Profile of
AINPT

Propelling Tobacco Research Through Networking

ICAR
NIRCA
राष्ट्रीय वाणिज्यिक कृषि अनुसंधान संस्थान
National Institute for Research on Commercial Agriculture

All India Network Research Project on Tobacco

तम्बाकू पर अखिल भारतीय नेटवर्क परियोजना

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(An ISO 9001:2015 Certified Institute)

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INTRODUCTION

Tobacco (*Nicotiana spp.*) is a high-value commercial crop in India, occupying approximately 0.425 million hectares (0.30% of the net cultivated area) contributing around ₹ 84,000 crore annually through excise duty and foreign exchange earnings. India produces an estimated 772 million kg of cured leaf tobacco (FAO, 2024), with Flue-Cured Virginia (FCV), *bidi, natu*, chewing, *hookah*, cigar wrapper, dark fire-cured, oriental tobaccos *etc.,* being the primary types cultivated. FCV and burley tobaccos are the principal exportable types, offering considerable diversity in leaf styles to meet global market demands. The multilocation research needs of various tobacco types cultivated in India is being undertaken by All India Network Project on Tobacco (AINPT).

EVOLUTION OF ALL INDIA NETWORK PROJECT ON TOBACCO (AINPT)

To address the region-specific research and technological requirements of various tobacco types cultivated in India, the Indian Council of Agricultural Research (ICAR) established the All India Coordinated Research Project (AICRP) on Tobacco in 1970–71, with its Coordinating Unit at Anand, Gujarat. In 1998, the unit was transferred to the ICAR-National Institute for Commercial Agriculture (NIRCA) (formerly Central Tobacco Research Institute (ICAR-CTRI), Rajahmundry, Andhra Pradesh (AP) and later it was re-designated as the All India Network Project on Tobacco (AINPT). The AINPT functions as a multi-institutional and multidisciplinary platform that undertakes coordinated research focused on Crop (Genetic) Improvement, Crop Production, Crop Protection, and Crop Chemistry & Soil Science with the following mandate.

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.

AINPT conducts several multilocation and multidisciplinary field trials targeting varietal evaluation and agro-technological refinement under diverse agro-ecological zones. The major research programmes of the Network Project are enlisted below.

Research Programmes

- Coordinated testing and release of tobacco varieties
- Co-ordinated development and validation of agrotechnology 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 labled seed of popular varieties

Organizational Structure of AINPT

AINPT operates, currently, through three main centres: Rajahmundry (AP), Shivamogga (Karnataka) and Anand (Gujarat), and seven sub-centres: located at Nipani, Nandyal, Berhampur, Araul, Dinhata, Guntur, and Hunsur & four voluntary centres: Ladol, Jeelugumilli, Kandukur, and Vedasandur. Thus a total number of 14 centres (3 Main centres, 7 sub-centres and 4 voluntary centres) are functioning at present. Established in different years, these centres work under the administrative control of either ICAR-NIRCA or respective State Agricultural

Universities (SAUs) as given in the Table 1. Each centres conducts research on a specified mandated tobacco type(s)that is/are cultivated in their respective locations (Table 1).

Table 1: Research Centres under AINPT

S. No.	AINPT Centre	Administrative Control	Year of start	Mandated tobacco type
A.	**Main Centres**			
1.	ICAR-NIRCA (formerly CTRI), Rajahmundry	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	1970-71	FCV & Burley
2.	Zonal Agricultural Horticultural Research Station, Shivamogga	Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Naveli, Karnataka	1970-71	FCV
3.	*Bidi* Tobacco Research Station (BTRS), Anand	Anand Agricultural University, Gujarat	1970-71	*Bidi*, Chewing & *Rustica*
B.	**Sub-Centres**			
4.	ICAR-NIRCA RS, Dinhata, West Bengal	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	1970-71	*Jati* & *Motihari* (*Rustica*)
5.	ICAR-NIRCA RS, Hunsur, Karnataka	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	1970-71	FCV
6.	ICAR-NIRCA RS, Guntur, Andhra Pradesh	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	1970-71	FCV, *Natu* & Burley
7.	Regional Agricultural Research Station, Nandyal	Acharya N. G. Ranga Agricultural University, Andhra Pradesh	1970-71	*Bidi, Natu* & Burley
8.	Agricultural Research Station, Nipani, Karnataka	University of Agricultural Sciences, Dharward, Karnataka	1970-71	*Bidi*
9.	All India Network Project on Tobacco, Nutri-Crops Research Station, Berhampur	Odisha University of Agriculture and Technology, Odisha	1987-88	*Pikka*
10.	Tobacco Research Station, Araul, Uttar Pradesh (UP)	Chandrashekhar Azad University of Agriculture and Technology, Kanpur,UP	1987-88	*Rustica*
C.	**Voluntary centres**			
11.	Agricultural Research Station, Ladol	Sardarkrushinagar Dantiwada Agricultural University, Dantiwada, Gujarat	2001	*Rustica*
12.	ICAR-NIRCA-RS, Kandukur	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	2001	FCV
13.	ICAR-NIRCA-RS, Jeelugumilli, Andhra Pradesh	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	2001	FCV & Irrigated *Natu*
14.	ICAR-NIRCA-RS, Vedasandur, Tamil Nadu	ICAR-NIRCA, Rajahmundry, Andhra Pradesh	2001	Chewing, Cheroot, Cigar filler & Cigar Wrapper

The AINPT is under the administrative control of Indian Council of Agriculture Research (ICAR), New Delhi (Fig. 1). It operates under the Crop Science Division of ICAR. The unit works administratively by Director, ICAR-NIRCA (CTRI). AINPT Co-ordination Unit located at ICAR-NIRCA, Rajahmundry helps Director in co-ordinating the activities of all the centres and monitors the research programmes through four Project Investigators *viz.*, Cop Improvement, Crop Production, Crop Protection and Crop Chemistry & Soil Science at ICAR-CTRI, Rajahmundry. It also co-ordinates with different centres and 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.

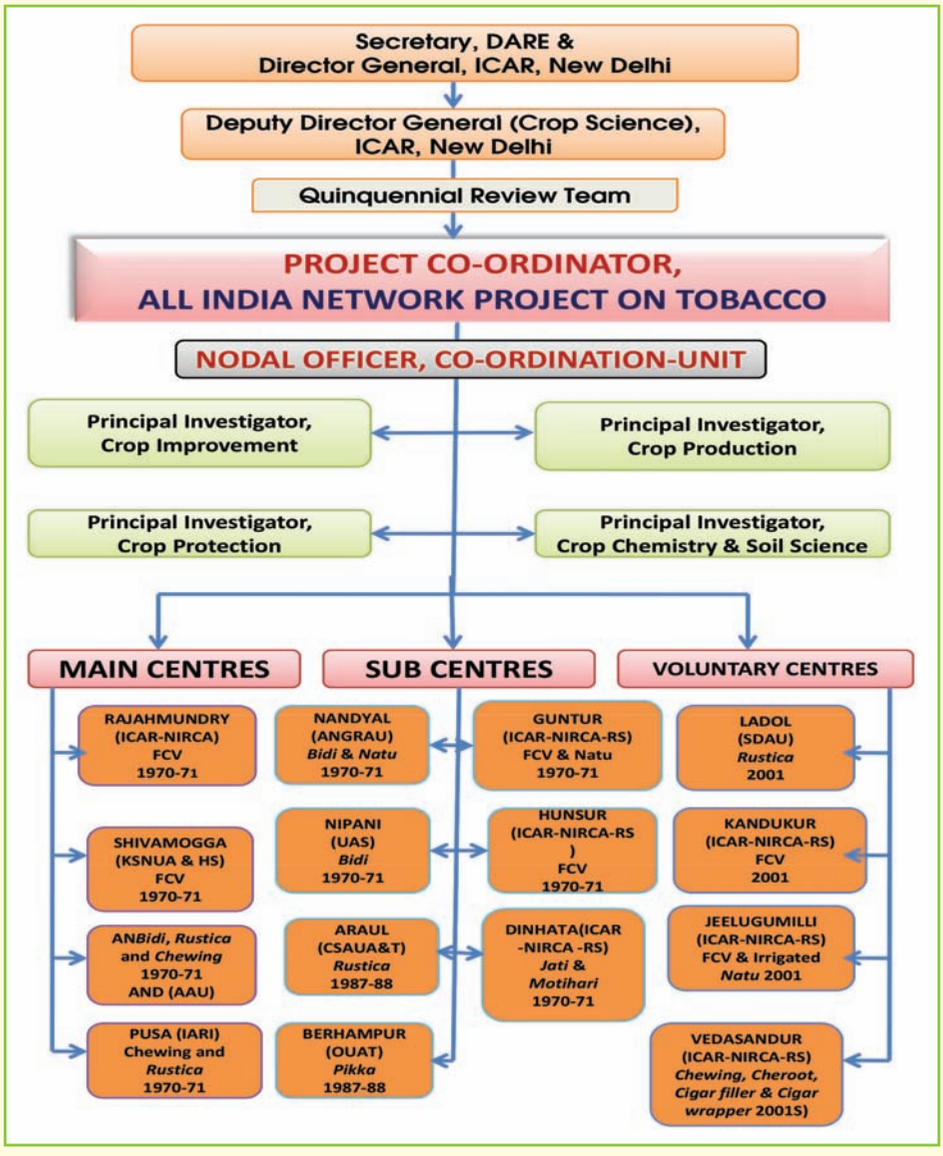


Fig. 1: Organogram of AINPT

The ICAR provides Budgetary support to the tune of 75% of Grant-in-aid-Salaries and Grant-in-aid-general to six SAU (paid) centres *viz.*, Anand, Shivamogga, Nipani, Nandyal, Araul and Berhampur and the 25% share is borne by the respective parent University. In general Budgetary support is not provided for other centres. However, need based financial support is offered.

Cadre Strength

The existing Scientific, Technical, Administrative and Supporting staff strength is 16, 21, 03 and 01, respectively (Table 2). The cadre strength is for paid SAU centres only. The centres under ICAR-NIRCA and voluntary centre Ladol undertake the AINPT research programme through their existing cadre.

Table 2: Centre wise sanctioned cadre strength of AINPT

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

Coordination of Research in different tobacco types

The AINPT coordinates research in various tobacco types through a specific group of centres. The group of centres in view of the type specific and location specific research requirements different tobacco types have identified set of centres as given in the Table 3. The trial related to different tobacco types are taken up in the respective specified centres only.

Table 3: Type wise tobacco research coordination centres of AINPT

S.No.	Tobacco type	Centres / Area
1.	Flue Cured Virginia (FCV)	Rajahmundry, Jeelugumilli, Guntur, Kandukur, Hunsur, Shivamogga
2.	*Bidi*	Anand, Nipani, Nandyal
3.	*Natu/ Pikka*	Berhampur, Jeelugumilli, Nandyal
4.	*Rustica (Motihari/ Hookah)*	Anand, Araul, Dinhata, Ladol
5.	Chewing (*Jati*)	Anand, Dinhata, Vedasandur
6.	Burley	Rajahmundry, Vinukonda (Guntur), Giddaluru (Nandyal)

Achievements of AINPT

AINPT is the only unit that takes care of all the major research areas and monitors the release of the varieties and technologies of all types of tobaccos grown in India. The network contributes significantly to the development of region-specific FCV & Non-FCV tobacco cultivars and sustainable production practices.

Germplasm Maintenance

Germplasm is the important source material for breeding improved varieties and understanding the genetics and molecular mechanisms involved in manifestation different traits. As a National Active Germplasm Site (NAGS), ICAR-NIRCA maintains germplasm of all tobacco types and *nicotiana* species (Table 4). All the other AINPT centres maintains germplasms of their mandated tobacco types.

Table 4: Status of germplasm maintained

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

* As a National Active Germplasm Site, NIRCA maintains germplasm of all tobacco types and *nicotiana* species

Advanced Breeding Lines/ Hybrids Evaluated

A total number of 2452entriesreceivedfromdifferentbreeders were evaluated under AINPT Trials (Table 5). Among these lines, 584 are FCV, 517 *Bidi*, 502 Chewing/ Cheroot/ Cigar filler, 631 *Rustica*and218*Natu*. Maximum number of entries were tested in *rustica* tobacco type followed by FCV and *Bidi*. FCV constitutes about 23% of total number evaluated and Non-FCV 77%.

Table 5: Advanced breeding lines and hybrids of various tobacco types assessed in Multilocational trials

Tobacco Type	Advanced breeding lines(No.)	Hybrids (No.)	Total(No.)
Flue-Cured Virginia	556	28	584
Bidi	416	101	517
Chewing/ Cheroot/ Cigar filler	502	0	502
Rustica	631	0	631
Natu/ Pikka and Lanka	218	0	218
Total	2323	129	2452

A total number of 98 varieties were released under seven different tobacco types. Around 162 crop production and protection technologies were developed (Table 6), evaluated and recommended to different tobacco types for improving their yield and quality. Maximum number of varieties released in FCV tobacco (32) and technologies developed in *Bidi* tobacco (57). minimum number of varieties released in cigar filler (2) and technologies developed in Cheroot & Cigar filler tobaccos (one each).

Table 6: Number of tobacco varieties released and technologies developed for different tobacco types

Type of Tobacco	No. of Varieties Released/ Identified	No. of Technologies Developed/ Identified
Flue-Cured Virginia	32	52
Bidi	20	57
Chewing	24	24
Rustica	11	15
Natu/ Pikka and Lanka	06	12
Cheroot	03	1
Cigar filler	02	1
Total	98	162

Among the centres maximum number of varieties released and technologies developed by Anand Centre (16 & 30, respectively) (Table 7). The minimum number of varieties released by Berhampur (1) and technologies developed by Ladol centre (2).

Table 7: Centre-wise number of tobacco cultivars and technologies developed

Name of the centre	No. of Varieties	No. of Technologies
Anand	16	30
Nipani	7	15
Shivamogga	3	21
Nandyal	2	16
Araul	2	10
Berhampur	1	9
Lodol	2	2
Kandukur	3	3
Jeelugumill	6	6
Vedasandur	15	14
Dinhata	9	6
Guntur	7	5
Hunsur	7	9
Rajahmundry	15	11
Pusa	7	5

CENTRE WISE ACHIEVEMENTS

The SAU centres are undertaking research in different areas of cultivar development, crop production, crop protection, Crop chemistry and Soil Science, pure seed production, training and extension activities. Whereas, the ICAR-NIRCA Centres are involved only in conducting multi-location testing of tobacco breeding lines for identification of varieties with high yield potential, superior quality and tolerance/ resistance to biotic and abiotic stresses and validation of agro-technologies under AINPT. However, ICAR-NIRCA breed for improved varieties and develop agro-technologies for different tobacco types under the umbrella of its mandate. The major achievements of different centres are briefly described herewith.

ACHIEVEMENTS OF SAU CENTRES

ANAND CENTRE

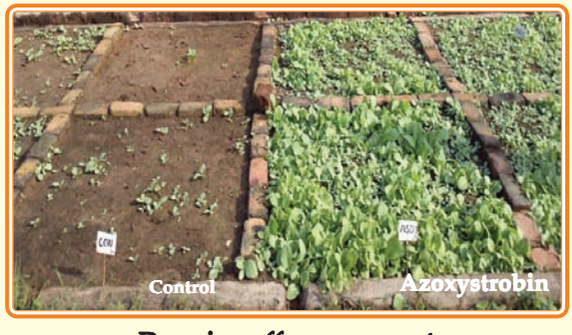
The *Bidi* Tobacco Research Station, Anand (Gujarat), under Anand Agricultural University (AAU), was established in 1970–71. Anand is one of the main centre under AINPT and the Co-Unit initially established at this centre. This centre mainly focuses on conducting research in *Bidi,* Chewing, and *Rustica* tobaccos grown in an area of around 1.75 lakh ha in Middle Gujarat. The Anand centre is one of the centre that has developed highest number of varieties and agro-technologies. This has contributed to the development and release of 16 cultivars and 30 improved technologies for different tobaccos grown in the area thereby improving the productivity and net returns. The details of different varieties released and major technologies developed by the centre are enlisted below.

Varieties Released (16)

- *Bidi* varieties: GT-4, A119, A-2, GT-5, GT-7, GTH-1, GT-9, MRGTH-1, ABT-10, GABT-11, GABTH-2, GT-6, GT-8
- *Rustica*/chewing varieties: GC-1, GCT-2, GCT-3

Major Technologies Developed

GABT-11



Damping-off management

Crop Production

- Vegetable Cowpea + *Bidi* Tobacco (*Kharif*-based system): Recommended for Middle Gujarat to increase annual income from the same field
- Sowing Variety A-119 in 3rd Week of July resulted in highest healthy seedling count ensuring better crop establishment and higher productivity in the subsequent season

Crop protection

- Effective management of Rove beetle using botanical extracts *viz.*, neem or naffatia leaf extract (10%) as a drench at 2 l/m².
- Integrated Disease Management (IDM) practices such as soil solarization, application of castor cake, rabbing, and treatment with Carbosulfan (2.5 L/ha at 15 DAS) in combination with fungicides like Metalaxyl MZ and Carbendazim for the broad-spectrum protection against damping-off, root-knot nematodes, frog-eye spot, and weeds
- Alternative IDM strategy for broad spectrum protection involving soil solarization with Carbosulfan one day before sowing followed by Metalaxyl MZ and Carbendazim at 25 DAS

- Damping-off Control with the application of Azoxystrobin @ 0.023% and use of Agro-shade nets (75% or 90%)
- Sowing Anand-119 in the first or third week of September reduces the incidence of leaf curl, frog-eye spot, and root-knot nematodes
- Application of organic measures such as poultry manure or tobacco dust for reducing root-knot incidence and improved seedling survival
- Sowing during the first to third week of July is recommended for Agro-climatic Zone III of Gujarat for minimizing root-knot incidence and healthy seedling production

NIPANI CENTRE

The Agricultural Research Station at Nipani (Karnataka)is one of the sub centres of AINPT and was established in 1970–71. The centre works under the administrative control of University of Agricultural Sciences, Dharwad. This centre conducts research mainly on *Bidi* tobacco cultivated in Karnataka. At present, *bidi* tobacco occupies an area of 6000 hectares with the production of about 7200 tonnes and productivity of 1200 kg/ha (2024-25). The centre is instrumental in developing improved varieties (7) and technologies (15) suitable to this area.

Varieties Released (7): NPN-190, Spoorthy (PL-5), Bhavyashree, Bhagyashri, Vedaganga-1, NBD-209, DTV-9 (NBD-316)

Major Technologies Developed

NBD-209

Damping-off control with Metalaxyl-MZ

Crop Production

- Summer deep ploughing for controlling *Orobanche*
- Ridge planting for improving drainage
- Use of black and white mulches on the ridges for conserving soil moisture and improved leaf yield
- Application of farmyard manure along with micronutrients such as zinc sulphate for improving soil fertility and crop performance
- Topping 18-20 leaves under irrigated and 14-16 leaves under rainfed conditions for higher leaf yields
- Relay intercropping with soybean, sugarcane or sunnhemp for higher system productivity
- Alternate cropping followed by majority of the farmers of the area is groundnut or soybean in the kharif season followed by rabi jowar or chickpea in the subsequent season.

Crop Protection

- Controlling of Damping-off disease by fungicides, Metalaxyl-MZ and Hexaconazole
- Nematodes controlled through the combined application of Carbofuran and poultry manure
- Aphids and leaf curl vectors management through Acephate and Imidacloprid

NANDYAL CENTRE

The Regional Agricultural Research Station at Nandyal (Andhra Pradesh) is one of the sub centres of AINPT established during 1970–71. The centre is works under the administrative control of Acharya N. G. Ranga Agricultural University (ANGRAU), Guntur. The centre conducts research mainly on *Bidi* and *Natu tobacco* cultivated in Kurnool and Nandyal districts covering 9000 ha *bidi* and 2000 ha *natu*. In the recent years the burley tobacco cultivation has substantially increased to an extent of 10,000 ha. The tobacco types viz., Kentucky Fire Cured (KFC), Dark Western Fire Cured (DWFC), sun cured are also cultivated limited extent in this area.

Currently the centre is concentrating its research efforts in the *bidi* and *natu* tobacco types and proposing to take up evaluation of burley tobacco entries. The research efforts of the centre resulted in the release of 2 cultivars and 16 agro-technologies for *Bidi* tobacco cultivation. The efforts to breed improved *natu* tobacco cultivars is in progress.

Varieties Released (2 *bidi*): Nandyal Pogaku-1 & Nandyal Pogaku-2

Major Technologies Developed

Nandyal Pogaku-2

Green manuring with Daincha

Crop Production

- Optimum Fertilizer Dose for rainfed conditions: Application of 100% RDN (110 kg N/ha) + P (70 kg P_2O_5) every year, or full NPK (110N + 70P + 50K) once every two years
- Better water and nitrogen use efficiency with 130 kg N/ha combined with two irrigations of 30 mm each
- Integrated Nutrient Management (INM): 130 kg N/ha in the ratio of 25% nitrogen through organic sources (vermicompost) and 75% through inorganic fertilizers
- Green manuring with *Dhaincha* along with recommended fertilizer doses for enhanced productivity and improves leaf quality
- The N Level of 150 kg N/ha and Topping at 15leaf stage increases cured leaf yield
- High-density planting combined with gibberellic acid spray (20 ppm at 90 days after planting) for mitigating drought stress and increased yields
- Transplanting of 45–60 days old seedlings in second week of September for increased leaf yield
- Optimum Planting Geometry: Ridge planting with 60 X 75 cm spacing for higher cured yield and waterlogging tolerance
- Alternative Cropping Systems: Maize – Bengal gram, Maize – Sunflower
- *Bidi* Tobacco-Based Systems: Bhendi – Tobacco (Okra), Onion – Tobacco Sweet corn – Tobacco, Crop intensification '! boosts income

Crop Protection

- Developed Integrated Pest Management (IPM) practices for managing major tobacco pests and diseases
- Recommended Emamectin benzoate for Leaf Eating Caterpillar Control.
- Management of *Orobanche* through Sorghum trap crop, application of Neem cake @ 200 kg/ha and post-emergence spray of Imazethapyr 10% SL
- Planting border rows with millet, sorghum, maize, or bajra to reduce pest entry, and applying a need-based spray of Imidacloprid around 35 days after planting controls aphid

SHIVAMOGGA CENTRE

The Zonal Agricultural Horticultural Research Station, Shivamogga (Karnataka) under Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS), Naveli, was initiated in 1970–71. As a main centre, it is taking the responsibility of fulfilling the research needs of FCV tobacco cultivated in zone 7 (KLS region), Karnataka. Since beginning, a multi-disciplinary team of scientists at Shivamogga has served the cause of FCV Tobacco cultivated right from Davanagere district in the north to Ramanathpura auction platform of Hassan district in the South of KLS tobacco by identifying the production and quality constraints and developing suitable location-specific technologies.

The centre's achievements include the development/release of 3 cultivars and 19 technologies tailored for FCV tobacco cultivation.

Varieties Released (3): Thrupthi, Sahyadri, Sahyadri Swarna

Major Technologies Developed

Sahyadri

Application of Areca husk as crop residue mulch

Crop production

- Use of tobacco stem ash or compost @ 50 kg K/ha as an alternative source of potassium
- Bio-fertilizers: Application of 75% recommended N + 2.5 kg Azotobacter + 2.5 kg Azospirillum + 2.5 t FYM/ha for Yield Enhancement.
- Increase phosphorus efficiency by reducing P application by 25% using PSB + VAM @ 6.25 kg each + FYM/compost.
- Humic Acid Application (Bio-stimulants) to soil @ 1.25 kg/ha and foliar spray @ 0.05% at 30 & 45 DAS improves seedling growth.
- Areca Husk Mulch: Apply dry areca husk @ 10 t/ha on ridges as mulch at planting to improve yield and soil moisture/fertility.
- Modified flue pipe (heat conveyance) system reduces fuel use by 35%.
- Integrated Barn System: Use of Ventury furnace + modified flue pipes gives 27% fuel savings.
- Alternative biomass fuel sources such as coffee husk, arecanut husk, and maize rinds can also be effectively used for tobacco curing, reducing dependence on conventional firewood
- Alternative Cropping Sequences for KLS Region: Cotton + Chilli + French Bean,Cotton + Chilli + Groundnut
- Tobacco-Based Rotations suggested for KLS: Tobacco–Chilli,Tobacco–Maize

Crop protection

- Apply vermicompost + poultry manure + neem cake for root-knot nematode (RKN) management.
- Bioagents: P. fluorescens + Acacia, or Pochonia + Paecilomyces + P. fluorescens.P. lilacinum @ 5 kg/acre + FYM (1 t/ha) showed best results (Green Leaf Yield: 9046 kg/ha).T. harzianum + FYM and Carbofuran were effective for rootnot control
- Application of *Purpureocillium lilacinum* at 5 kg/acre along with 1 t/ha FYM improves leaf yield
- *Trichoderma harzianum* with FYM is recommended for managing black shank
- Damping-off in nurseries can be controlled with Fenamidone + Mancozeb or Azoxystrobin sprays
- Apply neem cake @ 40 g/plant for control of root grubs
- UseFlubendiamide @ 0.25 ml/L for budwarm control
- Leaf-eating caterpillar (*Spodoptera litura*) in chewing tobacco can be suppressed effectively using Emamectin benzoate or Spinosad.

ARAUL CENTRE

The tobacco research station, Araul (Uttar Pradesh) was established in 1987–88 and administered by the Chandrashekhar Azad University of Agriculture and Technology (CSAUA&T), Kanpur. The centre focuses on *Chewing,* and *Hookah* tobaccos cultivated in the state of Utter Pradesh. The centre has successfully released 2 improved cultivars and 8 agro-technologies.

Varieties Released/Identified (2): Azad Kanchan and ArR-27

Major Technologies Developed

- Optimum P & K Application (*Hookah* Tobacco): Apply 50 kg P_2O_5 /ha and 50 kg K_2O_5/ha for increasing cured leaf yield.
- Integrated Nutrient Management (INM): Application of green manuring + 200 kg N/ha for yield improvement in *rustica* tobacco.
- Improved agro-techniques for higher cured leaf yield in *hookah* tobacco: Spacing: 45 cm x 45 cm; Topping: At 12-leaf stage Promotes;
- Ridge Planting in *Bidi* Tobacco with a spacing of 70 cm x 70 cm improves cured leaf yield.
- Alternative Crops: While tobacco is the most profitable, Bengal gram is the next best alternative.
- Intercropping: Vegetable pea inter cropped with *rustica* tobacco (1:1 ratio) and application of 180 kg N/ha for productivity.
- Three manual weedings in *hookah* tobacco gives highest cured leaf yield

Azad Kanchan

***Hookah* Tobacco + Vegetables Pea Inter Cropping**

BERHAMPUR CENTRE

The Nutri-Crops Research Station, Berhampur (Odisha) administered by Odisha University of Agriculture and Technology (OUAT), Bhubaneswar was undertaking research on pikka tobacco grown in Orissa since its establishment in 1987–88. The centre has released a *pikka* tobacco variety and introduced 8 improved technological innovations for the farmers of the state.

Varieties Released: Gajapathi

Gajapathi

Major Technologies Developed

- Optimum Planting Time & Spacing: Plant on 1st August; Spacing: 75 cm X 50 cm
- Nitrogen Source Management: 30 kg N/ha from organic + 90 kg N/ha from inorganic sources for enhancing both yield and profitability in *Pikka* tobacco
- Tomato Intercropping: Tomato as sole crop or Tobacco + Tomato in 2:4 row ratio recommended for better returns.
- Chilli Intercropping: Tobacco + Chilli in 2:4 row ratio increases net profits for *Pikka* tobacco growers.
- Next Best Alternatives to *Pikka* Tobacco: Groundnut – Greengram and Maize – Greengram

LADOL CENTRE

Agricultural Research Station, Ladol (Gujarat) was established during 2001 as voluntary under Sardarkrushinagar Dantiwada Agricultural University (SDAU), Krishi Nagar. It is conducting research on Rustica tobacco cultivated in North Gujarat. This centre has released two improved Rustica tobacco cultivars.

Varieties Released: DCT-4 and GCT-5

DCT-4

GCT-4

ICAR CENTRES

RAJAHMUNDRY CENTRE

ICAR-NIRCA (CTRI), Rajahmundry (Andhra Pradesh) is one of the main centre of AINPT established in 1970–71. Currently, the AINPT co-ordinating Unit of AINPT is operating from Rajahmundry. The Centre working on Flue-Cured Virginia (FCV) cultivated in black soils of Andhra Pradesh and lanka tobacco raised in Godavari lanka areas. This centre has 15 FCV cultivars.

Varieties Released (15 No.)

FCV varieties: CTRI Special, FCV Special, 16/103, Jayasri, CTRI Special MR, Godavari Special, Jayasri MR, Gouthami, VT 1158, Kanchan, Siri, CH-1, CTRI-Sulakshna,
***Natu* varieties:** Lanka Special, DR-1

CTRI Sreshta

Siri

GUNTUR CENTRE

Guntur centre was established during 1970–71 at ICAR-NIRCA RS, Guntur (Andhra Pradesh) and is conducting research on FCV (black soils), *Natu* and HDBGR tobaccos. This Sub-Centre has been involved in developing and releasing two FCV, a HDBRG and four *natu* varieties.

Varieties Released (7 No.): Hema (FCV), Hemadri (FCV), Prabhat (*natu*), Vishwanath (*natu*), *Natu* Special (*natu*), Bhairavi (*natu*), HDBRG

Bhairavi

Hema Hemadri

JEELUGUMILLI CENTRE

ICAR-NIRCA RS, Jeelugumilli (Andhra Pradesh) was established in 2001 as voluntary centre for conducting research on FCV and irrigated *Natu* tobacco. This centre developed and released six cultivars and two improved technologies for FCV and irrigated *Natu*."

Varieties Released: Mc Nair-12, CM-12(KA), Kanchan, LT-Kanchan, CTRI-Naveena, 1353 (FCRH-11)

Major Technologies Developed

- Sunhemp-tobacco is the most profitable cropping system
- Maize -Tobacco -Groundnut for higher net returns to FCV tobacco farmers in the NLS region.

Kanchan

CTRI Naveena

KANDUKUR CENTRE

ICAR-NIRCA RS, Kandukur (Andhra Pradesh) was another voluntary centre established in 2001 and is focusing on FCV tobacco research needs of Southern Light Soil region of Andhra Pradesh. This centre has developed and released three FCV cultivars to the region.

Varieties Released (3): Kanthi, N-98 and CTRI-Shresta

N-98

Kanthi

VEDASANDUR CENTRE

A voluntary centre was established in 2001 at ICAR- NIRCA RS, Vedasandur (Tamil Nadu) for conducting research *on Chewing, Cheroot, Cigar Filler, and Cigar Wrapper* tobaccos. This centre's achievements include the development/release of 15 cultivars and 4 technologies.

Varieties Released (15 No.): Vairam, Thangam, Bhagyalaxmi, Margatham, Meenakshi, Kaviri, Meenakshi CR, Abirami, Abirami CR, Kamatchi, Yasini, Bhavani Special, Sendarpatty Special, Sangami, Krishna

Major Technologies Developed

- Integrated Nutrient Management (INM): Sunn hemp green manuring + 100% Recommended Dose of Fertilizers (RDF) in chewing tobacco–sunflower system for better yield.
- Potassium application: Apply 50 kg K_2O/ha as KCl for enhancing first-grade leaf yield, chewability quality, and soil K levels.
- Optimal planting time for chewing is 1st fortnight of October and
- Drip Fertigation: Use 100% RDN (Recommended Dose of Nitrogen) for VDH3 chewing tobacco hybrid for boosting yield and profits.
- Natural Solutions for Chewability: Use Palmyrah jaggery solution (10%) or 5% solutions of Coconut mesocarp, Banana pseudostem and Banana peduncle for improving body, aroma, taste, pungency, saliva secretion, whitish encrustation, and mouthfeelness and increases net returns
- *Orobanche* effectively controlled by adopting sesame as a pre-crop, applying neem cake at 250 kg/ha at 30 days after planting, and supplementing with manual removal of the weed.

Kamatchi

Kharif* Sesamum+Neem cake application for control of *Orobanche

DINHATA CENTRE

ICAR-NIRCA RS, Dinhata (West Bengal) is one of the AINPT subcentres established during 1970–71 and is focusing on the research related to *Jati* and *Motihari* (*Rustica*) cultivated in West Bengal area. The centre has successfully released nine improved cultivars.

Varieties Released (9 No.): Podali, Chama, Manasi, DJ-1, Soar *Motihari*, DD-437, Dharla, Torsa and S 5

Manasi

DJ-1

PUSA CENTRE

Pusa centre established in 1970–71 at erstwhile CTRI Research Station, Pusa, Bihar was a sub-centre on AINPT that focused on chewing & *Rustica* tobacco types cultivated in Bihar state. Later, it was Shifted to ICAR Research Complex for Eastern Region, Patna on 1st April 2001 and subsequently shifted to IARI Regional Station, Pusa, Samastipur on 1st April 2007 onwards. Pusa centre is now under the administrative control of IARI New Delhi. The centre released seven chewing tobacco varieties.

Varieties Released (7): DP-401, Sona, Gandakbahar, Prabha, PT-76, Vaishali Special, Litchavi

PT-76

Lichchavi

IMPACT of AINPT

Since inception of AINPT, there has been a significant progress in developing improved varieties and site specific technologies on integrated crop management for increasing productivity and exports of different types of tobacco. AINPT's integrated efforts support the livelihoods of over 47.7 million stakeholders, including farmers, farm labourers, *bidi* rollers, factory workers, and traders. Its strategic co-ordinated R&D initiatives have been crucial in enhancing the competitiveness of Indian tobacco in the global market, offering advantages in terms of lowering cost of production and increased average farm and export prices.

Site specific crop production technologies including cropping systems have reduced the cost of cultivation, increased the input use efficiency and profitability to the farmers. The energy saving green techniques in FCV curing such as barn modifications, agri-waste as fuel reduced the use of forest wood and fossil fuels and contributed to environmental sustainability. Farmers could save around 30% costs on pesticide application through the pant protection measures developed by AINPT thus creating an ecologically sound crop ecosystem which enhanced the natural biocontrol agents. The usage of biocontrol agents to reduce the pest problems, enhanced the scope for organic and or natural farming, thus preserving the biodiversity and clean environment. Vast usage of biocontrol agents and other ecologically sound technologies lead to entrepreneur development in local youth thus contributing to employment generation. Integrated pests and diseases management techniques has resulted in reduced residues of crop protection agents in the cured product, there by sustained exports and incomes to stake holders. The regular leaf quality assessment of different tobacco types across agroclimatic regions over a period resulted in adjusting the crop nutrition, optimising the resource quality especially in FCV tobacco across KLS, NLS, SLS and SBS regions leading to achieving higher leaf yield and better quality. Seasonal monitoring of chemical quality and implementing strategies based on leaf quality assessment resulted in resource saving, timely application of inputs and adoption of improved curing techniques besides better leaf and smoke quality.

As a result of technological advancements, the productivity of various types of tobaccos in vogue doubled compared to those cultivated in 1970s. The productivity potential of FCV reached to 3300 kg/ha and non-FCV to around 5000 kg/ha. In a case study with FCV tobacco, the rate of gain in cured leaf yield is estimated to be 26 kg/ha out of which > 46% was attributable to genotypic improvement. The tobacco improvement efforts have resulted in increase of total tobacco productivity from 914 kg/ha to 1823 kg/ha during 1972 to 2023. This amount to an improvement of about 18 kg/ha/year since inception of the unit (Graph).

Data Source: FAO Stat 2025

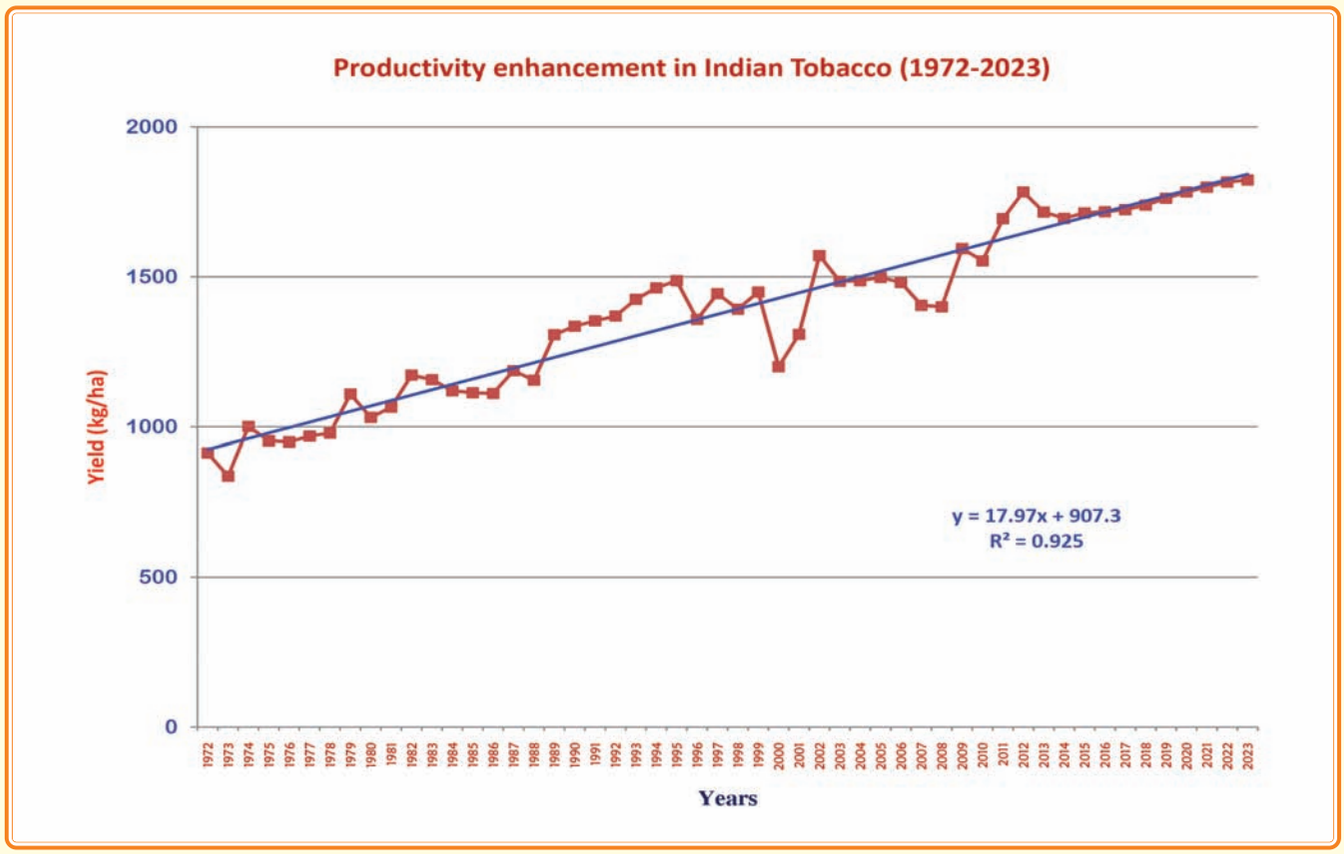


Fig.2 : Productivity enhancement in Indian Tobacco

Through pioneering co-ordinated research and development endeavours, AINPT continues to spearhead transformative initiatives, thereby shaping the future landscape of tobacco crop and fostering a more sustainable and safer tobacco industry. Thus, the efforts have contributed to increase in productivity, production and exports of tobacco.

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Published by

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Word Process & Design : Md. Elias