

Technical Bulletin No. 03/2023

तम्बाकू पर अखिल भारतीय नेटवर्क परियोजना

ALL INDIA NETWORK PROJECT ON TOBACCO

SUCCESS STORIES



ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE

(An ISO 9001:2015 Certified Institute)

RAJAHMUNDRY - 533 105, ANDHRA PRADESH, INDIA

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भाकृअनुप – केन्द्रीय तम्बाकू अनुसंधान संस्थान
ICAR-CENTRAL TOBACCO RESEARCH INSTITUTE
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January, 2023

Preface



ICAR-CTRI and Network centres since their inception in 1947 and 1971, relentlessly made research efforts on development of high yielding biotic and abiotic stress tolerant varieties/ hybrids for the benefit of the farmers. A total number of 103 varieties/hybrids were released/identified in different tobacco types viz., FCV (33), *Bidi* (19), *Rustica* (11), Chewing (23), Burley(4), *Natu & Lanka* (7). These varieties made a significant contribution to the tobacco yield improvement in different states. More than 90% of the farmers adopted these varieties. The unique feature of ICAR-CTRI and network centers is supplying pure and quality seeds to more than 90% tobacco farmers. Every year a total quantity of ~15000 kg tobacco seed of notified varieties is supplied to farmers through revolving fund scheme, ICAR-CTRI research stations and also through networking centers. "Tobacco Seed Portal", an innovative and hassle free seed supply mechanism was also developed by CTRI for transparent seed supply to farmers. The important tobacco varieties released in All India Network Project on Tobacco (AINPT) in different tobacco types, their details and their significant impact was given in this bulletin as success stories of AINPT.

I express my sincere gratitude to Dr. Himanshu Pathak, Secretary, DARE and DG, ICAR, New Delhi, Dr. T.R. Sharma, DDG(CS) and Dr. R.K. Singh, ADG(CC) for the support, guidance and encouragement. I express my sincere thanks to the scientists developed these varieties, documented and compiled the varietal information and the AINPT coordination unit for their efforts in compiling and bringing out this bulletin. I hope this bulletin will enlighten the stakeholders and readers about the service rendered to farmers by the ICAR-CTRI and network centres.

Date: 23.01.2023


(M. SHESHU MADHAV)
DIRECTOR

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SIRI : An Impactful FCV Tobacco Variety

Siri variety with its high yielding potential (3000 kg/ha) and adoptability spread to entire Black Soil and Southern Light Soil regions of AP replacing all the varieties in vogue prior to its release. SIRI meaning wealth in *Telugu* language became house hold name with the farmers of Black Soil and Southern Light Soil regions. This land mark variety has been instrumental in the socio-economic transformation of tobacco farming community and others dependent on tobacco sector.

Tobacco is an important commercial crop grown in a wide range of soil and climatic conditions. Flue Cured Virginia (FCV) tobacco is an exportable type accounting for around 30% of total tobacco (240 million kg) produced in India. It is mainly used in making cigarettes and about 70% of it is exported. The FCV grown in Vertisols and Alfisols under rainfed conditions of Andhra Pradesh (AP) is considered as cheap neutral filler in the export market. The FCV tobacco cultivated in Vertisols (Black Soils-BS) and Alfisols (Southern Light Soils-SLS) constitute 75% of FCV area in AP and 40% of India. The productivity of FCV in these areas was low (~1190 kg/ha) prior to 2006. Systematic concerted research efforts made over a period of time at ICAR-Central Tobacco Research Institute (CTRI), Rajahmundry with the objective of increasing the productivity, a high yielding variety, 'SIRI' was developed and released for commercial cultivation in rainfed areas of Andhra Pradesh in 2006 (A.I. Narayanan *et al.*). The cultivation of SIRI revolutionized tobacco yields and enhanced the prosperity of the region.

Siri variety was developed through pedigree method of breeding from a cross between CM-16 and Gauthami. It is a medium to light cast variety with open plant habit. It possesses around 32-34 curable leaves with easy curing. Cured leaves are deep lemon to orange in colour with open graininess. Leaf nicotine (2.42%), reducing sugars (17.1%), EMC (12.74%) and filling Value (3.06 cc/g) of cured tobacco are in desirable ranges. It has an yield potential of more than 3000 kg/ha under favourable conditions. With the



release of this variety, the yield potential of FCV tobacco has been crossed 3000 kg/ha mark. The cured leaf yield potential of Siri is about 50% and 100% higher than VT 1158 and Hema, ruling cultivars at the time of its release, respectively.

Agronomic and Special Characters

- **SIRI variety has the cured leaf yield potential of 3000 kg /ha i.e. 50% higher than the then existing high yielding variety, VT 1158 (2000 kg/ha).**
- Owing to its fast and vigorous growth nature, it has fair degree of tolerance to moisture stress
- It produces around 32-34 longer and broader medium to light cast leaves suitable for easy curing
- Cured leaves are open grained, deep lemon to orange in colour and have balanced chemistry with 2.42 % nicotine, 17.1% reducing sugars and 3.06 cc/g filling value.



Variety spread: In 2006, the SIRI variety was primarily recommended for commercial cultivation on Vertisols of East Godavari, Guntur, Prakasam districts of Andhra Pradesh. In view of its higher yielding ability, it was readily accepted by the farmers in Black Soils region of AP. Subsequently, it spread to even the adjoining Southern Light Soil region covering Prakasam and Nellore districts of AP. In the very next year of release (2006-07) itself, SIRI was cultivated in about 12% of the Black Soil and Southern Light Soil regions (Table 1). This variety quickly replaced the old cultivars and occupied about 65% of Black Soil and Southern Light Soil regions at the end of fifth year of its release (2010-11). **By the year 2018-2019, this has made inroads and emerged as the single largest variety in Black Soil and Southern Light Soil regions occupying almost entire area. This trend continued during 2019-2020 and 2020-21 crop seasons also.** This phenomenal coverage, evidently signifies the suitability and adoptability of SIRI variety to biophysical environment of Black Soil and Southern Light Soil regions and its acceptability and popularity among the farmers and traders.

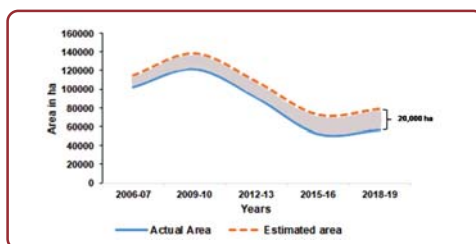
Table 1: Spread of SIRI variety in Black Soil and Southern Light Soil regions of AP

Year	SIRI planted area in BS/SLS region (ha)	Total BS/SLS area (ha)	Per cent BS/SLS area covered by SIRI (%)
2005-06	1925	96259	2
2006-07	12246	102051	12
2010-11	72087	110903	65
2014-15	56720	79887	71
2018-19	56100	56661	99

Currently, ‘Siri’ is the major variety grown in Southern Light Soils and Traditional Black Soil regions accounting for about 99% of the total area (Tobacco Board Annual Report - 2020-2021). Every year Siri is being cultivated on an average 73,400 ha of area in Andhra Pradesh.

Land Sparing Potential

Owing to high yielding ability, the SIRI variety makes it possible to realise the production targets fixed by Tobacco Board, Guntur for FCV tobacco in Black Soil and Southern Light Soil regions with lower acreage. There is a clear gap between the actual area used for FCV tobacco production and the estimated area that would have required for realising same production in different years had the yield levels of pre-2006 are maintained (Fig. 1). **Thus, cultivation of SIRI variety resulted in sparing of about 20,000 ha area every year.**



Note: Shaded area indicates tobacco area spared for other crops

Fig 1: Tobacco area spared by cultivation of SIRI variety in Black Soil and Southern Light Soil regions of AP

Economic Impact

The impact of SIRI variety was assessed from 2006-07 when the coverage of SIRI was around 12% of the Black Soil and Southern Light Soil regions in terms of productivity increase, income generation to farmers and revenue to Nation.

- Cultivation of SIRI variety resulted in gradual increase in the average productivity of Black Soil and Southern Light Soil regions from 1187 kg/ha (2003-07) to 1475 kg/ha (2015-19) in proportion to its area of cultivation, negligible to around 99%, respectively. **The average productivity increased to the tune of 288 kg/ha during 2003-07 to 2015-2019 with a record productivity of 1573 kg/ha in 2014-15.**

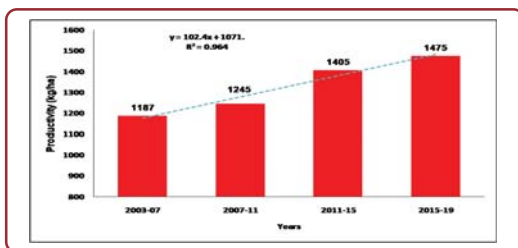


Fig 2: Average productivity of tobacco in Black Soil and Southern Light Soil regions of AP

- During the period from 2006-07 to 2018-19, about **1030 M kg** leaf was produced from SIRI variety in Black Soil and Southern Light Soil regions. The worth of this material was **Rs. 12,904 crores**. This has contributed to Rs. 90,325 crores of revenue to National economy in the form of central excise, VAT and export earnings. About 1,03,0 billion sticks of cigarettes were made out of the leaf of SIRI variety, translating to the economic value of **Rs. 12,38,400 crores**.
- SIRI variety with its high yielding potential lead to an additional cured leaf yield of **279 M kg** during 2006-07 to 2018-19. This translates to additional farm income of **Rs. 3841 crores**, revenue of **Rs. 24,370 crores** and finished product worth **Rs. 3,36,000 crores**.
- *Revenue from seed sales:* During last 15 years, ICAR-CTRI through Revolving Fund Scheme, produced and sold around 99,200 kg of SIRI seed to farmers of Black Soil and Southern Light Soil regions and thus earned more than Rs. 11.04 crores.

SIRI variety with its high yielding potential and adoptability spread to entire Black Soil and Southern Light Soil regions and became a house hold name with the farmers of Black Soil and Southern Light Soil regions. This land mark variety has brought about socio-economic transformation of tobacco farming community of Black Soil and Southern Light Soil regions and others dependent on tobacco sector.

FCH 222: A high yielding *Fusarium* wilt resistant FCV tobacco variety

FCH 222 - A *Fusarium* wilt resistant FCV tobacco variety, with genetic yield potential of more than 3000 kg/ha was developed through pedigree method. Along with high yield potential and disease resistance, the variety has desired cured leaf qualities. Green leaves are broad, long and puckered, while cured leaf is mature, medium bodied, open grained, deep lemon to orange color, oily, pliable with medium spots and characterised by neutral aroma with around 70% bright grades. The variety has become popular among the KLS farmers owing to its disease resistance coupled with high yield and bright grade out turn.

FCV tobacco (*Nicotiana tabacum* L.), grown as rain fed crop in transition Zone of Karnataka light soils (KLS), is known for its unique cured leaf qualities and thus has huge export demand. In KLS, fungal diseases are the major production constraints since the cultivation of crop. *Fusarium* wilt- a devastating soil borne fungal disease caused by *Fusarium oxysporum* (Schlecht) *f.sp.nicotianae* Johnson was first reported from India in the year 2000. The disease which was once endemic to certain FCV tobacco growing areas is spreading at an alarming rate and has become a threat in recent years. An estimated yield loss of 60% is reported from India, with more pronounced incidence in Karnataka where FCV tobacco is grown as rain fed crop.

Wilt disease management is difficult or rather impossible as the spores of the pathogen from diseased plants can remain viable in the soil in dormant state for several years without host and can infect as and when predisposing factors arise. As there are no viable control methods available, concerted research efforts were made to identify resistance sources to develop wilt resistant variety for light soil region of Karnataka. A consistent effort in this direction has resulted in the development of FCH 222.



FCH 222, is a FCV tobacco variety developed by pedigree method by crossing FCH 201 (high yielding line derived from the cross Rathna × Kanchan) and Speight G 33 (resistant donor) as parents, suitable for wilt sick as well as dry and semi dry regions of KLS. The variety was released in 2012 (K.N. Subrahmanya *et al.*) for the endemic areas of the *Fusarium* wilt in FCV tobacco grown KLS. It has an average



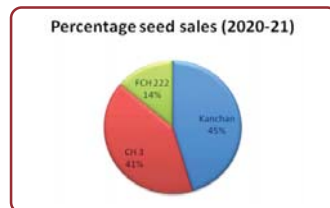
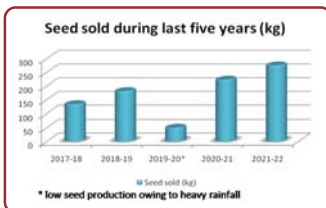
potential yield of 2600 kg/ha with more than 65% bright leaf yield. It is recommended to light soils of southern transition zone of Karnataka where FCV tobacco is cultivated under rainfed conditions.

Plant characteristics

- The plant has open habit with green colour stem, medium internodal length and grows to a height of 110-125 cm.
- The leaf is puckered, long and broad with acute tip. Leaf colour is medium to dark green and sessile.
- The plant has around 25 leaves with 20-22 curable leaves. The leaf spangling is medium at maturity.
- It has acceptable physical and chemical characters like the existing ruling variety Kanchan.

In *Fusarium* wilt sick plot, the resistant line FCH 222 confirmed its high level of resistance with only 2.5% disease incidence and the reaction was comparable to the resistance donor Speight G 33 (5.0%) while the disease incidence in susceptible check Bhavya and Kanchan was 82.5% and 62.5% respectively. Even in high wilt sick plots, FCH 222 had only 15% disease incidence as against 90 to 95% in susceptible varieties Kanchan and Bhavya.

Variety spread: In view of its high yield potential coupled with higher bright leaf out turn and *Fusarium* wilt resistance, FCH 222 is becoming popular among the farmers as indicated by the increased demand for its seeds by the farmers over the years.



FCH 222 occupied an area of 10% in Karnataka Light soils and around 33-35% of the wilt affected areas.

A 119: A high yielding *Bidi* tobacco variety

A 119 - A high yielding (2600 kg/ha) *bidi* tobacco variety (88-47 x Sokhadiu), tolerant to black shank diseases. Leaves are dark green and turn to light green to yellow after ripening with rough surface having thick, fairly gummy and moderate spangles. It is predominantly cultivated in *bidi* tobacco growing areas of Gujarat, Karnataka, Maharashtra and Andhra Pradesh.

Tobacco, one of the important high value low volume commercial crops is valued for its potential to generate farm income and employment to farmers and farm labours, and revenue to the government. It is grown in an area of 0.42 M ha in the country. With a production of 758 M kg, India ranks second in the world tobacco production, after China. Tobacco made a significant contribution to Indian economy (~Rs. 28,000 crore) in terms of excise revenue (Rs. 22,000 crore) and export earnings (Rs. 6,000 crore). Among various tobacco types grown in India, *bidi* tobacco is accounting for 33% of the total tobacco area and 49% of the production in the country. *Bidi* tobacco is grown in an area of ~1.70 lakh ha in Gujarat, Andhra Pradesh and Karnataka. In middle Gujarat the crop is grown in Anand, Kheda, Vadodara, Panchmahal and Dahod districts on alluvial soils (*Goradu*). In Karnataka, *bidi* tobacco is mainly grown in Nipani area on silt loams having good moisture holding capacity and in Andhra Pradesh it is grown in Kurnool district.

A 119, is a *Bidi* tobacco (*Nicotiana tabacum* L.) variety developed under All India Network project on tobacco by crossing 88-47 x Sokhadiu, dwarf, suitable for early as well as late transplanting, responds well to nitrogen and



irrigation. The variety is released for Gujarat in 1969 and as a national check in 1984 (G.J. Patel). The variety is resistant to lodging, highly resistant to leaf burn and tolerant to black shank diseases and has a potential yield of 2600 kg/ha. It is recommended to *bidi* tobacco growing areas of Gujarat, Karnataka and Andhra Pradesh.

Plant characteristics

- A 119 has a plant height ranging between 130 to 150 cm having 25 and 20 no. of leaves/plant at untopped and topped conditions respectively with average leaf length of 60 cm and width of 40 cm. Stem is thick and round having internodal length of 5 cm in lower half with compound inflorescence.
- Leaves are narrow and tapering at the base with acute tip abruptly tapering, entire margin with moderate puckering.
- Leaves are dark green in colour and turn to light green to yellow after ripening with rough surface having thick, fairly gummy with moderate spangles

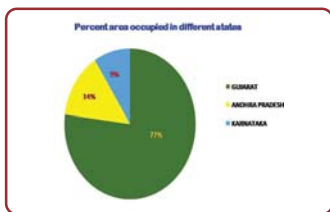
Quality parameters: The plant is known for its good quality parameters which are preferred by the traders all over the country.

LEAF QUALITY

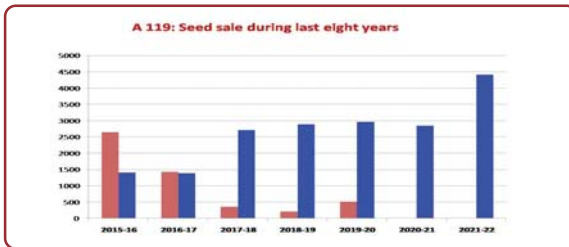
Puckering	: Moderate
Surface	: Rough
Leaf thickness	: Thick
Spangles	: Moderate
Gumminess	: Fairy gummy
Nicotine (%)	: 5.88
Reducing sugar (%)	: 3.34
Colour	: Unripe : Dark green Ripe : Light green with yellow cast



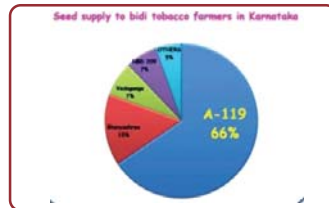
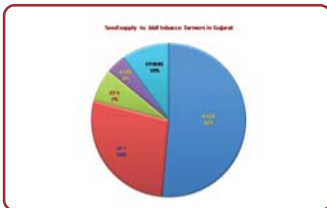
Variety spread: In view of the high yield potential coupled with good leaf quality and adaptability to the different biophysical environments A 119 variety has occupied a sizeable area in Gujarat (25%) (Anand, Kheda, Vadodara, Mahisagar, Panchmahals), Andhra Pradesh (65%) and Karnataka (60%) states to an extent of 30500 ha, 11000 ha and 4000 ha respectively. In the total cultivated *bidi* tobacco area among three states of Gujarat, Andhra Pradesh and Karnataka, the variety A119 occupies 28%. Maximum area under this variety in Gujarat (77%), Andhra Pradesh (14%) and Karnataka (9%).



The increase in demand for the seed supply for this variety in all the three states for this variety is a testimony for its popularity in the *bidi* tobacco farming community.

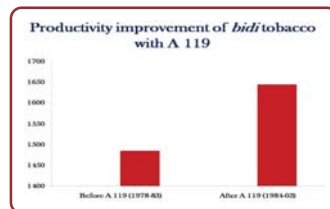


Every year about 2800-2900 kg A 119 *bidi* tobacco seed is supplied to farmers in Gujarat, Karnataka and Andhra Pradesh contributing to an extent of 46-66% of the total seed supplied to *bidi* tobacco farmers.



Productivity improvement

Bidi tobacco average productivity (1978-83) in Gujarat, Karnataka and Andhra Pradesh before the release of A 119 is 1485 kg/ha. With the release of high yielding disease tolerant variety A 119, the productivity was increased to 1644 kg/ha resulting in an additional yield of 15.4 million kg of *bidi* tobacco fetching an additional 77 crores of net returns to the *bidi* tobacco farming community.



The advent of *bidi* tobacco cultivation with A 119 variety has transformed the *bidi* tobacco cultivation a profitable venture in the states of Gujarat, Andhra Pradesh and Karnataka.

GT 7: Drought tolerant *Bidi* tobacco variety

GT 7 - A drought tolerant high yielding (2535 kg/ha) *bidi* tobacco variety (Anand 2 x Line 930-42, give culture line 155-100-84-100). Leaves are green in colour and turn to parrot green after ripening with rough surface having thick, fairly gummy with moderate and less coalescing. It is predominantly cultivated in rainfed (unirrigated) *bidi* tobacco growing areas of Gujarat.

Among various tobacco types grown in India, *bidi* tobacco is accounting for 33% of the total tobacco area and 49% of the production in the country. *Bidi* tobacco is grown in an area of ~1.70 lakh ha in Gujarat, Karnataka and Andhra Pradesh. In middle Gujarat the crop is grown in Anand, Kheda, Vadodara, Panchamaharaj and Dahod districts on alluvial soils (*Goradu*).

GT 7, is a *Bidi* tobacco (*Nicotiana tabacum* L.) variety developed under All India Network Project on Tobacco by crossing of Anand 2 x Line 930-42, give culture line 155-100-84-100 suitable for rainfed (unirrigated) condition. The variety has a yield potential of 2535 kg/ha. GT 7 variety was released in the year 1993 (G.J. Patel *et al.*). GT 7 variety has recorded > 30 percent higher yield than A 119 and GT 4. It is comparable to Anand 119 and GT 4 in reaction to diseases and pest, chemical and smoke constituents under unirrigated conditions. From smokers as well as traders' point of view, the variety GT 7 has shown parity with the existing varieties. It is recommended to rainfed (unirrigated) *bidi* tobacco growing areas of Gujarat.



Plant characteristics

- GT 7 has a plant height ranging between 94 to 150 cm having 32 and 24 no. of leaves/plant in untopped and topped conditions respectively with average leaf length of 49 cm and width of 22

cm. Stem is thick and round having internodal length of 3.5 cm in lower half with compact inflorescence.

- Leaves are narrow and tapering at the base with acute tip abruptly tapering, entire margin with moderate puckering.
- Leaves are green in colour and turn to parrot green after ripening with rough surface having thick, fairly gummy with Moderate and less coalescing

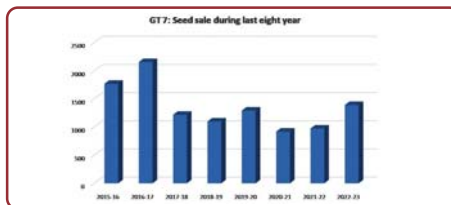
Quality parameters: The plant is known for its good quality parameters which are preferred by the traders of Gujarat.

LEAF QUALITY

Puckering	: Moderate
Surface	: Coarse
Leaf thickness	: Medium Thick
Spangles	: Moderate
Gumminess	: Fairy gummy
Nicotine (%)	: 6.22
Reducing sugar (%)	: 4.37
Colour	: Unripe: Green Ripe: Parrot green



Variety spread: In view of the drought tolerant high yield potential coupled with good leaf quality and adaptability to the different biophysical environments, GT 7 variety has occupied a sizeable area (25 %) in Gujarat (Anand, Kheda, Vadodara, Mahisagar, Panchmahals).



Every year about 1000-1300 kg GT 7 *bidi* tobacco seed is supplied to farmers in Gujarat, contributing to an extent of 12-16% of the total seed supplied to *bidi* tobacco cultivating farmers.

Dantiwada Culcutti Tobacco 4 (DCT 4): A high yielding *rustica* tobacco variety

DCT 4 - A high yielding (4700-4900 kg/ha) *rustica* tobacco variety (NP 216 x SK 196) x (GC 1 x Pandharpuri). In early stage, leaves are dark green and turn to medium green after ripening with moderate puckering, coarse surface, more thickness and moderate to better spangles. It is predominantly cultivated in *rustica* tobacco growing areas of north Gujarat and some pockets of middle Gujarat.

Among the different *Nicotiana* species, *Nicotiana tabacum* and *Nicotiana rustica* species are being cultivated in different agro-climatic regions of the country. *Rustica* tobacco is mainly cultivated in Gujarat, Uttar Pradesh and also in West Bengal. *Rustica* tobacco occupies 16% of the total tobacco cultivated area in the country. In Gujarat *rustica* tobacco is mainly grown in Middle and North Gujarat. In North Gujarat *rustica* tobacco occupy an area of ~33,000 ha (17.5%) in Mehsana, Banaskantha, Sabarkantha, Patan, Gandhinagar and Aravalli districts under irrigated conditions in *rabi* season. *Rustica* tobacco in North Gujarat has very high yield potential and is used mainly in chewing, nicotine extraction and also for hookah. It occupies 40-50% of the *rustica* tobacco grown in North Gujarat.

Tobacco cultivar *viz*: Dantiwada Culcutti Tobacco 4 (DCT 4) developed from the cross (NP 216 x SK 196) x (GC 1 x Pandharpuri) The variety is released during 2009 (J.N. Patel *et al.*) and is recommended to farmers of north Gujarat. The



variety possesses attractive plant type, short internodes length with good leaf expansion, more thickness and high leaf potential (16 topped) along with quality maintained at maturity stage. This cultivar has 9.22 per cent higher yield over GCT 3.

Plant characteristics

- DCT 4 has attractive plant type with an average plant height 52 cm, 16 no. of leaves in topped conditions with an average leaf length of 36 cm and width of 34 cm.
- Stem is medium thick and round having inter-nodal length of 3.16 cm.
- Leaves are dark green, turn to medium green after ripening with moderate puckering, coarse surface, more thickness and moderate to better spangles.

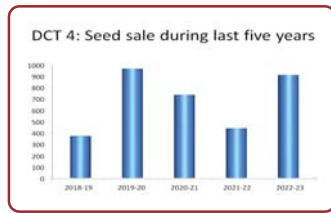
Quality parameters: The variety has good quality parameters which are preferred by the traders in North Gujarat.

LEAF QUALITY

- Puckering : Moderate
- Surface : Coarse
- Leaf thickness : Thick
- Spangles : Moderate to high
- Nicotine (%) : 3.0 to 4.51
- Reducing sugar (%) : 1.76 to 4.41
- Chlorides (%) : 1.21 to 1.54
- Colour : **Unripe:** Dark green
Ripe: Medium green



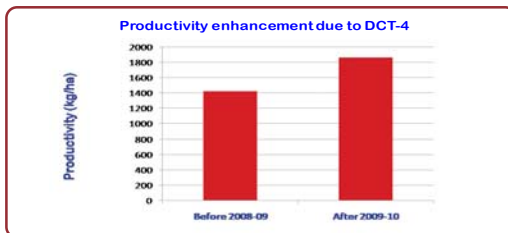
Variety spread: With high yield potential coupled with good leaf quality and better adaptability, DCT 4 variety has occupied 40-50% *rustica* tobacco area in North Gujarat (Mehsana, Banaskantha, Sabarkantha, Patan, Gandhinagar and Aravalli districts).



The increase in demand for the seed supply for this variety is a testimony for its popularity in the *rustica* tobacco farming community in North Gujarat. Every year an average 600-700 kg seed of DCT 4 is supplied to farmers of North Gujarat which is 40-50% total seed supplied to *rustica* tobacco farmers.

Productivity improvement

Rustica tobacco productivity in Gujarat before the release of DCT 4 is 1425 kg/ha. With the release of high yielding *rustica* tobacco variety DCT 4, the productivity was increased to an average 1863 kg/ha (2009/10-2021/22).



The advent of *rustica* tobacco cultivation with DCT 4 variety has transformed the *rustica* tobacco cultivation a profitable venture in Gujarat state.

TORSA: A high yielding *Motihari* tobacco variety

Torsa - A high yielding (2200 kg/ha) *Motihari* (*N. rustica* L.) tobacco variety developed by mass selection. Plant is open, more puckering, thick body and medium green colour. Cured leaf exhibited reddish brown colour, oily with gumminess. The incidence of brown spot disease is low. It is predominantly cultivated in *Motihari* tobacco growing areas of Cooch Behar Dist., West Bengal.

Tobacco is an important commercial crop of India occupying about 0.42 M ha of area (0.23% of the total arable land in the country) producing ~758 million kg cured leaf annually. Non-FCV tobaccos *viz.*, *Bidi*, Chewing, *Rustica*, Cheroot, Lanka and *Natu* tobaccos are predominantly grown in India.

West Bengal occupies an important place on the tobacco map of India. Tobacco growing areas in the state are concentrated mainly in northern district of Cooch Behar, Jalpaiguri, Malda and Murshidabad. Tobacco is also grown in southern districts of Midnapore, Singh Bhumi of Nadia dist. *etc.* to a lesser extent. Of the 15,151 ha area under tobacco cultivation in the West Bengal, *Motihari* tobacco (*Nicotiana rustica*) occupied about 12,000 ha area followed by Jati tobacco (*N. tabacum*) covering an area of around 3,000 ha. It is grown in soils of river deposits, texturally known as sandy loam and silt loam located in Adabari and Gosanimari clusters of Cooch Behar District.

ICAR-CTRI research station, Dinhata was established in the year 1965. Dinhata station has released a total number of seven tobacco varieties out of which three varieties are of *Jati* Tobacco and four varieties are of *Motihari* tobacco. The *Motihari* tobacco variety Torsa has occupied an area of 4800 ha out of 12000 ha.

Torsa, is a *Motihari* tobacco (*Nicotiana rustica* L.) variety developed through mass selection, an early maturing variety, responds well to nitrogen and irrigation. It was released in the year 2008 (S. Amarnath *et al.*) and recommended for *Motihari* tobacco growing areas of Cooch Behar District West Bengal predominantly in Khalisa Gosanimari, Danga and Kowrai villages.



Plant characteristics

- Plant height 45-47 cm, 8 to 9 leaves under topped conditions with average leaf length of 30-32 cm and leaf breadth of 25-26 cm. Cured leaf exhibited reddish brown colour, oily with gumminess
- Plant habit is open, high puckering, thick bodied and medium in green colour under field condition
- Leaves are moderately large in size, pungent taste, sweet aroma, with satisfactory chewing strength
- The incidence of brown spot and hollow stalk is lesser than other varieties. Infestation of Aphid, Leaf eating caterpillar and cut worm are also low under filed condition

Quality parameters: The plant is known for its good quality parameters which are preferred by the traders all over the country.

LEAF QUALITY

Puckering	: Moderate
Surface	: Rough
Leaf thickness	: Thick
Spangles	: Moderate
Gumminess	: More gummy
Nicotine (%)	: 5.74
Reducing sugar (%)	: 0.34
Colour	: Unripe: Dark green Ripe: Reddish brown



Variety spread: In view of the high yield potential coupled with good leaf quality and adaptability to the different biophysical environments, Torsa variety has occupied a sizeable area (40%) of Cooch Behar dist., West Bengal. The increase in demand for the seed supply for this variety in all the areas is a testimony for its popularity in the *Motihari* tobacco farming community.

Every year about 70-80 kg Torsa tobacco seed is supplied to farmers in Cooch Behar District contributing to an extent of 60-70% of the total seed supplied to *Motihari* tobacco farmers.

Productivity improvement

With the release of high yielding variety Torsa, the productivity was increased to 2200 kg/ha resulting in an additional yield increase of 27 - 32% in cured and first grade leaf yield than the existing low yielding Bitri variety.

Motihari tobacco cultivation with Torsa variety has transformed the *Motihari* tobacco cultivation a profitable venture in the Cooch Behar District of West Bengal. The variety is in demand by traders because of its high yield and quality.

ABIRAMI A HIGH YIELDING SUN-CURED CHEWING TOBACCO VARIETY

ABIRAMI is a mutant chewing tobacco variety of I.64 (Monnai) base suitable for sun-cured Monnai tract as a replacement for I.64 (Monnai) and Bhagyalakshmi covering more than 10,000 ha in the sun-cum-smoke cured chewing tobacco belt of Tamil Nadu. It performed consistently well over the years both in the Research Station Farm and in outstation centers yielding 4078 kg/ha mean cured leaf.

Tobacco is grown in an area of 15000 ha in Tamil Nadu of which Chewing tobacco is grown in an area of 8000 ha (50%) of Dindigul, Dharapuram and Salem districts producing 20 M kg.

ABIRAMI is a high yielding Chewing tobacco (*Nicotiana tabacum* L.) variety developed through mutation breeding using EMS mutation. The mutant selection HV.86-5 was assessed against Bhagyalakshmi and Meenakshi. It was released in the year 2006 (R. Lakshminarayana *et al.*). It was found superior over Bhagyalakshmi and also to Meenakshi. It was further observed that this line showed some field tolerance to TMV and leaf curl diseases in a few growers fields.



Plant characteristics

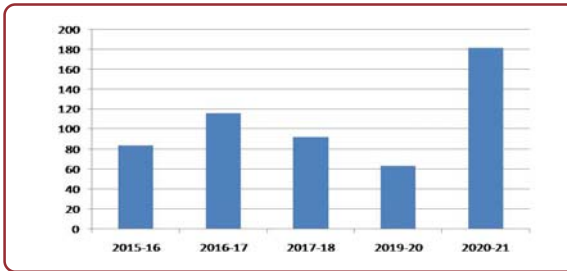
Plant habit open, thick broad shiny green leaves with good auricle development, acute tip, leaf long (65-70cm) and broad (40-50cm), heavy puckering, panicle semi-open.

Quality parameters

Cured leaves have dark brown colour, heavy bodied, elastic with whitish incrustations, sweet aroma and medium strength. Total N, Nicotine, Reducing sugars and Chlorides in cured leaf are 4.31%, 5.35%, 1.26%, 4.17%

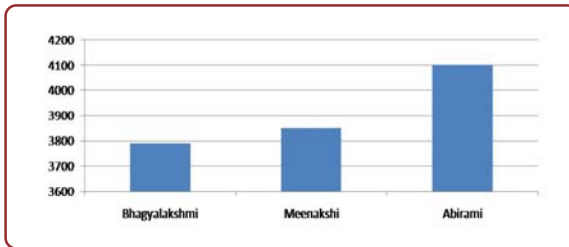
Variety spread

In view of the high yield potential coupled with good leaf quality, the variety occupied around 3500 ha (44%). The increase in demand for the seed supply for this variety is a testimony for its popularity in chewing tobacco farming community. Every year about 200-250 kg of seed is distributed and the Abirami occupies around 50% of the total seed supplied.



Productivity improvement

Chewing tobacco average productivity in Tamil Nadu before the release of Abirami was 3700 kg/ha. With the release of high yielding variety Abirami the productivity increased to 4000 kg/ha resulting in 8% increased yield.



Yield recorded in Ottanchatram farmers' field

Chewing tobacco cultivation with the variety "Abirami" has transformed the chewing tobacco cultivation more profitable in Tamil Nadu.



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