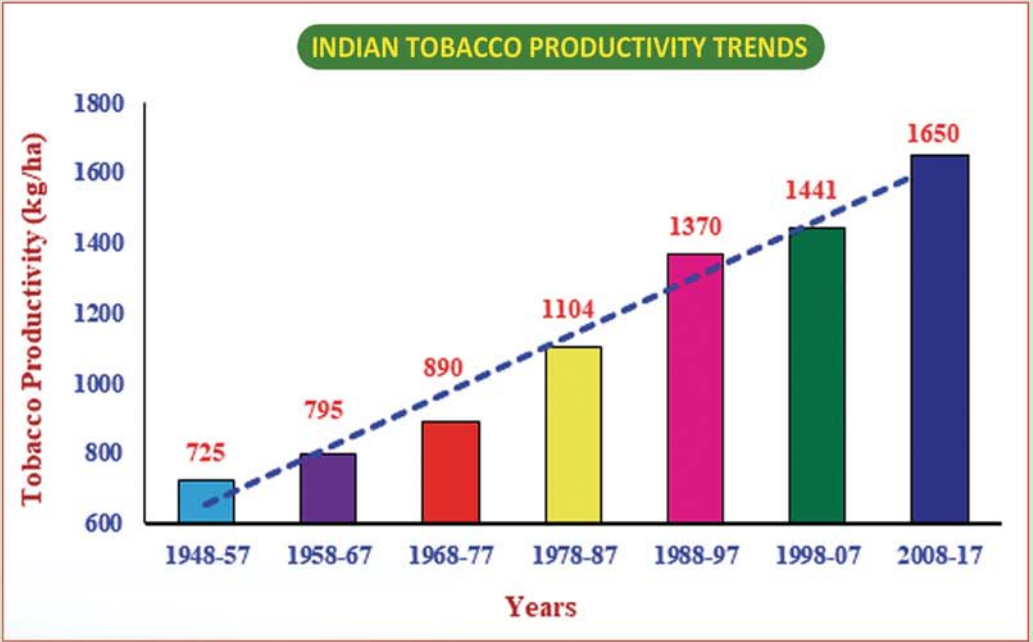


# ICAR-CTRI: RESEARCH CONTRIBUTION AND IMPACT



भाकृअनुप - केन्द्रीय तम्बाकू अनुसंधान संस्थान  
राजमन्द्री - 533 105, आन्ध्र प्रदेश

**ICAR - CENTRAL TOBACCO RESEARCH INSTITUTE**

( ISO 9001 : 2015 Certified Institute )

RAJAHMUNDRY - 533 105, ANDHRA PRADESH, INDIA





Technical Bulletin No. 1/2019

**ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE:  
RESEARCH CONTRIBUTION AND IMPACT**



**ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE**  
**(ISO-9001:2015 CERTIFIED INSTITUTE)**  
**RAJAHMUNDRY-533 105, ANDHRA PRADESH**

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May, 2019


## PREFACE



The Central Tobacco Research Institute (CTRI) was established way back in 1947 under the aegis of the then Indian Central Tobacco Committee and later on taken-over by the Indian Council of Agricultural Research (ICAR) in the year 1965. Since its inception, the ICAR-CTRI has been spearheading national tobacco research in all its dimensions and made singular contribution to the growth and development of tobacco science in the country. Through its long journey of seven decades, the institute has grown in size to have a network of six research stations catering to research needs of different tobacco types grown under distinct soil and climatic conditions in the country. It also coordinates research under All India Network Project on Tobacco with an objective of developing and delivering location specific research products and solutions.

The ICAR-CTRI, an ISO 9001:2015 certified institute, has made an impressive progress in development of whole range of improved varieties and standard production practices that are instrumental for enhanced productivity, quality and exportability of Indian tobacco. It also played a proactive role in dissemination of agro-technologies for field level adoption by way of conducting awareness and sensitization programmes and providing in-season advisories. Given the fact that the institute has been largely responsible for sustainable progress made in tobacco sector, it needs to showcase its achievements and impacts for increasing its visibility and for getting the recognition it deserves. Against this backdrop, a bulletin entitled **ICAR-Central Tobacco Research Institute: Research Contribution and Impact** is brought out to present a clear picture about the visibility of the institute as evident from the spread of its varieties, technologies and services on one hand and the impact they created in terms of increased tobacco productivity, quality, farm income and thus economic wellbeing of farmers. The publication embodies the gist of technologies and soil and crop management interventions recommended for tobacco production efficiency and product quality.

I compliment the authors for their sincere efforts in bringing out this publication embodying all relevant information about the ICAR-CTRI and its research contributions and impact created over the years. It is hoped that this technical bulletin would certainly enable tobacco sector stakeholders, researchers, policy makers and all its readers to better appreciate the institute for its monumental contribution to the body of tobacco science in the country and to the development of impact making research products, technologies and solutions for the benefit of tobacco farmers.

  
(D. DAMODAR REDDY)  
DIRECTOR, ICAR-CTRI

Date: 16.05.2019

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## I. TOBACCO - HISTORICAL PERSPECTIVE

Tobacco, one of the important cash crops and bio factory for molecular farmings, is considered native of Americas and its cultivation was thought to have begun as early as 6000 BC. It is believed that wilted and dried leaf blades were rolled to make cigars. Columbus noted Cuban natives smoking cigars when he discovered America. In 1560, Jean Nicot, the French Ambassador to Portugal, brought tobacco to England and France. It is reported that Nicot gifted tobacco to the Queen of France to cure her headache. From his name Nicot, the botanical name of the plant *Nicotiana* and the word nicotine (principle alkaloid of tobacco) have been derived. The genus *Nicotiana* belonging to *Solanaceae* family is represented by about 60 species of which, *Nicotiana tabacum* and *Nicotiana rustica* are cultivated extensively.

Tobacco cultivation in India has long history of more than 400 years. Initially, tobacco was grown in Kaira and Mehsana districts of Gujarat and later spread to other regions of the country. An endeavor to improve Indian tobacco has begun with the establishment of the Calcutta Botanical gardens in Howrah in 1787. Seven species of *Nicotiana* were imported from America and cultivated in botanical gardens of Calcutta in 1814. Again in 1875, a model farm was established at Pusa, Bihar for growing and curing of tobacco. The Imperial Agricultural Research Institute, established in 1903, carried out botanical and genetic studies of tobacco. The first Director of Imperial Agricultural Research Institute, Dr. Howard isolated 52 lines of tobacco. Later on, Shaw and Kashiram added 18 more lines in the series. Among those lines NP-28, NP-58 and NP-63 were found most promising. In 1940, B.P. Paul, the Royal Economic Botanist identified a selection NP-70, which became very popular among the tobacco growing areas of North Bihar due to its superior quality and the said variety continued to be popular among the farmers till 1960s. The Virginia tobacco cultivation and experiments were initiated in Pusa and Ghazipur in UP and commercial cultivation of Virginia tobacco in India in black soils was commenced in the year 1920. The flue-curing was first successfully done at Guntur, Andhra Pradesh in the year 1928. After 1930, India found a place on the world tobacco map. Indian Agricultural Research Institute established a Cigarette Tobacco Research Station at Guntur during 1936. During 1943-44, the excise duty on tobacco was introduced and since then tobacco remained as the important source of excise revenue. Realising the importance of tobacco in national economy, the Govt. of India constituted Indian Central Tobacco Committee (ICTC) in 1945 to look after tobacco cultivation specially technical and economic aspects of tobacco production in India.

## II. CENTRAL TOBACCO RESEARCH INSTITUTE - ESTABLISHMENT AND EVOLUTION

Indian Central Tobacco Committee (ICTC) established the Central Tobacco Research Institute in 1947 to conduct research on myriad aspects of different tobacco types grown in India. Subsequently, the institute was brought under the aegis of the Indian Council of Agricultural Research (ICAR) in the year 1965. The Institute has grown in its size and strength, presently Institute has four divisions at Headquarters (Crop Improvement, Crop Production, Crop Protection, Crop Chemistry and Soil Science) and it has a network of six Regional Research Stations situated at Guntur, Kandukur, Jeelugumilli (Andhra Pradesh), Vedasandur (Tamil Nadu), Hunsur (Karnataka) and Dinhata (West Bengal) and also coordinates one All India Network Project on Tobacco for organising coordinated multilocation trails in various tobacco production zones and further, the Institute host two KVKs (Kalavacharla, E.G.Dt. and Kandukur, Prakasam Dt. of A.P.) for effective dissemination of farm know-how and technologies to the farmers of East Godavari and Prakasam districts of A.P. The Regional Stations are catering to the requirements of tobacco farmers in their respective agro-climatic zones by developing improved varieties and location specific crop production technologies. The locations of tobacco research institute, stations and centres are depicted in the tobacco map of India.





## Vision

*Provide vibrant research back-up for Indian tobacco to be less harmful, remunerative and globally competitive in the changing milieu of national and international policy regimes*

## Mission

Developing environmentally sustainable agro-technologies for production efficiency, product quality and diversified uses of tobacco

## Mandate

- Basic and strategic research on domestic and exportable types of tobacco, improvement in quality and value-added products
- Coordination of tobacco research and developing the alternate usage of tobacco
- Identification of alternative crops/ cropping systems for tobacco growing regions of the country
- Dissemination of technologies and capacity building

## Uniqueness of CTRI

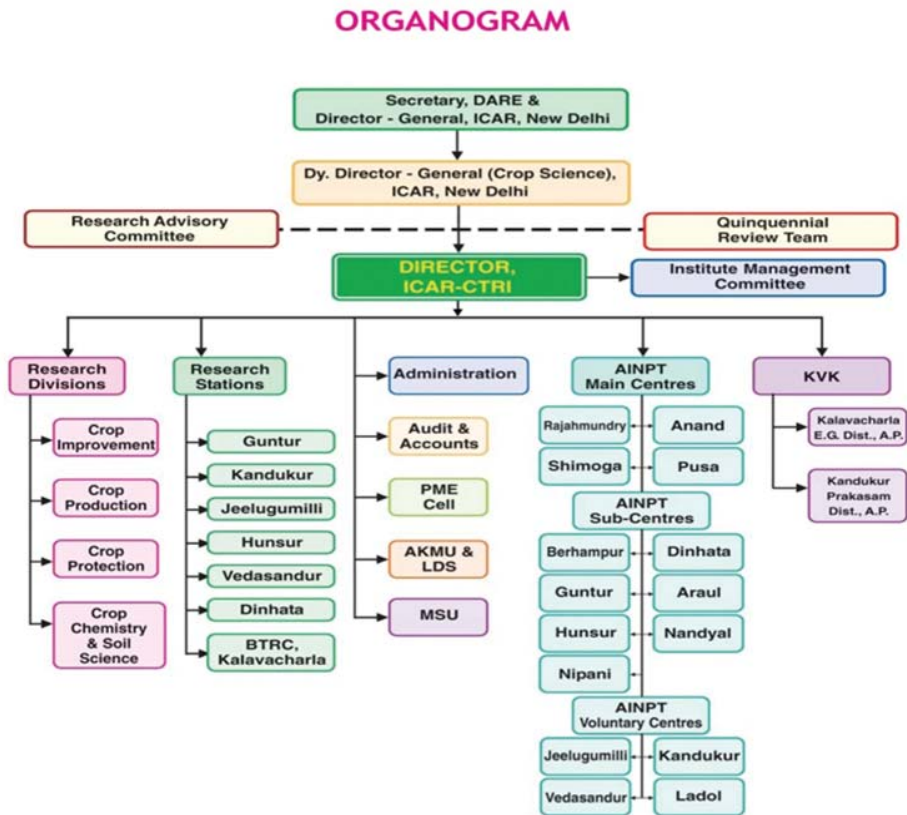
- ICAR-CTRI is the only research institute in the country and has the exclusive mandate of providing research backup for the production and processing of varied tobacco types grown across the different agro-ecologies of the country
- Institute research programmes are unique and do not represent the duplication of efforts by other institutes
- The institute mandate crop is a low volume-high value-commercial crop with high socio-economic relevance because of its vast potential to generate income to the farmers, employment to the labourers and revenue to the government
- Besides technical and extension support, the Institute has a unique service function of supplying high-quality tobacco seed to the farmers

## Institute's Quality Policy on Tobacco Research

- *Ensuring production of "quality tobacco" with reduced levels of harmful constituents*
- *Enhancing farm returns through innovative interventions for sustainable resource use and production efficiency*
- *Exploring and effective use of green energy sources for FCV tobacco curing*
- *Exploiting tobacco for diversified uses (phytochemicals and value addition)*
- *Effective technology transfer/consultancy services to address the stakeholders' needs*

## Institute's Organogram

The Institute has grown in size and strength. The state-of-the-art infrastructure facilities has been created at the Institute for persuing high quality research. The functional relationship of various units of the Institute are depicted in the Institute's Organogram.



## ICAR-CTRI : Core Strengths

- Large collection of tobacco germplasm
- Experienced scientists
- Well equipped laboratory facilities
- Trained technical manpower
- Accumulated scientific knowledge on tobacco crop

## Thrust areas

- Development of tobacco varieties for higher productivity and quality, tolerance to biotic and abiotic stresses, low harmful constituents through conventional and biotechnological approaches.
- Germplasm core and mini-core collections for traits of agronomic importance.
- Evolving cost-effective management strategies for *Orobanche*, a devastating root parasite on tobacco.
- Development of soil and water management interventions for enhancing resource use efficiency and produce quality.
- Evaluation of new generation pesticide molecules and their incorporation into IPM modules to address the pesticide residue issues.
- Development of climate-smart agro-techniques imparting resilience into the tobacco production systems.
- Use of alternate energy sources for FCV tobacco curing to minimize the fuelwood use
- Evaluation of potential tobacco and non-tobacco cropping systems for tobacco growing areas
- Identification of non-conventional uses for tobacco
- Production and supply of pure seed of notified tobacco varieties

## All India Network Project on Tobacco

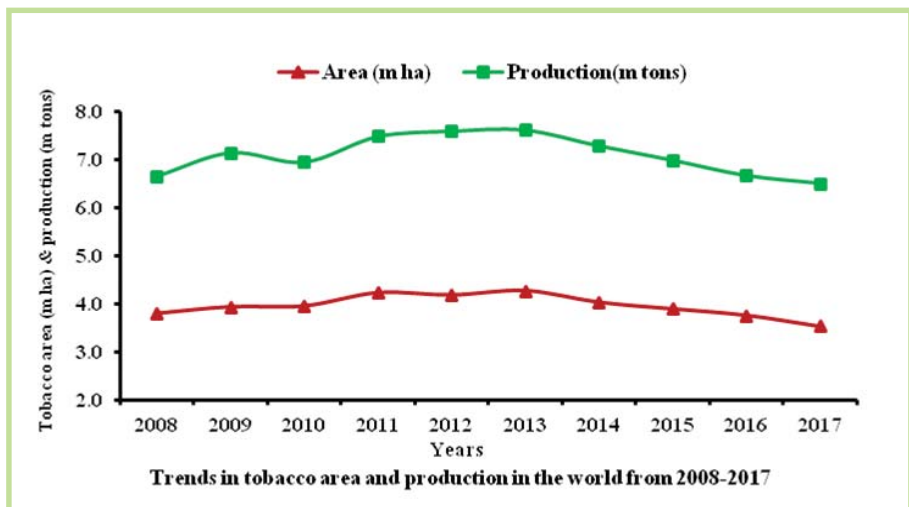
The Institute carries out network research on tobacco through its four main centres (Rajahmundry, Anand, Shimoga and Pusa), seven sub-centres (Nipani, Nandyal, Berhampur, Araul, Dinjata, Guntur, and Hunsur) and four voluntary centres (Ladol, Jeelugumilli, Kandukur and Vedasandur) located at different SAUs across different agro-ecological regions of the country. AINPT with its objectives of multi-location testing and multi-disciplinary approach for addressing the location-specific problems, facilitated in the generation of a number of varieties and agro-technologies for different tobacco types. All the production zones are occupied with improved tobacco varieties released in Network Project. Under this project, 1602 breeding lines of different types of tobacco (FCV, *bidi*, chewing, rustica/ Hookah, *natu*) were evaluated in initial and advanced varietal trials at different centers for yield potential /special traits including tolerance to biotic and abiotic stresses. After the inception of AINPT, 94 varieties of different tobacco types with different traits were released for commercial cultivation. Various tobacco production and protection technologies including IPM, IDM and INM and Post-harvest management were developed for different tobacco types.

### III. GLOBAL AND INDIAN TOBACCO SCENARIO

Tobacco also called “golden leaf” is one of the important commercial crops and being so it is vital to the world economy and it is known for its agricultural and industrial importance throughout the world. The time series data on area, production and productivity of tobacco for World and India were obtained from the official website of UN-FAO ([www.faostat.fao.org](http://www.faostat.fao.org)) for trend analysis.

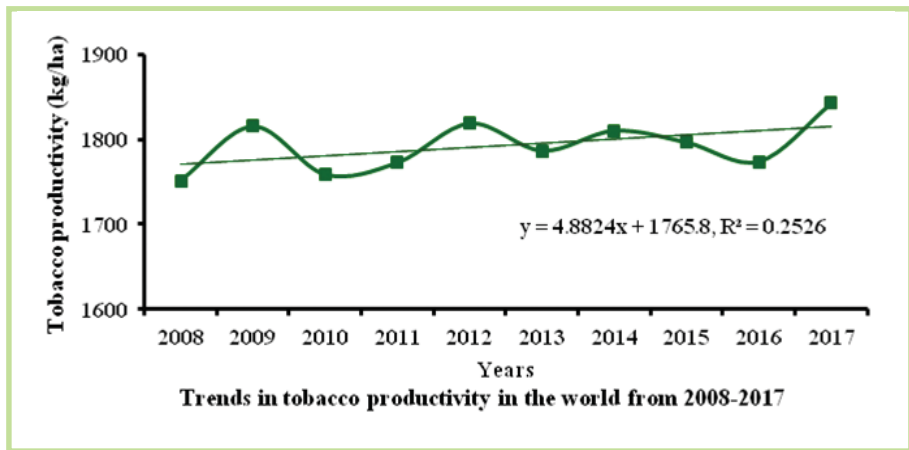
#### Trends in world tobacco area and production

- Tobacco is an international crop grown by about 124 countries across the world
- It is grown on less than one percent of the world’s agricultural land, and on a wide variety of soils and climate
- The global tobacco area under tobacco has not shown much change during the last one decade and persisted around 4.0 million hectares
- The global tobacco production was about 6.65 million tons in 2008 and reached 7.62 million tons in 2013 and gradually showed to reach to 6.50 million tons in 2017
- The most of the growth in global tobacco production is primarily credited to increase in productivity in the corresponding period since the area under tobacco cultivation is almost constant



## Trends in world tobacco productivity

- The global tobacco productivity was 1751 kg/ha during 2008 and subsequently increased to 1819 kg/ha during 2012 and has shown a marginal increase to 1843 kg/ha in 2017
- The global tobacco productivity has shown an increasing trend over the years (with year-to-year fluctuations) owing primarily to research, technology and extension interventions in the corresponding period

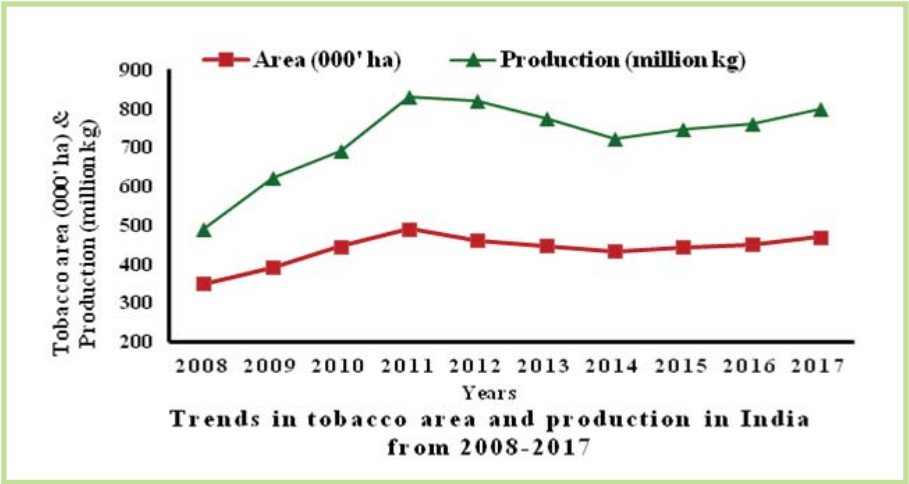


## Trends in Indian tobacco area and production

Presently, India stands third in production of tobacco (800 million kg) after China and Brazil. In India, tobacco is being cultivated in an area of about 0.47 million hectares, accounting for 0.32 percent of the total arable land in the country. Tobacco production concentrated in the states of Andhra Pradesh, Karnataka, Gujarat, Bihar, Uttar Pradesh, West Bengal and Tamil Nadu.

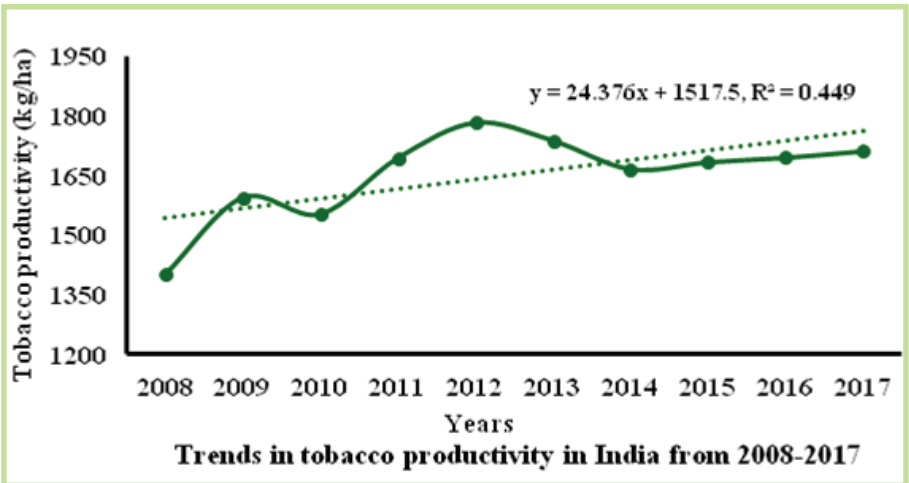
### Tobacco area and production

- In India, the area under tobacco cultivation has more or less remained same during last decade, while tobacco production has increased by more than 60 percent during the same period
- The increase in production is primarily attributed to increase in productivity during the corresponding period



### Tobacco productivity

- The tobacco productivity has shown a gradually increasing trend from 1400 kg/ ha during 2008 to 1711 kg/ha in the year 2017
- Productivity enhancement is mainly attributed to the technological interventions in terms of high yielding varieties, timely supply of quality seed, sustainable production and protection practices



## IV. NICHE AREAS OF FCV AND NON-FCV TOBACCO IN INDIA

### FCV tobacco

Flue-Cured Virginia tobacco is mainly grown in the states of Andhra Pradesh, Karnataka, and Telangana. In Andhra Pradesh, FCV tobacco is grown during *rabi* season by making use of conserved soil moisture in TBS as a rainfed crop, while 25 percent of tobacco area is under irrigated conditions of NLS domain. In Karnataka, FCV tobacco is predominantly grown as a rain-fed crop during *Kharif* season. The details of main soil domains along with districts covered and area under tobacco cultivation are furnished below.

### Major Production Domains of FCV Tobacco in India

Domains	States and Districts	Major soil group	Soil order	RF (mm)	Crop growing conditions
Northern Light Soils (NLS)	AP: East and West Godavari Telangana: Khammam	Red Sandy and sandy loams Soils	Alfisols	1100 - 1200	Irrigated (15 <sup>th</sup> Oct -15 <sup>th</sup> March)
Traditional Black Soils (TBS)	AP:Krishna, Guntur East, and West Godavari	Heavy Black Soils	Vertisols	1000 - 1200	Conserved Soil moisture (15 <sup>th</sup> Oct-15 <sup>th</sup> March)
Southern Light Soils (SLS)	AP: Prakasam and Nellore	Red Sandy Loams and Sandy Clay Loams	Alfisols/ Oxisols	750 - 800	Semi -monsoon (15 <sup>th</sup> Oct-15 <sup>th</sup> March)
Southern Black Soils (SBS)	AP: Prakasam and Nellore	Medium Black Soils (silt loams)	Inceptisols /Entisols	750 - 800	Semi -monsoon (15 <sup>th</sup> Oct-15 <sup>th</sup> March)
Karnataka Light Soils (KLS)	Karnataka: Mysore, Hasan, Davanagere and Shimoga	Red Sandy Loams	Alfisols	800- 850	Monsoon (May-Sep)

## Non-FCV tobacco

Non-FCV tobacco is mainly grown in the states of Gujarat, Tamil Nadu, West Bengal, Bihar, Odisha and Uttar Pradesh. In Gujarat, *Bidi* tobacco is mainly cultivated in three districts namely, Anand, Kheda, and Baroda and it is grown during *rabi* season with 60 percent of tobacco area is under irrigated conditions and 40 percent under rainfed conditions. In Tamil Nadu, Chewing tobacco is mainly cultivated in three districts viz., Dindigul, Erode and Salem and it is grown during *rabi* season predominantly under irrigated conditions. In Uttar Pradesh and West Bengal, Chewing/ hookah tobacco is mainly cultivated in some geographical areas viz., Kanpur, Gursahaiganj, and Ettawa and New Cooch Bihar and Jalpaigudi, respectively and it is mainly grown during *rabi* season predominantly under rainfed conditions. The details of main soil domains along with districts covered and area under tobacco cultivation are furnished below.

### Production domains of Non-FCV tobacco cultivation in India

Tobacco Type	State/ Districts Covered	Major Soil Group	Soil Order	RF (mm)	Crop Growing Conditions
Bidi tobacco	Gujarat: Anand, Kheda, Baroda, Karnataka: Belgaum	Sandy loams/ silt loams	Alfisols/ Vertisols	860	Irrigated (60 percent) and rainfed (40 percent) (August-March)
Chewing tobacco	Tamil Nadu: Dindigul, Erode, Salem	Sandy Loam	Inceptisol	800 - 900	Irrigated (Oct-March)
Chewing tobacco	WB: New Cooch Bihar, Jalpaiguri	Alluvial Sandy Loams	Mollisols/ Entisols	2500 - 3000	Rainfed (Oct-March)
Hookah tobacco	UP: Kanpur, Gursahaiganj, and Ettawa	Alluvial sandy loam	Inceptisol	1100	Rainfed (Oct-March)



## V. ICAR-CTRI RESEARCH CONTRIBUTION

The ICAR-CTRI focused on development of high yielding, biotic and abiotic stress tolerant varieties, crop production technologies for productivity enhancement and conservation of natural resources, protection technologies for production of pesticide-free tobacco, post-harvest management and energy conservation technologies in tobacco curing and phytochemicals from tobacco. During the past 70 years, the ICAR-CTRI released 94 tobacco varieties and the break-up of varieties of different tobacco types grown in India are furnished below:

Tobacco Type	Number of Varieties
<b>FCV (Flue-Cured Virginia)</b>	<b>31</b>
<b>Non-FCV</b>	<b>63</b>
Bidi	17
Chewing	26
Hookah	5
Cheroot	4
Natu	4
Burley	3
Lanka	2
Others	2
<b>Total</b>	<b>94</b>



SULAKSHANA



FCH 222



KANCHAN



ABIRAMI

## Research Contribution by ICAR-CTRI

S. No	Research Area	Research Contribution
1	<b>Varietal development</b>	<ul style="list-style-type: none"> <li>• Developed a total of 94 varieties/ hybrids of different tobacco types</li> <li>• Varieties have high yield potential and improved leaf quality along with special traits in terms of resistance/ tolerance to biotic and abiotic stresses</li> <li>• Maintained 3370 tobacco germplasm accessions for varietal improvement</li> </ul>
2	<b>Pure seed production</b>	<ul style="list-style-type: none"> <li>• Standard techniques of pure seed production and supply to farmers</li> </ul>
3	<b>Nursery raising</b>	<ul style="list-style-type: none"> <li>• Standardized the nursery raising technology on raised seed beds along with nutritional, irrigation and plant protection schedules for tobacco seedling production</li> <li>• Micro-sprinkler irrigation technology was developed to improve the water and nutrient use efficiency</li> <li>• Tray seedling production technology in polytrays was developed for production of healthy and disease free seedlings</li> </ul>
4	<b>Preparatory cultivation</b>	<ul style="list-style-type: none"> <li>• Deep summer ploughing for breaking hard pans and controlling soil born pests</li> </ul>
5	<b>Transplanting</b>	<ul style="list-style-type: none"> <li>• Location specific techniques for transplanting pattern and optimum plant geometry (spacing)</li> </ul>

S. No	Research Area	Research Contribution
6	Fertilizer schedules	<ul style="list-style-type: none"> <li>Green manuring with sunhemp or application of FYM/Filter press cake before tobacco transplanting</li> </ul>
		<ul style="list-style-type: none"> <li>Standardized fertilizer schedules (rate and timing) for different tobacco types for greater NUE</li> </ul>
		<ul style="list-style-type: none"> <li>Type of fertilizers and methods of application (dollop and PRPF) for increased fertilizer use efficiency in different tobacco production zones</li> </ul>
7	Weeding and intercultural operations	<ul style="list-style-type: none"> <li>Standardized the schedule of intercultural operations using the tractor / bullock drawn implements for weed control and better crop growth</li> </ul>
		<ul style="list-style-type: none"> <li>Physical and chemical weed control techniques</li> </ul>
		<ul style="list-style-type: none"> <li><i>Orobanche</i> management interventions</li> </ul>
8	Water management	<ul style="list-style-type: none"> <li>Optimum irrigation schedules with number and quantum of irrigation water at different crop growth stages</li> </ul>
		<ul style="list-style-type: none"> <li>Drip irrigation and fertigation techniques were developed for enhancing water and nutrient use efficiency</li> </ul>
		<ul style="list-style-type: none"> <li>Farm pond technology for rain water harvesting and to provide life saving irrigation in southern light soils of Prakasam and Nellore districts (AP)</li> </ul>
		<ul style="list-style-type: none"> <li>Moisture conservation methods viz., mulching and soil amendements</li> </ul>

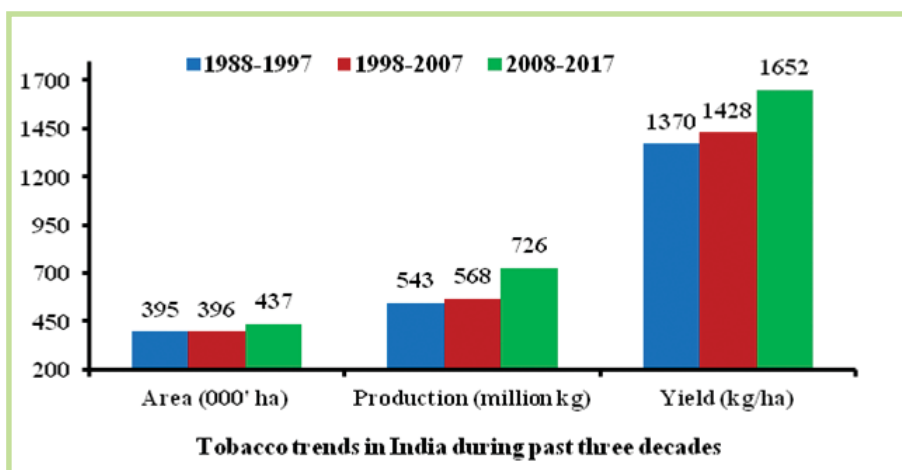
S. No	Research Area	Research Contribution
9	<b>Sucker control</b>	<ul style="list-style-type: none"> <li>• Developed techniques and methods for topping, desuckering schedules and chemical sucker control</li> </ul>
10	<b>Plant protection</b>	<ul style="list-style-type: none"> <li>• Integrated pest management techniques for important tobacco pests, major diseases and soil borne nematodes</li> <li>• Pesticide application techniques for increased efficacy and safety</li> <li>• Strategies for lowering pesticide residues in produce</li> </ul>
11	<b>Harvesting and curing</b>	<ul style="list-style-type: none"> <li>• Leaf harvesting methods (priming and stalk cut methods) and schedules were standardized for different tobacco types</li> <li>• Developed tobacco curing techniques for different tobacco types (flue curing, air curing, pit curing, sun curing and smoke curing)</li> <li>• Developed integrated barn for curing of FCV tobacco</li> <li>• Energy conservation measures like barn roof ceiling, installation of turbo fan for better air circulation</li> <li>• Agri-biomass briquette making and use as supplements to wood fuel</li> </ul>
12	<b>Post-harvest management</b>	<ul style="list-style-type: none"> <li>• Developed standard protocols for handling cured leaf (bulking, grading, baling techniques)</li> <li>• Bale pressing machine for reducing labour requirement and drudgery</li> </ul>

S. No	Research Area	Research Contribution
	<b>Other Contributions</b>	
1	<b>Phytochemicals from tobacco</b>	<ul style="list-style-type: none"> <li>• Developed process for purification of solanesol (95 + % pure) from crude/enriched extracts of tobacco green leaf/tobacco cured leaf/tobacco waste (Patent No. 211204).</li> <li>• Standardized extraction, refining and toxicological evaluation of tobacco seed oil</li> <li>• Developed extraction method of pure nicotine having medicinal value</li> </ul>
2	<b>Alternative crops to tobacco</b>	<ul style="list-style-type: none"> <li>• Identified the next best alternative crops to different tobacco types in the country</li> </ul>
3	<b>Service functions</b>	<ul style="list-style-type: none"> <li>• Analytical services on soil and water testing, chemical leaf quality evaluation, smoke analysis and pesticide residue analysis</li> <li>• Pure seed production and supply to farmers</li> </ul>
4	<b>Training and Capacity building</b>	<ul style="list-style-type: none"> <li>• Capacity building programmes on crop management techniques to all the stakeholders including farmers, manufacturers, traders, Tobacco Board staff etc.</li> <li>• Awareness and sensitization programmes about agro-technologies</li> </ul>
5	<b>Technology outreach activities</b>	<ul style="list-style-type: none"> <li>• Diagnostic visits and in-season contingency advisories</li> <li>• On-farm trials, Front line demonstrations, Field friends programmes, Field days and Kisan melas etc.</li> </ul>

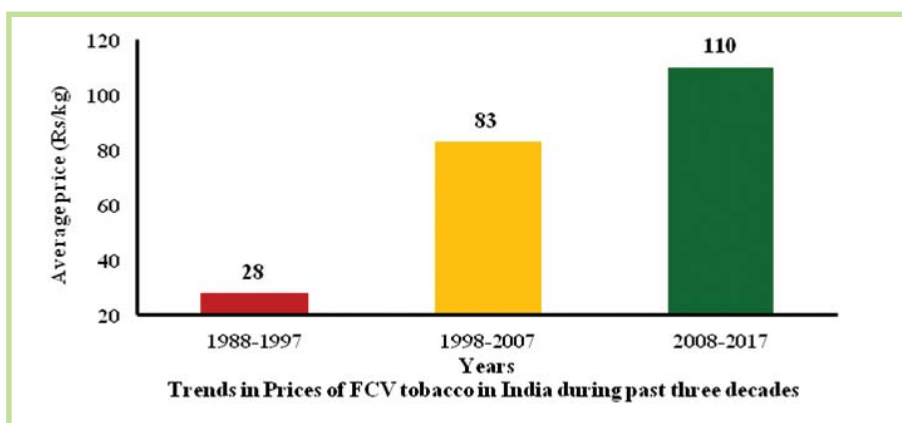
## VI. IMPACT OF ICAR-CTRI: AN ASSESSMENT

One of the core objectives of ICAR-CTRI has been to transfer research products and technologies to tobacco farmers. The institute played a proactive and aggressive role in dissemination of agro-technologies for field level adoption by way of conducting awareness and sensitization programmes and providing in-season advisories. All the tobacco varieties grown and the standard production practices followed by the tobacco farmers in different regions are in fact developed and recommended by the institute. This bears testimony to the visibility and brand image of ICAR-CTRI among the farming community. The spread of varieties/hybrids developed and evaluated by CTRI-AINPT system has been so extensive that these cultivars cover almost entire tobacco growing area in the country. Similarly, the institute developed region specific agro-technologies have shown high degree of adoption in all tobacco zones. As part of its service functions, the institute has been producing and supplying pure seed of tobacco varieties (9 - 10 t/annum) to meet >90% of seed requirement in the country. Extensive adoption and use of institute technologies, varieties and services created a huge economic impact on tobacco farms and farmers. The impact of ICAR-CTRI has been assessed in terms of performance indicators that include productivity, production, prices, exports and net farm income and detailed below.

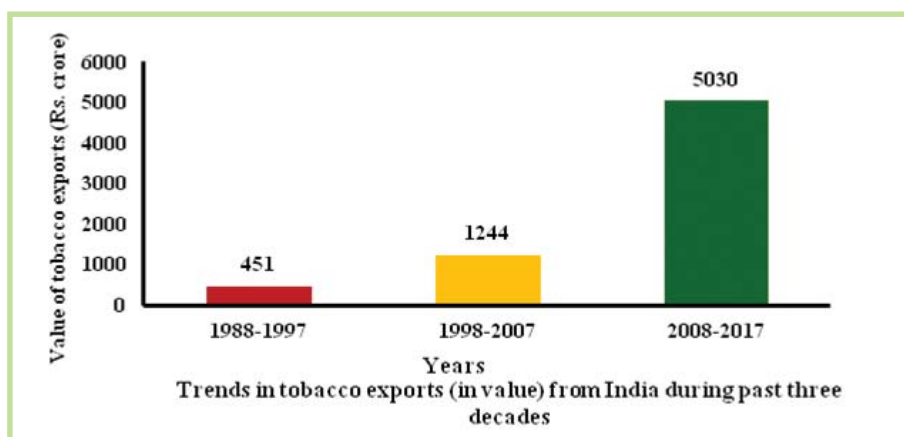
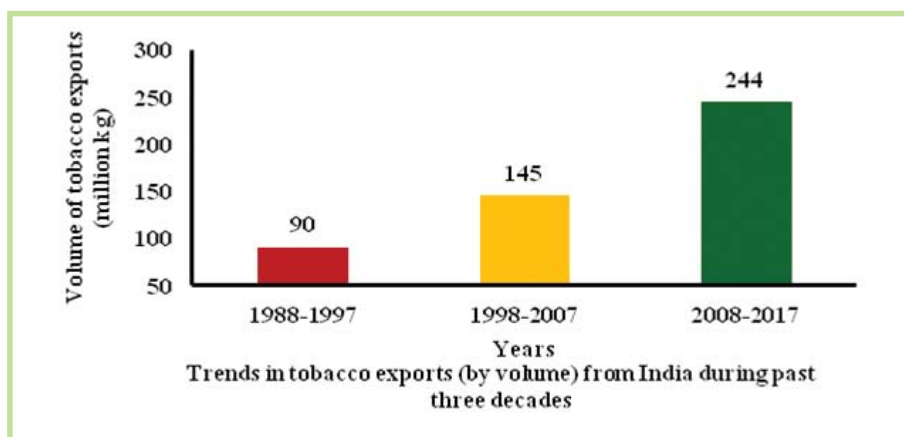
- 1. Increase in productivity of tobacco:** The concerted research efforts of ICAR-CTRI has led to significant increase in the productivity of tobacco in the country. The annual average productivity of tobacco was very low at 1370 kg/ha during 1988-97 and gradually increased over the decades and reached to 1652 kg /ha during 2008-2017 owing to the large-scale adoption of scientific interventions and practices developed by the Institute.
- 2. Productivity led growth in tobacco production:** The area under tobacco cultivation in the country remained more or less constant at around 4.10 lakh hectares during the past three decades (1988 to 2017). However, the average tobacco production during the corresponding period increased by 34 percent, owing primarily to productivity (kg/ha) enhancement (21 percent) resulting from the technological interventions in terms of high yielding varieties, timely supply of quality seed, sustainable production and protection practices made available by the institute.



- Tobacco seed supply:** The ICAR-CTRI has been supplying total seed requirement (> 90 percent) by the tobacco farmers in different agro-climatic zones of the country. The institute is consistently supplying the seed of all the popular varieties of tobacco in the country. Presently, the Institute is supplying > 9 tons of pure seed annually (worth about Rs. 90 lakhs) for all types of tobaccos grown in the country.
- Tobacco Prices:** In India, the average price of FCV tobacco has increased more than two folds from Rs. 28 /kg during 1988-97 to Rs. 110/kg during 2008-17. This increase is mainly due to increase in demand for quality Indian tobacco in the international market and quality improvement such as balanced leaf chemistry, low pesticide residues, and heavy metals mainly due to the adoption of scientific management interventions suggested by the Institute.

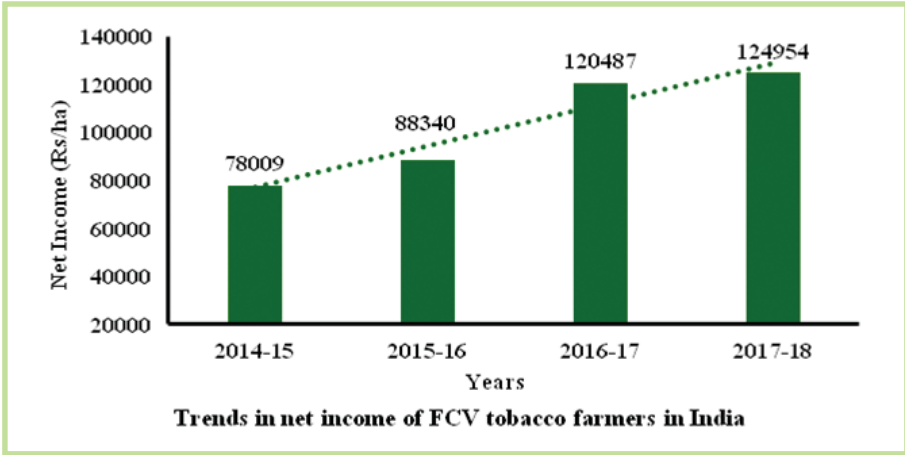


5. **Tobacco Exports:** Scrupulous adoption of technology interventions has led to the production of the quality leaf with low levels of pesticide residues and free from NTRMs. Accordingly, there has been a continuous demand for Indian tobacco in the global market as is evident from the increased tobacco exports in the past three decades. The annual tobacco exports from the country increased by 2.7 times in volume and 11 times in value during past three decades i.e. from an average of 90 million kg and Rs.451 crore during 1988-97 to 244 million kg and Rs. 5030 crore during 2008-2017, respectively.



6. **Net Income of Farmers:** The technology-led growth in the productivity resulted in significant rise in net income of FCV tobacco farmers in the country. The income of FCV tobacco farmers has increased from Rs.78, 009/ha during 2014-15 to Rs.1,24,954/ha during 2017-18, nearly a 60 percent increase. This is evident from the trends in net income during last 4-years.





7. **Employment Generation:** Tobacco provides livelihood to millions of people in various components of tobacco sector including tobacco production, processing, manufacture, and trade. *Bidi* sector employed millions of labour in *bidi* rolling, trade and retail activities and also millions of tribals are involved in *tendu* leaf plucking. According to one estimate (TII, 2017), the tobacco sector provides livelihood security to 45.7 million people in different categories, around 70 percent of whom are in the agriculture sector.

## VII. THE WAY FORWARD

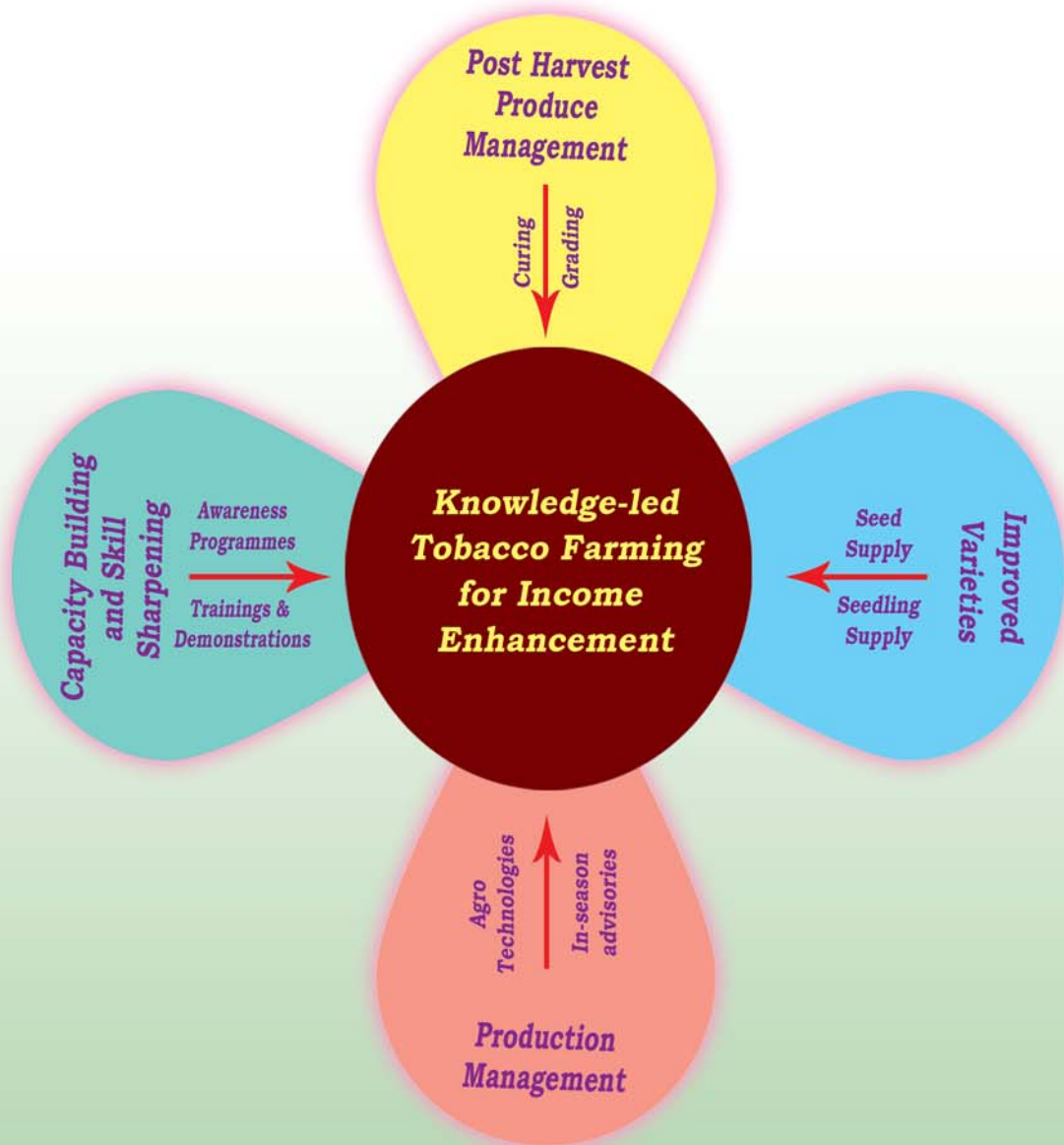
The dynamics of tobacco sector is tremendously influenced by trade requirements, end-user preferences and statutory regulations besides environmental and socio-economic considerations. Notwithstanding the income and employment generating potential of the crop, the emerging changes in policy environment at the national and international level particularly in public health, commerce, and environment sectors will have a direct bearing on the prospect of the tobacco sector in India. The future research framework for tobacco needs to be vibrant in nature so as to fit into all possible policy environments (In the policy of *status quo* safe tobacco for consumers, enhanced farm returns to farmers, environment smart energy sources for curing and diversified uses of tobacco. The policy of gradual phase out of tobacco - Increased focus on tobacco for exports, exploring alternative livelihood security options, rechristening the Institute and broadening its mandate to include other commercial crops. The policy of complete withdrawal of tobacco - Rechristening the Institute and recasting its mandate).

In view of this, ICAR-CTRI has to reorient its research to focus more on the following issues:

- Developing tobacco with less harmful substances (TSNA, Tar, CPA etc.)
- Enhancing farm income for tobacco farmers
- Environment-smart energy sources for FCV tobacco curing
- Diversified uses of tobacco
- Climate-resilient interventions for the management of biotic and abiotic stresses
- Farm mechanization to reduce the cost of production
- Developing green technologies for production, protection, and processing



# ICAR-CTRI BRAND IMAGE



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