^{a}	4.60 (2.26)^{a}	4.72 (2.28)^{a}	6.12 (2.57)^{a}	6.12 (2.57)^{a}	7.12 (2.76)^{a}	7.46 (2.82)^{a}	8.10 (2.93)^{a}	8.21 (2.95)^{a}	6.06
F value			NS	*	*	*	*	*	*	*	*	*	-
SEm±			-	0.09	0.11	0.13	0.28	0.28	0.16	0.16	0.17	0.35	-
CD@5%			-	0.27	0.32	0.40	0.86	0.86	0.49	0.49	0.52	1.05	-

DBT: Day before treatment; DAT: Day after treatment; Numbers in the parenthesis are square root transformed value of $\sqrt{x+0.5}$; NS: Non-significant ($p>0.05$); * Mean followed by different letters are significantly different at $\alpha=0.05$ ($p<0.05$); mean of 30 leaves

Table 3 VFSENC 3: FCV tobacco leaf yield in different treatments during *kharif* 2024

Treatments	Insecticides	Dose (ml or gm/lit)	Green leaf yield (kg/ha)	Cured leaf yield (kg/ha)	Percent increase in yield over control (%)
T_1	Afidopyropen 50 DC	0.3 ml/lit	12132[ab]	1451[ab]	78.69
T_2	Imidacloprid 17.8 SL	0.2 ml/lit	10850[bc]	1219[d]	50.12
T_3	Acetamiprid 20 SP	0.1 gm/lit	11324[bc]	1280[d]	57.64
T_4	Thiamethoxam 25 WG	0.2 gm/lit	11784[ab]	1317[cd]	62.19
T_5	Pymetrozine 50 WG	0.4 gm/lit	12066[ab]	1405[bc]	73.03
T_6	Flonicamid 50 WG	0.4 gm/lit	12889[a]	1520[a]	87.19
T_7	Cyantraniliprole 10.26 OD	0.3 ml/lit	9906[c]	1104[e]	35.96
T_8	Control	-	6574[d]	812[f]	-
F value			*	*	-
SEm±			284.93	21.40	-
CD@5%			1497.11	112.44	-

* Mean followed by different letters are significantly different at α=0.05 (p<0.05)

Table 4 VFSENC 3: Cost economics in various treatments for management of sucking pests in FCV tobacco during *kharif* 2024

Treat-ments	Insecticides	Cured leaf yield (kg/ha)	Cost of protection (Rs. /ha)	Total cost of production (Rs. / ha)	Gross returns (Rs. /ha)	Net returns (Rs. /ha)	C:B ratio
T_1	Afidopyropen 50 DC	1518	3525	165895	340985	175090	2.1
T_2	Imidacloprid 17.8 SL	1219	3275	163645	286465	122820	1.8
T_3	Acetamiprid 20 SP	1280	2650	164020	300800	136780	1.8
T_4	Thiamethoxam 25 WG	1317	3650	165020	309495	144475	1.9
T_5	Pymetrozine 50 WG	1425	3550	165920	330175	164255	2.0
T_6	Flonicamid 50 WG	1646	2900	165270	357200	191930	2.2
T_7	Cyantraniliprole 10.26 OD	1104	2775	164145	259440	95295	1.6
T_8	Control	812	0	157370	190820	33450	1.2

Project No.: VFSEN 34

Research project title	Population dynamics of insect pest complex and their natural enemies in tobacco ecosystem
Objectives of the project	▪ To record the insect pests occurring in tobacco ecosystem
Investigators	Prashantha C, T.M.Soumya & Santhosh Pattanshetti
Year of start	2021
Year of completion	2025
Location	ZAHRS, Shivamogga

Experimental details

Variety	Sahyadri
Season	*Kharif*2024
Area	100 m^2

RESULTS

In total five insect pests *viz.*, Aphids, Whiteflies, *Spodopteral itura*, *Helicoverpa armigera* and Semi looper and five natural enemies *viz.*, Lady bird beetles, *Spiders*, *Nesidiocoris sp*., *Ischiodon sp*. and Reduviid bugs were observed in tobacco ecosystem.

Salient research findings

- The aphid population was very high during the experimental period due to high temperature and humidity.
- Natural enemies like *Nesidiocoris sp*. and *Ischiodon sp.* were recorded more on aphid infested plants.

Table 1 VFSEN 34: Insect pests incidence in the tobacco ecosystem during *Kharif* 2024

Week	Month	MSW	Number of nymphs or adults/leaf		Number of larvae/plant		
			Whiteflies *B. tabaci*	Aphids *M. persicae*	*S. litura*	*H. armigera*	Semilooper
1st week	July	28	0.00	0.00	0.00	0.00	0.00
2nd week		29	0.90	0.00	0.50	0.00	0.00
3rd week		30	0.80	5.50	1.30	0.00	0.00
4th week	August	31	1.70	9.20	1.40	0.00	0.00
5th week		32	2.90	72.30	1.50	0.10	0.00
6th week		33	3.40	114.20	1.40	0.00	0.40
7th week		34	3.20	190.50	2.00	0.10	0.20
8th week	September	35	4.00	215.60	2.10	0.20	0.40
9th week		36	4.20	230.80	2.00	0.20	0.20
10thweek		37	4.00	284.50	2.50	0.00	0.20
11thweek		38	4.00	262.00	2.70	0.10	0.70
12thweek	October	39	3.00	242.00	2.50	0.80	0.20
13thweek		40	3.40	217.50	1.40	0.60	0.10
14thweek		41	3.50	192.40	1.30	0.80	0.80
15thweek		42	3.20	178.30	1.40	2.50	0.60
16thweek		43	3.00	165.70	1.60	1.80	0.50
17thweek	November	44	2.30	160.80	0.60	0.70	0.00

MSW-Mean Standard Week

Table 2 VFSEN 34: Natural enemies observed in the tobacco ecosystem during *Kharif* 2024

Weeks	Month	MSW	Number of natural enemies/plant				
			LBB	Spiders	*Nesidiocoris sp.*	*Ischiodon sp.*	Reduviid bug
1st week	July	28	0.00	0.00	0.00	0.00	0.00
2nd week		29	0.00	0.00	0.00	0.00	0.00
3rd week		30	0.20	0.0	0.00	0.00	0.00
4th week	August	31	0.20	0.10	0.60	0.00	0.10
5th week		32	0.00	0.10	1.00	0.20	0.10
6th week		33	0.30	0.20	1.30	0.40	0.10
7th week		34	0.40	0.60	2.20	0.70	0.20
8th week	September	35	0.00	0.50	3.10	1.00	0.10
9th week		36	0.10	0.40	3.60	1.20	0.10
10th week		37	0.20	0.50	3.30	1.80	0.10
11th week		38	0.00	0.50	3.80	2.20	0.20
12th week	October	39	0.60	0.50	3.10	2.10	0.10
13th week		40	0.60	0.40	3.40	2.40	0.10
14th week		41	0.70	0.30	3.70	2.80	0.10
15th week		42	0.20	0.10	3.00	2.30	0.10
16th week		43	0.20	0.20	2.20	1.60	0.00
17th week	November	44	0.20	0.10	2.10	0.80	0.10

MSW-Mean Standard Week, LBB-Lady Bird Beet

Project No.: VFSEN 37

Research project title	Validation of IPM modules against *Spodoptera litura* in FCV tobacco
Objectives of the project	▪ To evaluate the different modules for the management of *Spodoptera litura*in FCV Tobacco
Investigators	Prashantha C, T.M.Soumya & Santosh Pattanashetti
Year of start	2023
Year of completion	2024 **(CONCLUDED)**
Location	ZAHRS, Shivamogga
Duration	2 years

Experimental details

Design	RCBD
Replications	Five
Variety	Sahyadri
Season	*Kharif* 2023
Treatments	4
Plot size	7m X 7 m

Details of the different modules for the management of *Spodoptera litura* in FCV Tobacco

Treatments	Modules	Particulars
M_1	Integrated	• Sowing of trap crop (Castor) 15 days before planting • Collection and destruction of egg masses • Installation of pheromone traps (Spodlure/Litlure) @ 4/acre at 15 DAP& erection of bird perches @ 20/acre • Need based spraying of Azadirachtin 10000 ppm @ 2ml/L, *Btkurstaki* @ 1.5 g/L, Emamectin benzoate 5SG @0.5 g/L
M_2	Bio-intensive	• Spray of Azadirachtin 10000 ppm @ 2 ml/L 15 DAP • *Btkurstaki* @ 1.5 g/L at 45 DAP • SlNPV @250 LE/ha at 60 DAP and • *Beauveria bassiana* at 75 DAP
M_3	Chemical	• First spray - Novaluron 10 EC @ 1ml/L 15 DAP • Second spray -Emamectin benzoate 5SG @0.5 g/L 45 DAP • Third spray - Chlorantraniliprole 18.5 SC @0.3 ml/L at 60 DAP
M_4	Control	• Untreated Control

RESULTS

The overall mean egg masses of *S. litura* per plant indicated that, the Module-1 has recorded negligible number of 0.06 egg masses per plant which was followed by Module-3 and Module-2 with 0.32 and 0.36 egg mass per plant, respectively (Table 1 VFSEN 37). However, untreated control recorded highest number of egg mass of 0.79 per plant. The overall mean population of *S. litura* indicated that, the Module-1 has recorded lowest larval population of 0.27 per plant which was followed by Module 3 and Module 2 with 0.32 and 0.69 larva per plant, respectively (Table 2 VFSEN 37). However, untreated control recorded highest mean larval population of 1.55 per plant. The overall mean number of damaged leaves indicated that, module 1 has recorded lowest number of damaged leaves per plant (5.09% damaged leaves) followed by module 3 (7.39% damaged leaves) followed by module 2 (14.57% damaged leaves) (Table 3 VFSEN 37). However, untreated control recorded highest number of damaged leaves per plant (22.06% damaged leaves). The overall mean number of natural enemies indicated that, untreated control recorded highest number of 1.18 natural enemies per plant and module 1 and module 2 recorded 1.03 and 0.93 number of natural enemies per plant, respectively (Table 4 VFSEN 37). However, module 3 recorded lowest number of natural enemies per plant (0.31). Significant differences in the leaf yield were noticed among all the modules. Module 1 recorded highest green and cured leaf yield of 11860 and 1479 kg/ha, respectively, followed by module 3 (10678 kg/ha and 1365 kg/ha). Module 2 recorded 9546 kg/ha and 1101 kg/ha of green and cured leaf yield, respectively (Table 4 VFSEN 37). Lowest green and cured leaf yield was recorded in untreated control (7432 kg/ha and 804 kg/ha). The higher cost benefit ratio of 1:2.1 was recorded in IPM module followed by chemical module (1:1.9) and bio-intensive module (1:1.5). However, lowest cost benefits ratio of1: 1.2 was recorded in untreated control (Table 6 VFSEN 37).

Salient research findings

- Among the different modules evaluated, the Module-I was found to be most promising with lowest incidence of *S. litura* and highest percent reduction over control. Integration of castor as a trap crop, collection and destruction of *S. litura* egg mass, use of pheromone trap & bird perches and need based folia spray of insecticides could protect FCV tobacco from *S. litura.*

Table 1 VFSEN 37: Effect of different modules on *S. litura* egg masses in tobacco during *Kharif* 2024

Modules	Mean number of *S. litura* egg masses per plant												Overall Mean	ROC (%)
	Meteorological Standard Weeks													
	28	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**		
M1	0.00 (0.71)	0.04 (0.73)^{c}	0.04 (0.73)^{d}	0.04 (0.73)^{c}	0.08 (0.76)^{d}	0.08 (0.76)^{c}	0.04 (0.73)^{c}	0.12 (0.79)^{c}	0.08 (0.76)^{d}	0.08 (0.76)^{c}	0.04 (0.73^{d}	0.04 (0.73)^{d}	0.06	92.86
M2	0.00 (0.71)	0.08 (0.76)^{b}	0.12 (0.79)^{b}	0.40 (0.95)^{b}	0.48 (0.99^{a}	0.52 (1.01)^{a}	0.48 (0.99)^{b}	0.52 (1.01)^{b}	0.44 (0.97)^{c}	0.48 (0.99)^{b}	0.36 (0.99)^{c}	0.52 (0.93)^{c}	0.36	54.20
M3	0.00 (0.71)	0.04 (0.73)^{c}	0.08 (0.76)^{c}	0.08 (0.76)^{c}	0.12 (0.79)^{c}	0.32 (0.91^{b}	0.48 (0.99)^{b}	0.44 (0.97)^{b}	0.56 (1.03)^{b}	0.52 (1.01)^{b}	0.68 (1.09)^{b}	0.56 (1.03)^{b}	0.32	59.24
M4	0.00 (0.71)	0.12 (0.79)^{a}	0.36 (0.93)^{a}	0.44 (0.97)^{a}	0.32 (0.91)^{b}	0.52 (1.01)^{a}	0.88 (1.17)^{a}	1.32 (1.35)^{a}	1.40 (1.38)^{a}	1.48 (1.41)^{a}	1.36 (1.36)^{a}	1.32 (1.35)^{a}	0.79	-
F value	NS	*	*	*	*	*	*	*	*	*	*	*	-	-
SEm±	0.002	0.004	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.03	-	-
CV(%)	8.92	11.25	13.21	12.11	10.89	10.53	11.69	12.14	12.71	12.85	12.49	12.66	-	-
CD@5%	0.006	0.01	0.03	0.04	0.04	0.05	0.08	0.10	0.11	0.11	0.11	0.10	-	-

M1: IPM module, M2: Bio-intensive module, M3: Chemical module and M4: Untreated control; Numbers in the parenthesis are square root transformed value of $\sqrt{x+0.5}$; NS: Non-significant ($p>0.05$); * Mean followed by different letters are significantly different at $\alpha=0.05$ ($p<0.05$); ROC: Reduction over control

Table 2 VFSEN 37: Effect of different modules on larval population of *S. litura* in tobacco during *Kharif*-2024

Modules	Mean number of *S. litura* larvae per plant												Overall Mean	ROC (%)
	Meteorological Standard Weeks													
	28	29	30	31	32	33	34	35	36	37	38	39		
M1	0.28 (0.88)	0.28 (0.88)c	0.24 (0.86)d	0.12 (0.79)d	0.08 (0.76)d	0.12 (0.79)d	0.24 (0.86)d	0.32 (0.91)c	0.28 (0.88)c	0.36 (0.93)c	0.44 (0.97)c	0.44 (0.97)c	0.27	82.76
M2	0.32 (0.91)	0.44 (0.97)b	0.68 (1.09)b	0.60 (1.05)b	0.76 (1.12)b	0.72 (1.10)b	0.69 (1.09)b	0.68 (1.09)b	0.60 (1.05)b	1.04 (1.24)b	0.92 (1.19)b	0.84 (1.16)b	0.69	55.33
M3	0.32 (0.91)	0.40 (0.95)b	0.44 (0.97)c	0.48 (0.99)c	0.32 (0.91)c	0.32 (0.91)c	0.40 (0.95)c	0.24 (0.86)c	0.40 (0.95)c	0.32 (0.91)c	0.12 (0.79)d	0.08 (0.76)d	0.32	79.31
M4	0.28 (0.88)	0.60 (1.05)a	0.80 (1.14)a	0.96 (1.21)a	1.04 (1.24)a	1.56 (1.44)a	1.24 (1.32)a	3.36 (1.96)a	2.40 (1.70)a	1.68 (1.48)a	2.40 (1.70)a	2.24 (1.66)a	1.55	-
F value	NS	*	*	*	*	*	*	*	*	*	*	*	-	-
SEm±	0.01	0.02	0.02	0.03	0.03	0.04	0.03	0.07	0.06	0.05	0.06	0.05	-	-
CV(%)	9.70	9.58	10.27	11.27	12.04	12.91	11.33	14.43	13.48	12.03	13.34	13.17	-	-
CD@5%	0.04	0.06	0.08	0.08	0.09	0.12	0.14	0.23	0.17	0.14	0.18	0.16	-	-

M1: IPM module, M2: Bio-intensive module, M3: Chemical module and M4: Untreated control; Numbers in the parenthesis are square root transformed value of √x+0.5; NS: Non-significant (p>0.05); * Mean followed by different letters are significantly different at α=0.05(p<0.05); ROC: Reduction over control

Table 3 VFSEN 37: Effect of different modules on percent leaves damage in tobacco during *Kharif* 2024

Modules	Percent leaves damaged plant												Overall Mean	ROC (%)
	Meteorological Standard Weeks													
	28	29	30	31	32	33	34	35	36	37	38	39		
M1	5.31 (13.33)c	13.28 (21.37)c	14.34 (22.25)c	5.58 (13.66)d	5.31 (13.33)d	2.66 (9.38)c	2.99 (9.95)d	3.10 (10.14)c	3.98 (11.51)c	1.99 (8.11)c	0.72 (4.88)d	1.81 (7.73)c	5.09	76.93
M2	23.90 (29.27)a	39.84 (39.14)a	28.68 (32.38)b	15.14 (22.90)b	11.95 (20.23)b	11.16 (19.51)b	9.46 (17.91)b	7.97 (16.40)b	9.96 (18.40)b	5.18 (13.15)b	5.43 (13.48)b	6.16 (14.37)b	14.57	33.96
M3	13.28 (21.37)b	18.59 (25.54)b	15.94 (23.53)c	8.76 (17.22)c	8.63 (17.09)c	4.25 (11.90)c	4.98 (12.89)c	3.10 (10.14)c	3.49 (10.76)c	2.99 (9.95)c	2.90 (9.80)c	1.81 (7.73)c	7.39	66.49
M4	5.27 (13.27)c	18.58 (25.53)b	49.40 (44.66)a	18.34 (25.36)a	17.26 (24.55)a	24.97 (29.98)a	26.64 (31.08)a	21.28 (27.47)a	23.43 (28.95)a	23.13 (28.75)a	19.39 (26.13)a	17.04 (24.38)a	22.06	0.00
Fvalue	*	*	*	*	*	*	*	*	*	*	*	*		
SEm±	0.48	0.03	1.35	0.56	0.51	0.62	0.64	0.51	0.58	0.52	0.44	0.40		
CV(%)	8.98	9.32	11.12	10.48	10.49	12.82	12.92	12.88	12.61	13.93	13.90	13.38		
CD@5%	1.48	0.09	4.15	1.73	1.56	1.90	1.96	1.57	1.78	1.60	1.36	1.24		

M1: IPM module, M2: Bio-intensive module, M3: Chemical module and M4: Untreated control; Numbers in the parenthesis are arcsine transformed value of $\sqrt{x+0.5}$* Mean followed by different letters are significantly different at $\alpha=0.05 (p<0.05)$; ROC: Reduction over control

Table 4 VFSEN 37: Effect of different IPM modules on natural enemies in FCV tobacco during *Kharif*-2024

Modules	Mean number of natural enemies per plant												Overall Mean
	Meteorological Standard Weeks												
	28	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	
M1	0.04 (0.73)^{b}	0.12 (0.79)^{c}	0.16 (0.81)^{c}	0.56 (1.03)^{a}	0.68 (1.09)^{b}	1.16 (1.29)^{b}	1.24 (1.32)^{b}	1.76 (1.50)^{a}	1.80 (1.52)^{a}	1.56 (1.44)^{a}	1.68 (1.48)^{a}	1.56 (1.44)^{b}	1.03
M2	0.12 (0.79)^{a}	0.24 (0.86)^{b}	0.24 (0.86)^{b}	0.40 (0.95)^{b}	0.72 (1.10)^{b}	0.92 (1.19)^{c}	1.20 (1.30)^{b}	1.08 (1.26)^{b}	1.40 (1.38)^{b}	1.56 (1.44)^{a}	1.76 (1.50)^{a}	1.56 (1.44)^{b}	0.93
M3	0.04 (0.73)^{b}	0.12 (0.79)^{c}	0.24 (0.86)^{b}	0.36 (0.93)^{b}	0.56 (1.03)^{c}	0.64 (1.07)^{d}	0.36 (0.93)^{c}	0.36 (0.93)^{c}	0.56 (1.03)^{c}	0.24 (0.86)^{b}	0.12 (0.79)^{c}	0.12 (0.79)^{c}	0.31
M4	0.12 (0.79)^{a}	0.36 (0.93)^{a}	0.36 (0.93)^{a}	0.56 (1.03)^{a}	1.16 (1.29)^{a}	1.64 (1.46)^{a}	1.60 (1.45)^{a}	1.76 (1.50)^{a}	1.80 (1.52)^{a}	1.64 (1.46)^{a}	1.44 (1.39)^{b}	1.76 (1.50)^{a}	1.18
Fvalue	*	*	*	*	*	*	*	*	*	*	*	*	
SEm±	0.00	0.01	0.01	0.02	0.03	0.05	0.05	0.06	0.06	0.06	0.08	0.06	
CV(%)	11.09	11.14	10.12	9.40	9.98	10.06	10.29	10.52	9.89	10.34	10.35	10.91	
CD@5%	0.01	0.03	0.03	0.06	0.11	0.15	0.16	0.18	0.19	0.18	0.18	0.19	

M1: IPMmodule, M2: Bio-intensivemodule, M3: ChemicalmoduleandM4: Untreatedcontrol;Numbersintheparenthesis aresquare root transformedvalue of $\sqrt{x+0.5}$; NS: Non-significant($p>0.05$); * Mean followedby different letters are significantlydifferent at $\alpha=0.05$($p<0.05$)

Table 5 VFSEN 37: Effect of different modules on yield of FCV tobacco during *Kharif*-2024

Modules	Green leaf yield (kg/ha)	Cured leaf yield (kg/ha)	Percent increase in cured leaf yield over control
M1	11860	1479[a]	83.96
M2	9546	1101[b]	36.94
M3	10678	1365[a]	69.78
M4	7432	804[c]	
F test		*	
SEm±		40.88	
C.V. (%)		7.70	
C.D.@5%		125.97	

M1: IPM module, M2: Bio-intensive module, M3: Chemical module and M4: Untreated control; * Mean followed by different letters are significantly different at $\alpha=0.05$ ($p<0.05$)

Table 6 VFSEN 37: Cost benefit ratio of different modules against *Spodoptera litura* during *Kharif*2023

Modules	Yield (kg/ha)	Cost of protection (Rs. /ha)	Total cost of production (Rs. /ha)	Gross returns (Rs. /ha)	Net returns (Rs. /ha)	B:C
M1	1479	5065	167435	347565	180130	2.1
M2	1101	8045	169415	258735	89320	1.5
M3	1365	6364	166734	320775	154041	1.9
M4	804	00	157370	188940	31570	1.2

II. PLANT PATHOLOGY

A. *BIDI* TOBACCO

ANAND

Project No.: BDAPP 126

Research project title	**Monitoring of resistance development in *Pythium aphanidermatum* to fungicides**
Objectives	A) Monitoring of resistance in *P. aphanidermatum* against Metalaxyl + Mancozeb B) Monitoring of resistance in *P. aphanidermatum* against azoxystrobin
Investigators	Y. M. Rojasara
Year of start	2001-02 B) 2015-16
Year of completion	Long term (**CONCLUDED)**
Location	BTRS, AAU, Anand

Damping-off caused by *Pythium aphanidermatum* is an economically important disease of bidi tobacco in nursery. Bordeaux mixture at 0.6 % gives reasonable control of the disease. Metalaxyl + Mancozeb and Azoxystrobin are found to be effective against the disease and is recommended for management in the nursery in Gujarat. Since both being systemic fungicides, there exists a possibility for development of resistance in the target pathogen to the product. In order to monitor this phenomenon in the pathogen, this long-term program has been planned.

(A) Treatments

1.	Metalaxyl + Mancozeb @ 2.16 kg a.i./ha (i.e. 68 WP @ 3.17 kg/ha); 2-3 drenching as and when required starting from disease development…. …	(RDMZ)
2.	Bordeaux mixture (BM) at 0.6%; 4 to 5 drenching as and when required starting from disease development. …. …. ….	(BM)
3.	Control - No fungicide treatment. …. …. … ... ….	(CON)

Methodology

Six beds each of 1.44 m^2 size for each of the above three treatments seeded with susceptible *bidi* tobacco variety Anand 119 were maintained and received respective treatments. Percent incidence of damping-off in each case was worked out at the end of the season/experiment. The pathogen, which survived in the fungicide treated beds, was subjected to test against the fungicide, with three different concentrations using poisoned food technique in the laboratory and appropriate conclusion was drawn with respect to resistance development in the fungus.

RESULTS

The results of year 2002-03 presented in Table 1BDAPP 126-A indicated that maximum damped-off seedlings were recorded in control treatment (335/m^2) in comparison to metalaxyl MZ (15/m^2) followed by Bordeaux mixture (107/m^2). More or less same trend was observed in each year of experimentation. The pooled results revealed that a significantly minimum damped-off seedlings were recorded in metalaxyl MZ (28/m^2) which is at par with Bordeaux mixture (34/m^2), while the control treatment (117/m^2) registered maximum damped-off seedlings.

The data of the year 2002-03 recorded in (Table 2BDAPP 126-A) revealed that maximum transplantable seedlings were found in metalaxyl MZ (1050/m^2) and Bordeaux mixture (952/m^2) which significantly superior over control treatment (581/m^2). The pooled results revealed that a significantly maximum transplantable seedlings were recorded in metalaxyl MZ (654/m^2) which is at par with Bordeaux mixture (615/m^2), while control treatment (400/m^2) registered minimum transplantable seedlings.

Laboratory studies suggested cent percent inhibition of the *Pythium aphanidermatum* isolated from diseased seedlings *in-vitro* indicating absence of resistance in the pathogen to the chemical fungicide.

(B) Treatments:

1	Azoxystrobin 23 SC @ 0.023% (230g a.i./ha i.e. 10 ml/10 l water / 100m^2) 2 -3 spray drenching	(AZO)
2	Azoxystrobin (18.2) + Difenoconazole (11.4) 29.6 SC (372 g a.i./ha i.e. 12.6 ml/10 l water/100m^2) 2-3 spray drenching	(AZO+DIF)
3	Control - No fungicide treatment	(CON)

Methodology: As above in metalaxyl MZ

RESULTS

The results of the year 2015-16, presented in Table 3BDAPP 126-B, indicated that maximum damped-off seedlings were recorded in the control treatment (333/m^2) in comparison to azoxystrobin (52/m^2) and azoxystrobin + difenoconazole (40/m^2). A more or less similar trend was observed in each year of experimentation. The pooled results revealed that a significantly minimum damped-off seedlings were recorded in azoxystrobin + difenoconazole (42/m^2) which is at par with azoxystrobin (49/m^2), while control treatment (196/m^2) registered maximum damped-off seedlings.

The data of the year 2015-16 recorded in table 4BDAPP 126-B revealed that maximum transplantable seedlings were found in azoxystrobin + difenoconazole (419/m^2) and azoxystrobin (390/m^2) which significantly superior over control treatment (113/m^2). The pooled results revealed that a significantly maximum transplantable seedlings were recorded in azoxystrobin + difenoconazole (572/m^2) which is at par with azoxystrobin (559/m^2), while control treatment (291/m^2) registered minimum transplantable seedlings.

Laboratory studies suggested cent percent inhibition of the *Pythium aphanidermatum* isolated from diseased seedlings *in-vitro* indicating absence of resistance in the pathogen to the chemical fungicide.

Table 1 BDAPP 126-A: Effect of fungicides on number of damped-off seedlings in *bidi* tobacco nursery (Pooled 2002-03 to 2023-24)

Treatments	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
RDMZ	15	66	27	7	7	3	3	4	55	8	44	24
BM	107	74	4	1	6	20	11	11	35	14	36	21
CON	335	183	35	52	42	25	52	15	158	54	90	102
S.Em±	42.45	7.53	9.06	8.24	7.58	6.38	5.83	2.58	15.52	1.31	6.75	3.25
CD @ 5%	133.76	23.73	NS	25.97	23.90	NS	18.37	8.13	48.91	4.13	21.28	10.23
CV %	68.24	17.14	100.00	102.95	102.26	99.33	64.28	64.65	46.09	12.74	29.33	16.28

Treatments	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**POOLED**
RDMZ	49	19	27	19	84	43	59	10	18	22	28
BM	31	18	18	11	142	46	67	21	26	30	34
CON	116	74	114	61	376	161	170	80	118	162	117
S.Em±	12.50	5.16	9.53	4.81	19.12	4.44	6.75	6.26	4.36	2.43	8.91
C.D. @ 5%	39.40	16.25	30.02	15.15	60.25	13.98	21.28	19.74	13.75	7.66	25.19
CV %	47.00	34.19	44.17	38.82	23.34	13.01	16.79	41.22	19.77	8.31	
										Y x T	
										S.Em±	12.13
										CD @ 5%	33.63
										CV %	49.86

Table 2 BDAPP 126-A: Effect of fungicides on healthy transplantable seedlings in *bidi* tobacco nursery (Pooled 2002-03 to 2023-24)

Treatments	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
RDMZ	1050	693	704	845	196	354	689	840	956	777	808	684
BM	952	671	804	794	127	475	614	812	913	748	772	674
CON	581	492	485	684	110	313	510	546	597	501	617	138
S.Em±	42.45	24.90	26.62	42.19	17.23	31.42	46.72	25.62	49.92	17.06	37.81	25.89
CD @ 5%	133.76	78.46	83.87	NS	54.28	99.01	NS	80.74	157.28	53.75	119.12	81.59
CV %	12.08	9.86	9.01	13.34	29.21	20.22	10.94	8.57	14.88	6.18	12.65	12.73

Treatments	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	POOLED
RDMZ	900	460	705	424	420	411	441	762	668	610	654
BM	1135	406	504	256	395	359	415	567	598	546	615
CON	485	335	293	188	213	215	256	465	395	395	400
S.Em±	58.85	29.07	50.26	26.87	31.21	20.55	16.46	32.72	27.70	24.78	18.99
CD @ 5%	185.44	91.60	158.35	84.65	98.32	64.76	51.87	103.11	87.29	78.09	54.24
CV %	17.16	17.78	24.59	22.75	22.31	15.34	10.89	13.41	12.26	11.74	
										Y x T	
										S.Em±	34.10
										CD @ 5%	94.54
										CV %	15.01

Table 3 BDAPP 126-B: Effect of fungicides on number of damped-off seedlings in *bidi* tobacco nursery (Pooled 2015-16 to 2023-24)

Treatments	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	POOLED
Azoxystrobin	52	35	9	90	58	68	50	43	35	49
Azoxystrobin + Difenoconazole	40	41	8	67	68	51	45	30	26	42
Control	330	201	52	350	212	152	125	170	168	196
S.Em+	21.15	15.32	5.79	20.46	10.76	12.33	14.28	11.30	3.66	15.78
CD @ 5%	66.63	48.27	18.26	64.46	33.92	38.84	44.99	35.87	11.55	47.33
CV %	36.84	40.72	61.86	29.61	23.40	33.51	47.69	34.33	11.73	
									Y x T	
									S.Em+	13.94
									CD @ 5%	39.23
									CV %	35.70

Table 4BDAPP 126-B: Effect of fungicides on healthy transplantable seedlings in *bidi* tobacco nursery (Pooled 2015-16 to 2023-24)

Treatments	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	POOLED
Azoxystrobin	390	722	382	619	588	446	658	590	634	559
Azoxystrobin + Difenoconazole	419	746	327	608	606	463	645	647	690	572
Control	113	328	303	253	256	242	430	341	360	291
S.Em+	11.43	56.96	38.69	40.47	31.85	16.27	26.01	20.76	11.92	20.83
CD @ 5%	36.02	179.48	NS	127.51	100.36	51.26	81.96	65.41	37.57	62.47
CV %	9.11	23.31	28.11	20.11	16.14	10.40	11.03	9.67	5.20	
									Y x T	
									S.Em+	31.69
									CD @ 5%	89.46
									CV %	16.37

Project No.: BDAPP 128

Research project title	**Screening for resistance to damping-off and root-knot in tobacco (Joint study by Plant Pathology and Plant Breeding sections)**
Objectives of the project	▪ To identify damping-off and root-knot resistant/tolerant genotype(s)
Investigators	Y. M. Rojasara&D. R. Delvadiya
Year of start	2002-03
Year of completion	Continuous experiment
Location	BTRS, AAU, Anand

Damping-off of tobacco caused by *Pythium aphanidermatum* is an economically important disease of nursery. The severity of pre and post-emergence damping-off leads to less seedling emergence. Under most congenial environmental conditions, the nursery gets completely destroyed. Due to relative ease in management of the disease by Metalaxyl + Mancozeb, due attention has not been paid for searching for resistance/tolerance in tobacco genotypes. There exists some variability but only preliminary and limited work to find differential response in tobacco genotypes has been done so far. Ultimately, it is essential to evolve damping-off resistant/tolerant cultivars to keep the cost of nursery raising at low level.

Root-knot incited by nematode *Meloidogyne incognita* and *M. javanica* is another important problem both in nursery and field. Losses due to root-knot nematode (RKN) to the tune of 50% have been reported in *bidi* tobacco. Although effective technologies of RKN management in nursery have been evolved, concerted efforts need to be made so that its management in field crop is achieved to a satisfactory level. Finding resistance in cultivars would be a most appropriate proposition.

Methodology: Twenty numbers of tobacco genotypes/lines including check were evaluated separately for damping-off and root-knot diseases employing standard procedures in nursery and controlled conditions.

RESULTS

Results (Table1 BDAPP 128) revealed that out of 20 genotypes/lines, eleven and nine line showed moderately susceptible and susceptible reaction, respectively to damping-off disease in the nursery conditions. Out of 20 lines/varieties (Table 2 BDAPP128),one was highly resistant, six were resistant, seven were moderately resistant, four were moderately susceptible and two were susceptible to root-knot disease.

Salient research findings

- Eleven and nine line showed moderately susceptible and susceptible reaction, respectively to damping-off disease in the nursery conditions. Out of 20 genotypes, one was highly resistant, six were resistant, seven were moderately resistant, four were moderately susceptible and two were susceptible to root-knot disease.

Table 1 BDAPP 128: Reaction to damping-off disease in the nursery conditions

S. No.	Culture/ variety / line	Percent damped-off seedlings	Reaction
1	ABD 289	38	MS
2	ABD 290	56	S
3	ABD 291	47	MS
4	ABD 292	45	MS
5	ABD 293	35	MS
6	ABD 294	55	S
7	ABD 295	64	S
8	ABD 296	58	S
9	ABD 297	52	S
10	ABD 298	36	MS
11	ABD 299	40	MS
12	ABD 300	58	S
13	ABD 301	40	MS
14	ABD 302	68	S
15	ABD 303	36	MS
16	ABD 304	54	S
17	ABD 305	42	MS
18	A 119 (C)	64	S
19	GT 7 (C)	48	MS
20	ABT 10 (C)	34	MS

Table 2BDAPP 128: Reaction to root-knot disease

S. No.	Culture/ variety /line	Root-knot index (0-5)*			Index range	Reaction on maximum index
		Nursery	Sick field	Pot		
1	ABD 289	0.80	0.80	1.80	1-3	MR
2	ABD 290	1.20	1.40	1.40	1-2	MR
3	ABD 291	1.00	2.40	2.60	2-3	MS
4	ABD 292	1.80	0.40	2.20	1-3	MS
5	ABD 293	2.00	0.40	2.60	1-4	MS
6	ABD 294	1.00	0.40	2.00	1-3	MR
7	ABD 295	1.40	0.40	1.60	1-2	MR
8	ABD 296	0.80	1.00	0.60	0-1	R
9	ABD 297	0.60	1.40	0.80	0-2	R
10	ABD 298	0.40	1.40	1.00	1	R
11	ABD 299	0.60	1.00	1.00	1	R
12	ABD 300	1.60	1.00	2.40	1-4	MS
13	ABD 301	1.40	1.40	1.80	1-3	MR
14	ABD 302	1.00	1.00	1.00	1	MR
15	ABD 303	0.60	0.40	0.80	0-2	R
16	ABD 304	0.80	0.00	0.60	0-1	R
17	ABD 305	1.60	1.00	1.80	1-3	MR
18	A 119 (C)	1.20	1.00	3.40	3-4	S
19	GT 7 (C)	0.60	2.60	3.20	2-4	S
20	ABT 10 (C)	0.00	0.00	0.00	0	HR

*0=Free, 5=Maximum disease intensity,

HR = Highly Resistant; R= Resistant; MR= Moderately Resistant; MS =Moderately Susceptible; S= Susceptible; HS = Highly Susceptible

Project No.: BDAPP 813

Research project title	**Evaluation of fungicides against frog-eye leaf spot and *alternaria* leaf spot in *bidi* tobacco**
Objectives of the project	▪ To manage frog-eye leaf spot and *alternaria* leaf spot in *bidi* tobacco with fungicides
Investigators	Y. M. Rojasara & N. A. Bhatt
Year of start	20022-23
Year of completion	2025-26 **(CONCLUDED**)
Location	BTRS, AAU, Anand

Experiment details

Design	RBD
Replications	7
Variety	GT 7
Season	2024-25 (*Rabi*)
Treatments	3 modules
Plot size	Gross: 3.6 x 7.5 m Net:1.8 x 6.0 m
Spacing	90 x 75 cm

Frog-eye spot disease caused by *Cercospora nicotianae* Ellis &Everh. occurs every year in moderate to severe form starting from nursery to field crop. *Alternaria* leaf spot known as brown leaf spot caused by *Alternaria alternata* (Fr.) Keissl usually appears during the later stage of plant growth in the field and causes both qualitative and quantitative loss of cured leaf yield of bidi tobacco. The brown spot disease is a significant foliar disease that limits tobacco production worldwide (Cheng et al. 2011; Stavely 1975). The fungus mainly infects the leaves of tobacco, although the stems, pedicels, and capsules may also be damaged in severe cases (Lucas 1975; Shew and Lucas 1991). Tobacco leaves infected by this disease normally become incomplete, uneven baking leaf color and leaf thickness which results in poor quality of tobacco leaves and low value of industrial use (Jenning*et.al.,* 2002; Yakimova*et.al.,* 2009). Losses can reach more than 60% if disease management practices are not utilized. Therefore, the experiment was planned to manage the disease and improve quality.

Treatments : 11

Treatments	Conc. (%)	g a.i. /ha	Quantity of formulation required (g/10 litre water)
Carbendazim 12% + Mancozeb 63% WP	0.20	1000	26.25
Carbendazim 12% + Mancozeb 63% WP	0.26	1312.5	35
Carbendazim 12% + Mancozeb 63% WP	0.33	1650	43.75
Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0329	164.81	11.25
Azoxystrobin 11% + Tebuconazole 18.3% SC	0.04395	219.75	15
Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0549	275	18.75
Zineb 68% + Hexaconazole 4% WP	0.108	540	15
Zineb 68% + Hexaconazole 4% WP	0.144	720	20
Zineb 68% + Hexaconazole 4% WP	0.18	900	25
Zineb 75% WP	0.144	1.125	20
Control			

Observations recorded

1. Brown spot disease index (0-5)
2. Frog-eye spot disease index (0-5)
3. Cured leaf yield (kg/ha)

RESULTS

Year 2023-24: The results on evaluation of fungicides against frog-eye leaf spot and alternaria leaf spot in bidi tobacco (Table.1BDAPP 813) indicate that foliar spray of azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 percent immediately after appearance of the disease followed by another spray at 15 days interval recorded minimum percent disease index (PDI) of 6.91 which was at par with azoxystrobin 11% + tebuconazole 18.3% @ 0.04395% (10.21 PDI) followed by zineb 68% + hexaconazole 4% @ 0.18 percent (12.61 PDI). Among the fungicides, the performance of zineb 75% @ 0.144 percent (20.42 PDI) and carbendazim 12% + mancozeb 63% @ 0.20 and 0.26 percent (20.12 and 19.52 PDI, respectively) in terms of checking the incidence of the disease was inferior. Maximum disease incidence was noticed in untreated plots (27.50 PDI).

The data on yield parameters revealed that cured leaf yield was maximum (2372 kg/ha) in azoxystrobin 11% + tebuconazole 18.3% @ 0.0329 treatment followed by azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 (2339 kg/ha), carbendazim 12% + mancozeb 63% @ 0.26 percent (2249 kg/ha), azoxystrobin 11% + tebuconazole 18.3% @ 0.04395 percent (2207 kg/ha) and zineb 68% + hexaconazole 4% @ 0.144 percent (2198 kg/ha). There was no significant difference of cured leaf yield between the treatments. Treatments are not significant due to less incidence.

Year 2024-25: The results on evaluation of fungicides against frog-eye leaf spot and alternaria leaf spot in bidi tobacco (Table.2BDAPP 813) indicate that foliar spray of azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 percent immediately after appearance of the disease followed by another spray at 15 days interval recorded minimum percent disease index (PDI) of 8.51 followed by azoxystrobin 11% + tebuconazole 18.3% @ 0.04395% (12.21 PDI) which was at par with zineb 68% + hexaconazole 4% @ 0.18 percent (15.96 PDI). Among the fungicides, the performance of zineb 75% @ 0.144 percent (23.31 PDI) and carbendazim 12% + mancozeb 63% @ 0.20 and 0.26 percent (28.86 and 25.53 PDI, respectively) in terms of checking the incidence of the disease was found least effective. Maximum disease incidence was noticed in untreated plots (35.52 PDI).

The data on yield parameters revealed that cured leaf yield was maximum (2625 kg/ha) in carbendazim 12% + mancozeb 63% @ 0.2 treatment followed by azoxystrobin 11% + tebuconazole 18.3% @ 0.04395 (2570 kg/ha), azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 (2531 kg/ha), carbendazim 12% + mancozeb 63% @ 0.33 percent (2442 kg/ha) and azoxystrobin 11% + tebuconazole 18.3% @ 0.329 percent (2414 kg/ha). There was no significant difference of cured leaf yield between the treatments. The frog eye spot PDI in control (2024-25) is 12.21% and T6is having 6.61% PDI so it gives 45% disease control.

Table 1BDAPP 813: Effect of fungicides against *alternaria* leaf spot and frog-eye leaf spot in *bidi* tobacco (2023-24)

S. No.	Treatments	Conc. (%)	PDI		Percent reduction over control	Cured leaf yield (kg/ha)
			ALS	FES	ALS	
1	Carbendazim 12% + Mancozeb 63% WP	0.20	20.12 (26.62)*	6.01 (14.15)	26.83	1913
2	Carbendazim 12% + Mancozeb 63% WP	0.26	19.52 (26.00)	6.31 (14.47)	29.01	2249
3	Carbendazim 12% + Mancozeb 63% WP	0.33	14.41 (22.15)	6.61 (14.89)	47.60	2183
4	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.329	12.91 (21.04)	5.41 (13.44)	53.05	2372
5	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.04395	10.21 (18.34)	6.01 (14.18)	62.87	2207
6	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0549	6.91 (14.96)	4.80 (12.65)	74.87	2339
7	Zineb 68% + Hexaconazole 4% WP	0.108	13.51 (21.35)	6.31 (14.52)	50.87	1882
8	Zineb 68% + Hexaconazole 4% WP	0.144	13.21 (21.30)	6.01 (14.12)	51.96	2198
9	Zineb 68% + Hexaconazole 4% WP	0.18	12.61 (20.53)	6.91 (15.19)	54.15	2025
10	Zineb 75% WP	0.144	20.42 (26.86)	6.61 (14.86)	25.75	1902
11	Control	-	27.50 (31.32)	6.91 (15.23)	-	2050
	SEm±		1.95	0.68		145.57
	C.D. at 5%		5.76	NS		NS
	C.V.%		14.84	8.18		11.89

*Figures in parentheses are angular transformed values, while outside percent disease incidence (PDI) original values, ALS- Alternaria leaf spot, FES- Frog-eye spot

Table 2BDAPP 813: Effect of fungicides against *alternaria* leaf spot and frog-eye leaf spot in *bidi* tobacco (2024-25)

S. No.	Treatments	Conc. (%)	PDI		Percent reduction over control		Cured leaf yield (kg/ha)
			ALS	FES	ALS	FES	
1	Carbendazim 12% + Mancozeb 63% WP	0.20	28.86 (32.46)*	18.40 (9.99)	18.75	18.18	2625
2	Carbendazim 12% + Mancozeb 63% WP	0.26	25.53 (30.28)	18.06 (9.62)	28.68	21.21	2390
3	Carbendazim 12% + Mancozeb 63% WP	0.33	17.39 (24.63)	17.32 (8.88)	51.04	27.27	2442
4	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.329	17.02 (24.35)	15.78 (7.40)	52.08	39.39	2414
5	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.04395	12.21 (20.44)	15.37 (7.03)	65.63	42.42	2570
6	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0549	8.51 (16.91)	14.92 (6.66)	76.04	45.45	2531
7	Zineb 68% + Hexaconazole 4% WP	0.108	21.83 (27.83)	17.66 (9.25)	35.54	24.24	2340
8	Zineb 68% + Hexaconazole 4% WP	0.144	18.12 (25.19)	16.91 (8.51)	48.99	30.30	2260
9	Zineb 68% + Hexaconazole 4% WP	0.18	15.96 (23.47)	17.32 (8.88)	55.06	27.27	2222
10	Zineb 75% WP	0.144	23.31 (28.84)	18.37 (9.99)	34.38	18.18	2278
11	Control	-	35.52 (36.56)	20.44 (12.21)	-	-	2097
	SEm±		1.13	0.74			243.28
	CD@5%		3.35	2.17.			NS
	C.V.%		7.43	7.35			17.71

*Figures in parentheses are angular transformed values, while outside percent disease incidence (PDI) original values, ALS- Alternaria leaf spot, FES- Frog-eye spot

Table 3 BDAPP 813: Effect of fungicides on percent disease incidence of *alternaria* leaf spot and frog-eye leaf spot in *bidi* tobacco (Pooled)

S. No.	Treatment	Conc. (%)	*Alternaria* leaf spot (PDI)				Frog-eye leaf spot (PDI)			
			2023-24	2024-25	Pooled	PROC	2023-24	2024-25	Pooled	PROC
1	Carbendazim 12% + Mancozeb 63% WP	0.20	20.12 (26.62)*	28.86 (32.46)*	24.49 (29.54)	22.28	6.01 (14.15)	9.99 (18.40)	8.00 (16.28)	14.62
2	Carbendazim 12% + Mancozeb 63% WP	0.26	19.52 (26.00)	25.53 (30.28)	22.52 (28.10)	28.53	6.31 (14.47)	9.62 (18.06)	7.96 (16.26)	15.05
3	Carbendazim 12% + Mancozeb 63% WP	0.33	14.41 (22.15)	17.39 (24.63)	15.90 (23.39)	49.53	6.61 (14.89)	8.88 (17.32)	7.74 (16.10)	17.40
4	Azoxystrobin 11% + Tebuconazole18.3% SC	0.329	12.91 (21.04)	17.02 (24.35)	14.97 (22.70)	52.49	5.41 (13.44)	7.40 (15.78)	6.40 (14.61)	31.70
5	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.04395	10.21 (18.34)	12.21 (20.44)	11.21 (19.39)	64.42	6.01 (14.18)	7.03 (15.37)	6.52 (14.77)	30.42
6	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0549	6.91 (14.96)	8.51 (16.91)	7.71 (15.94)	75.53	4.80 (12.65)	6.66 (14.92)	5.73 (13.78)	38.85
7	Zineb 68% + Hexaconazole 4% WP	0.108	13.51 (21.35)	21.83 (27.83)	17.67 (24.59)	43.92	6.31 (14.52)	9.25 (17.66)	7.78 (16.09)	16.97
8	Zineb 68% + Hexaconazole 4% WP	0.144	13.21 (21.30)	18.12 (25.19)	15.67 (23.25)	50.27	6.01 (14.12)	8.51 (16.91)	7.26 (15.51)	22.52
9	Zineb 68% + Hexaconazole 4% WP	0.18	12.61 (20.53)	15.96 (23.47)	14.26 (22.00)	54.74	6.91 (15.19)	8.88 (17.32)	7.89 (16.25)	15.80
10	Zineb 75% WP	0.144	20.42 (26.86)	23.31 (28.84)	21.87 (27.85)	30.59	6.61 (14.86)	9.99 (18.37)	8.30 (16.61)	11.42
11	Control	-	27.50 (31.32)	35.52 (36.56)	31.51 (34.09)	-	6.91 (15.23)	12.21 (20.44)	9.37 (17.83)	-
	S Em.+	T	1.96	1.13	1.13		0.68	0.74	0.21	
		Y	-	-	0.48		-	-	0.51	
		TxY	-	-	1.60		-	-	0.71	
	CD at 5 %	T	5.76	3.35	3.21		NS	2.17	1.46	
		TxY	-	-	4.54		-	-	NS	
	C.V. (%)		14.84	7.43	11.23		8.18	7.35	7.74	

* Figures in parentheses are angular transformed values, while outside percent disease incidence (PDI) original values, ALS- Alternaria leaf spot, FES- Frog-eye spot

Table 4 BDAPP 813: Effect of fungicides on cured leaf yield in *bidi* tobacco (Pooled)

S. No.	Treatment	Conc. (%)	Cured leaf yield (kg/ha)		
			2023-24	2024-25	Pooled
1	Carbendazim 12% + Mancozeb 63% WP	0.20	1913	2625	2269
2	Carbendazim 12% + Mancozeb 63% WP	0.26	2249	2390	2319
3	Carbendazim 12% + Mancozeb 63% WP	0.33	2183	2442	2312
4	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.329	2372	2414	2393
5	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.04395	2207	2570	2389
6	Azoxystrobin 11% + Tebuconazole 18.3% SC	0.0549	2339	2531	2435
7	Zineb 68% + Hexaconazole 4% WP	0.108	1882	2340	2111
8	Zineb 68% + Hexaconazole 4% WP	0.144	2198	2260	2229
9	Zineb 68% + Hexaconazole 4% WP	0.18	2025	2222	2124
10	Zineb 75% WP	0.144	1902	2278	2090
11	Control	-	2050	2097	2073
	S Em.$\pm$	T	145.57	243.28	134.87
		Y	-	-	60.45
		TxY	-	-	200.48
	CD at 5 %	T	NS	NS	NS
		TxY	-	-	NS
	C.V. (%)		11.89	17.71	15.44

NS = Non Significant

Pooled Results

The pooled results presented in table 3BDAPP 813 indicated that foliar spray of azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 percent immediately after appearance of the disease followed by another spray at 15 days interval recorded minimum percent disease index (PDI) of 7.71 followed by azoxystrobin 11% + tebuconazole 18.3% @ 0.04395% (11.21 PDI) which was at par with zineb 68% + hexaconazole 4% @ 0.18 percent (14.26 PDI). Among the fungicides, the performance of zineb 75% @ 0.144 percent (21.87 PDI) and carbendazim 12% + mancozeb 63% @ 0.20 and 0.26 percent (24.49 and 22.52 PDI, respectively) in terms of checking the incidence of the disease was inferior. Maximum disease incidence was noticed in untreated plots (31.51 PDI).

The pooled data on yield parameters presented in table 4BDAPP 813 revealed that cured leaf yield was maximum (2435 kg/ha) in azoxystrobin 11% + tebuconazole 18.3% @ 0.0549 followed by azoxystrobin 11% + tebuconazole 18.3% @ 0.329 percent (2393 kg/ha), azoxystrobin 11% + tebuconazole 18.3% @ 0.04395 (2389 kg/ha) and carbendazim 12% + mancozeb 63% @ 0.26 percent (2319 kg/ha). There was no significant difference of cured leaf yield between the treatments. The incidence of frog-eye spot was negligible and not destructive to the crop.

Conclusion: Looking to the above results, it concluded that azoxystrobin 11% + tebuconazole 18.3% SC found best for management of alternaria leaf spot and frog-eye leaf spot. In addition to azoxystrobin 11% + tebuconazole 18.3% SC, combi-product zineb 68% + hexaconazole 4% WP was found effective for managing leaf spot disease.

Proposed Recommendation: *Bidi* tobacco farmers are advised to spray azoxystrobin 11% + tebuconazole 18.3% SC, (15 ml/10 l water) or zineb 68% + hexaconazole 4% WP (20 g/10 l water) first at initiation of disease and second at 15 days after first spray for effective management of *alternaria* leaf spot and frog-eye leaf spot disease in bidi tobacco field.

Project No.: BDAPP 511

Research project title	**Screening of advanced breeding materials/ introductions/ genotypes for major diseases of tobacco under field and control conditions**
Objectives of the project	▪ To locate the source of resistance for major diseases of tobacco
Investigators	Y. M. Rojasara & D. R. Delvadiya
Year of start	2018-19
Year of completion	Long term
Location	BTRS, AAU, Anand

RESULTS

During the year under report, total 47 entries of bidi tobacco grown in different generations were artificially inoculated with tobacco mosaic virus and evaluated for resistance to mosaic. Out of these, 38 entries including segregation materials showed resistance to the disease and these materials are maintained by plant breeding section for further breeding advancement work.

Screening of tobacco cultures for resistance to Tobacco Leaf Curl Virus (TLCV) during the year 2023-24 revealed that none of the entries were found free from leaf curl in field conditions.

During the year 2024-25, seventy-nine entries of advanced breeding materials /crosses of bidi tobacco, twenty-nine entries of *rustica* tobacco and two entries of chewing tobacco (Table 1 BDAPP 511) including respective check were examined for mosaic, leaf curl and frog-eye spot diseases. Observations revealed that, twenty-eight entries were found free from mosaic disease in bidi tobacco while none of the entries were free from *rustica* and chewing tobacco. None of the entries were free from leaf curl infection of *bidi*, *rustica* and chewing tobacco. Four entries/check were found free from leaf curl but they were infected in previous year. During the year very low incidence of frog-eye leaf spot disease was noticed.

Out of 68 genotypes screened including check varieties (Table 2 BDAPP 511), two genotypes including check were found free from root-knot index in root-knot sick field and selected for further screening in the next year.

Salient research findings

- Out of seventy-nine *bidi* tobacco, twenty-nine *rustica* tobacco, and two entries of chewing tobacco, none of the entries were found free from leaf curl infection. Out of forty-seven entries, thirty-eight entries including segregation materials showed resistance to tobacco mosaic virus under artificially inoculated conditions. Out of sixty-eight genotypes screened, two genotypes were found free from root-knot infection in root-knot sick field.

Table 1BDAPP 511: Leaf curl and mosaic incidence in natural condition (2024-25)

Sr. No.	Name of trial	No. of entries screened (Check)	No. of entries (Natural conditions)		
			Mosaic free	Leaf curl free	Frog-eye spot free
***Bidi* Tobacco**					
1	IVT	6+4	0+0	0	*
2	AVT-I	3+4	1+4	0+4	*
3	AVT-II	3+4	0+1	0	*
4	Station hybrid	8+2	3+2	0	*
5	Standard variety	0+10	0+4	0	*
6	NP-I	17+3	0+0	0	*
7	NP-II	14+4	0+1	0	*
8	RKN	4 + 4	0+0	0	*
9	TMV -R	24+1	24+1	0	*
	Total	**79 + 10**	**28+ 2**	**0+4**	
***Rustica* Tobacco**					
1	IVT	3+3	0	0	*
2	AVT-I	2+3	0	0	*
3	AVT-II	3+3	0	0	*
4	NP I	10+2	0	0	*
5	NP II	11+2	0	0	*
	Total	**29 + 3**	**0**	**0**	
***Chewing* Tobacco**					
1	IVT	2+3	0	0	*
	Total	**2+ 3**	**0**	**0**	

*very low/ no incidence of FES disease was appeared, therefore considered as free from the disease.

Table 2 BDAPP 511: Screening of root-knot (RK) in natural and sick field conditions (2024-25)

Sr. No.	Name of Trial	Natural field conditions		Sick plot
		No. of entries observed	No. of RK free entries	No. of RK free entries
1	IVT	6+4	0+0	0
2	AVT-I	3+4	0+0	0
3	AVT-II	3+4	3+3	0
4	Station hybrid	8+2	8+2	-
5	NP I	17+3	0+0	-
6	NP II	14+4	2+0	-
7	BDAPP 128 genotypes	17 + 3	-	1+1
	Total	**68 + 6**		**1+1**

Project No.: BDAPP 686

Research project title	**Impact of organic amendments and varieties on incidence of root-knot nematode in *bidi* tobacco**
Objectives	▪ Impact of organic amendments and varieties on incidence of root-knot nematode in bidi tobacco
Investigators	Y. M. Rojasara
Year of start	2023-24
Year of completion	Long term
Location	BTRS, AAU, Anand

Design	RBD (Factorial)
Replications	3
Variety	ABT 10 &A 119
Season	2024-25 (*Rabi*)
Treatments	3 modules
Plot size	Gross: 3.6 x 7.5 m Net:1.8 x 6.0

Treatments details

(A) Factor A: Varieties

1. ABT 10
2. A 119

(B) Factor B: Organic amendments

1. Poultry manure 3 ton/ha (PM)
2. Farm yard manure 10 ton/ha (FYM)
3. Vermicompost 4 ton/ha (VC)
4. Tobacco spent 2 ton/ha (TS)
5. Control (Con)

RESULTS

The results on impact of organic amendments and varieties on incidence of root-knot nematode in bidi tobacco indicated that the significant difference were found in varieties among cured leaf yield and root-knot index. Variety ABT 10 gave 2437 kg/ha yield and 0.00 root-knot index (RKI) as compared to A 119 which gave 2010 kg/ha with 3.07 RKI.

While in case of organic amendments, maximum cured leaf yield was found in the treatment of poultry manure (2467 kg/ha) which were at par with farm yard manure (2382 kg/ha) and vermicompost (2317 kg/ha). The lowest root-knot index was recorded from the treatment with poultry manure (0.84 RKI) which was followed by tobacco spent (1.37 RKI).

With respect to interaction effect between varieties and organic amendments, different treatment combinations failed to exert their significant effect on tobacco cured leaf yield but significant difference were found for root-knot index.

Salient researchfindings

- Variety ABT 10 gave 2437 kg/ha yield and 0.00 root-knot index (RKI) as compared to A 119 which gave 2010 kg/ha with 3.07 RKI.Maximum cured leaf yield was found in the treatment of poultry manure (2467 kg/ha), which were at par with farm yard manure (2382 kg/ha) and vermicompost (2317 kg/ha). The lowest root-knot index was recorded from the treatment with poultry manure (0.84 RKI), which was followed by tobacco spent (1.37 RKI).

Table 1BDAPP 686: Effect of variety and organic amendments on yield and root-knot index of *bidi* tobacco (2024-25)

Treatment	Cured leaf Yield (kg/ha)	Root-knot index (0-5)
A. Varieties (V)		
ABT 10	2437	0.00 (1.00)*
A 119	2010	3.07 (2.00)
S. Em. ±	76.61	0.014
C.D. at 5%	227.63	0.04
B. Organic amendments (OM)		
Poultry manure (PM)	2467	0.84 (1.32)
Farm yard manure (FYM)	2382	1.67 (1.54)
Vermicompost (VC)	2317	1.60 (1.52)
Tobacco spent (TS)	2056	1.37 (1.47)
Control	1896	2.20 (1.66)
S. Em. ±	121.13	0.022
C.D. at 5%	359.92	0.064
V x OM	NS	0.09
C.V. %	13.35	3.51

*Figures in parenthesis is $\sqrt{x+1}$ transformation, while outside isoriginal value

Table 2 BDAPP 686: Interaction effect of variety and organic amendments on yield and root-knot index of *bidi* tobacco (2024-25)

V / OM	Cured leaf yield (kg/ha)		Root-knot index (0-5)	
	ABT 10	**A 119**	**ABT 10**	**A 119**
Poultry manure (PM)	2669	2264	0.00 (1.00)*	1.67 (1.63)
Farm yard manure (FYM)	2652	2111	0.00 (1.00)	3.33 (2.08)
Vermicompost (VC)	2418	2216	0.00 (1.00)	3.20 (2.05)
Tobacco spent (TS)	2286	1825	0.00 (1.00)	2.73 (1.93)
Control	2161	1632	0.00 (1.00)	4.40 (2.32)
SEm±	171.31		0.03	
C.D. at 5%	NS		0.09	

*Figures in parenthesis is $\sqrt{x+1}$ transformation, while outside isoriginal value

Table 3BDAPP 686: Effect of variety and organic amendments on root-knot nematode population (2024-25)

V / OM	INITIAL		FINAL	
	ABT 10	**A 119**	**ABT 10**	**A 119**
Poultry manure (PM)	192	197	158	310
Farm yard manure (FYM)	198	202	173	437
Vermicompost (VC)	202	194	177	463
Tobacco spent (TS)	198	190	178	327
Control	189	195	170	868

III. NEMATOLOGY

A. *BIDI* TOBACCO

ANAND

Project No.: BDANC / BDNNC /BDNyNC 1

Research project title	Field evaluation and demonstration of nematode antagonists enriched coco-peat technology against root-knot nematodes in tobacco nursery and main field crop
Objectives	▪ To evaluate nematode antagonists enriched coco-peat Technology against root knot nematodes
Investigators	Y. M. Rojasara
Year of start	2024-25
Year of completion	2026-27
Location	BTRS, AAU, Anand

NURSERY

Design	RBD
Replications	5
Variety	GT 7
Bed size	Gross: 1.2 m x 1.2 m Net: 1.0 m x 1.0 m

FIELD

Design	RBD
Replications	5
Variety	GT 7
Plot size	Gross: 3.6 x 7.5 m Net:1.8 x 6.0 m
Spacing	90 x 75 cm

Methodology

- The experiment was conducted at BTRS farm, AAU, Anand. All the agronomical practices were followed for raising the tobacco nursery.
- Ten kg coco-peat was enriched by mixing with 150g of each bio agent. It has to be covered with mulch and optimum moisture has to be maintained for a period of 15 days. All the bio agents were applied prior two days before seeding in each bed @ 500 g enriched coco-peat/1.0 m^2.
- The periodical count on root-knot index was carried out from each bed at each pulling and separate the RKI free and healthy seedlings.
- The seedlings of 25-30 days were transplanted in bio agent enriched coco-peat for 15 days and same seedlings were transplanted in field and also enriched coco-peat applied at planting and second application at 30 days after planting of each bio agents.
- Carbofuran 3G was applied at 10g/m^2 in nursery and 1g/plant in field
- Water solution of Fluopyrum 34.48% SC was prepared by mixing 5 ml in the 10-liter water and drench 2 liter/m^2 in nursery while 200 ml solution per plant near the root zone area one day after transplanting in field.

- The data was analyzed by using standard statistical method. The data is subjected to ANOVA.

RESULTS

NURSERY

The results on efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco nursery presented in (Table 1 BDANC 1) revealed that the fresh weight remain at par with each other as treatment difference is non-significant. The maximum number of healthy transplantable seedlings were obtained from the treatment of fluopyrum 0.05% (560/m^2) followed by treatment of *Trichodermaviride@* 15g+ *Paecilomyceslilacinus@* 15g enriched coco-peat (485/m2) and Carbofuran 3G @ (450/m^2), while minimum was noticed in untreated check (350/m^2).

The minimum root-knot index was observed in the treatment of fluopyrum 0.05% (0.6) followed by treatment carbofuran 3G (1.04) and *Trichodermaviride@* 15g+ *Paecilomyceslilacinus@* 15g enriched coco-peat (1.28 RKI) treatment. The maximum root-knot index 2.4 was found in untreated check.

The initial nematode population was uniform before the impose of the treatment. The nematode population was gradually decrease in the treatment fluopyrum 0.05% while rest of the treatment had low population compare to untreated check.

FIELD

The results on efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco field presented in (Table 2 BDANC 1)revealed that the treatment had no any major effect on plant height and yield as treatment difference is non-significant. The minimum root-knot index 0.68 was observed in the treatment T4 (Normal Seedlings + Fluopyrum @ 0.05% drenching at planting) and 0.96 in treatment T2 (Planting *Trichoderma viride* @ 30g/kg + *Paecilomyces lilacinus@* 30g/kg coco-peat enriched seedlings + T. viride & *P. lilacinus* enriched coco-peat @ 10g/plant at planting and at 30 DAP) and both remain at par with each other followed by 1.68 and 1.84 in treatment T3 (Normal Seedlings + Carbofuran 3G @ 1g per plant at planting) and in treatment T1 (Planting *Trichoderma viride* @ 30g/kg + *Paecilomyces lilacinus* @ 30g/kg coco-peat enriched seedlings alone), respectively. The maximum root-knot index 3.20 was found in untreated control treatment.

The initial nematode population was uniform before the impose of the treatment. The nematode population was gradually decrease in the treatment fluopyrum 0.05% while bioagents treatment check the nematode population.

Salient research findings

- The maximum number of healthy transplantable seedlings (560/m^2) and minimum root-knot index (0.6) were obtained from the treatment of fluopyrum 0.05% in *bidi* tobacco nursery.
- The minimum root-knot index 0.68 was observed in the treatment T4 (Normal Seedlings + Fluopyrum @ 0.05% drenching at planting) and 0.96 in treatment T2 (Planting *Trichoderma viride@* 30g/kg + *Paecilomyces lilacinus* @ 30g/kg coco-peat enriched seedlings + *T. viride* & *P. lilacinus* enriched coco-peat @ 10g/plant at planting and at 30 DAP) and both remain at par with each other.The nematode population was gradually decrease in the treatment fluopyrum 0.05% both in nursery and field condition

Table 1 BDANC 1: Efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco nursery

Sr. no.	Treatments	Fresh weight (g)	No. of healthy seedlings/m^2	Root-knot index	% damped-off seedlings	Initial nematode population	Final nematode population
1	*Trichoderma viride* @ 15g + *Paecilomyces lilacinus* @ 15g enriched coco-peat @ 500g / sq.m nursery bed	400	485	1.28* (1.51)	45	85	177
2	Carbofuran 3G @ 10g / sq.m nursery bed	385	450	1.04 (1.43)	51	80	170
3	Fluopyrum @ 0.05%	415	560	0.6 (1.26)	49	83	57
4	Untreated Check	375	350	2.4 (1.84)	60	93	360
	SEm±	53.02	24.80	0.04			
	CD@5%	NS	76.41	0.12			
	C.V. %	30.11	12.02	5.99			

*Figure in parenthesis is $\sqrt{x+1}$transformation, while outside isoriginal value

Table 2 BDANC 1: Efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco field

Sr. no.	Treatments	Plant height (cm)	Yield (kg/ha)	Root-knot index	Initial nematode population	Final nematode population
1	Planting *Trichoderma viride*@ 30g/kg + *Paecilomyces lilacinus*@ 30g/kg coco-peat enriched seedlings alone	87.48	2096	1.84* (1.35)	100	207
2	Planting *Trichoderma viride*@ 30g/kg + *Paecilomyces lilacinus*@ 30g/kg coco-peat enriched seedlings + *T. viride* & *P. lilacinus* enriched coco-peat @ 10g/plant at planting + *T. viride* & *P. lilacinus* enriched coco-peat @ 10g/plant at 30 DAP	88.36	2217	0.96 (1.11)	105	135
3	Normal Seedlings + Carbofuran 3G @ 1g per plant at planting	89.00	2227	1.68 (1.33)	100	197
4	Normal Seedlings + Fluopyrum @ 0.05% drenching at planting	88.08	2240	0.68 (1.04)	108	88
5	Untreated Check (Planting Normal seedlings alone)	88.84	1912	3.20 (1.64)	103	397
	SEm±	0.66	84.84	0.07		
	CD@5%	NS	NS	0.22		
	C.V. %	1.68	8.87	12.76		

*Figure in parenthesis is $\sqrt{x+1}$transformation, while outside isoriginal value

NIPANI

Project No.: BDANC / **BDNNC** /BDNyNC 1

Research project title	Field evaluation and demonstration of nematode antagonists enriched coco-peat technology against root-knot nematodes in tobacco nursery and main field crop
Objectives	▪ To evaluate nematode antagonists enriched coco-peat Technology against root knot nematodes
Year of start	2024-25
Year of completion	2026-27
Location	Nipani

NURSERY

Design	RBD
Replications	5
Variety	Variety: A119
Treatments	4
Bed size	Gross: 1.2 m x 1.2 m Net : 1.0 m x 1.0 m

RESULTS

The nematodes were extracted from the soil by using Cobb's sieving and decanting technique (Cobb, 1918) followed by Baermann funnel method and nematode juveniles were identified based on the morphological characters like presence of stylet, stylet knobs, length and other characters. Roots were washed gently and scored for number of galls and indexing was done using 0-5 scale as follows (Taylor and Sasser, 1978).

In nursery highest plant height (14.45cm) and root length (7.67 cm) was recorded in treatment T1:*T.viride*@15g+ *P. lilacinus*@ 15g enriched coco-peat @ 500g / sq.m nursery bed. Root knot Index at final pulling recorded in all the treatments is 0 *i.e.*,no galls. Mean initial and final soil population of root-knot nematodes recorded were 0 juveniles / 100 g soil (Table 3 BDNNC 1). However based on morphological characters, some free living nematodes (10-15 juveniles / 100 g soil) were found in soil irrespective of different treatments imposed.

Table 1BDANC 1: Efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco nursery (Not replicated)

Treatments	**Fresh weight (g)**	**No. of healthy seedlings/m^2**	**Root-knot index**	**% damped-off seedlings**	**Initial nematode population**	**Final nematode population**
Trichodermaviride@ 15g + *Paecilomyces lilacinus*@ 15g enriched coco-peat @ 500g / sq.m nursery bed		75	0	4.0	0	0
Carbofuran 3G @ 10g / sq.m nursery bed		80	0	6.0	0	0
Fluopyrum @ 0.05%		82	0	6.0	0	0
Untreated Check		75	0	8.0	0	0
SEm±		-	-	-	-	-
CD@5%		-	-	-	-	-
C.V. %		-	-	-	-	-

*Figure in parenthesis is $\sqrt{x+1}$transformation, while outside is original value

Following observations were recorded in nursery

Table 2 BDNNC 1: Effect of different treatments against root-knot nematodes in tobacco nursery

	Treatments	Seedlings growth character-istics		Root knot Index at Final pulling (0-5 scale)	Per cent incidence (%)			Mean initial Soil population (juveniles / 100 g soil)	Mean Final Soil Population (juveniles / 100 g soil)
		Plant ht. (cm)	Root length (cm)		Damping off,	blight	Black shank		
TI	*T.viride*@15g+ *P. lilacinus*@ 15g enriched coco-peat @ 500g / sq.m nursery bed	14.45	7.67	0	4.00	0.00	0.00	0	0
T2	Carbofuran 3G @ 10g / sq.m nursery bed.	10.67	6.35	0	6.00	0.00	0.00	0	0
T3	Fluopyrum @ 0.05%	11.84	6.40	0	6.00	0.00	0.00	0	0
T4	Untreated Check	9.34	4.87	0	8.00	0.00	0.00	0	0

Grade	**Description**	**Reaction**
0	No galls	Highly Resistant
1	1-2 galls/root system	Resistant
2	3-10 galls/root system	Moderately Resistant
3	11-30 galls/root system	Moderately Resistant
4	31-100 galls/root system	Susceptible
5	>100 galls/root system	Highly susceptible

NANDYAL

Project No.: BDANC / BDNNC / **BDNyNC 1**

Research project title	Field evaluation and demonstration of nematode antagonists enriched coco-peat technology against root-knot nematodes in tobacco nursery and main field crop
Objectives	▪ To evaluate nematode antagonists enriched coco-peat Technology against root knot nematodes
Investigators	K. Satish Babu & P. Pullibai
Year of start	2024-25
Year of completion	2026-27
Location	RARS, Nandyal

RESULTS

During 2024-25 experiment conducted in nursery in randomized block design with 5 replications using nandyal pogaku-1 variety. The results revealed that there is no incidence of nematode, less percent (12%) of damping off, higher fresh weight (1024g/m^2), higher number of healthy seedlings (512/m^2) noticed in application of *Trichoderma viride* @ 15 g + *Paecilomyces lilacinus*@ 15g enriched coco-peat @ 500g / sq.m nursery bed compared with other treatments.

In main field experiment conducted in randomized block design with 3 replications using nandyal pogaku-1 variety. The results indicated that there is no incidence of nematode, damping off and black shank in main field. Plant height(79.8cm), Leaf length(49.4cm), Leaf width (24.6cm) and cured leaf yield (2052 kg/ha) significantly higher with Planting *Trichoderma viride* @ 30 kg +*paecilomyces lilacinus* @ 30g /kg coco-peat enriched seedlings + *T.viride* & *P. lilacinus* enriched coco peat @10g/plant at planting + *T.viride & P. lilacinus* enriched coco peat @10g/plant at planting at 30 DAP. Lower growth and yield parameters recorded with untreated Check (Planting Normal Seedlings alone).

Salient Research findings:

- There is no incidence of nematode, black shank in tobacco nursery and main field in black cotton soils. Less percent of incidence of damping off noticed with application of *Trichoderma viride* @ 15g + *Paecilomyces lilacinus* @ 15 g enriched coco-peat @ 500 g /sq.m nursery bed.
- Significantly higher growth and yield parameters recorded with Planting *of Trichoderma viride* @ 30 kg +*paecilomyces lilacinus* @ 30 g/kg coco-peat enriched seedlings + *T. viride* & *P. lilacinus* enriched coco peat @10g/plant at planting + *T. viride* & *P. lilacinus* enriched coco peat @10g/plant at planting at 30 DAP compared with untreated Check (Planting Normal Seedlings alone) in main field.

Conclusion: In tobacco nursery and main field there is no incidence of nematode, black shank. In tobacco nursery less percent of incidence of damping off noticed with application of *Trichoderma viride* @ 15 g + *Paecilomyces lilacinus*@ 15 g enriched coco-peat @ 500 g/ sq.m nursery bed compared with other treatments. In main field significantly higher growth and yield parameters recorded with Planting *of Trichoderma viride* @ 30 kg + *paecilomyces lilacinus* @ 30 g/kg coco-peat enriched seedlings + *T. viride* & *P. lilacinus* enriched coco peat @10 g/plant at planting + *T. viride* & *P. lilacinus* enriched coco peat @10 g/plant at planting at 30 DAP.

Table 1 BDNyNC 1: Efficacy of antagonists enriched coco-peat against root-knot nematodes in tobacco nursery during 2024-25

Treatments	Fresh weight (g)/m2	No. of healthy seedlings/m^2	Root-knot index	% damped-off seedlings	Initial nematode population	Final nematode population
T1:*Trichoderma viride* @ 15g + *Paecilomyces lilacinus*@ 15g enriched coco-peat @ 500g / sq.m nursery bed	1024	512	0	12.0	0	0
T2:Carbofuran 3G @ 10g / sq.m nursery bed	902	451	0	24.0	0	0
T3:Fluopyrum @ 0.05%	852	426	0	22.0	0	0
T4:Untreated Check	818	409	0	40.0	0	0
SEm±	41.32	21.1	-	-	-	-
CD@5%	124.2	63.2	-	-	-	-
C.V. %	8.92	6.94	-	-	-	-

Table 2 BDNyNC 1: Growth and yield (kg/ha) parameters as influenced by antagonists enriched coco-peat against root-knot nematodes in main filed (2024-25)

Treatments	Plant height (cm)	Leaf length (cm)	Leaf width (cm)	Cured leaf yield	Root-knot index	Initial nematode population	Final nematode population
T_1: Planting *Trichoderma viride* @ 30 kg + *paecilomyces lilacinus* @ 30 g/kg coco-peat enriched seedlings alone	68.4	38.2	20.4	2018	-	-	-
T_2 : Planting *Trichoderma viride* @ 30kg +*paecilomyces lilacinus* @ 30g /kg coco-peat enriched seedlings + T.viride & *P. lilacinus* enriched coco peat @10g/plant at planting + T.viride & *P. lilacinus* enriched coco peat @10g/plant at planting at 30 DAP	79.8	49.4	24.6	2052	-	-	-
T_3 : Normal Seedlings + Carbofuran 3G @ 1g per plant at planting	51.4	25.6	17.2	1934	-	-	-
T_4:Normal Seedlings + Fluopyrum @ 0.05% drenching at planting	59.8	31.4	18.9	1956	-	-	-
T_5:Untreated Check (Planting Normal Seedlings alone)	39.6	19.8	15.3	1728	-	-	-
S.E m±	1.15	0.66	0.94	21.92	-	-	-
CD (P=0.05)	3.83	2.19	2.80	72.85	-	-	-
CV (%)	5.62	5.94	5.41	8.96	-	-	-

ALL INDIA NETWORK PROJECT ON TOBACCO

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