Technical Bulletin No.: 04/2023

Tobacco Seed Production technology: Success story of three decades



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
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Citation:

Tobacco Seed Production technology: Success story of three decades; Tech.Bulletin No: 04/2023, ICAR -Central Tobacco Research Institute, Rajahmundry.

Published by

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January, 2023

Preface



Seed is the vital constituent in tobacco cultivation as it is the source for highly valued, quality conscious crop. Hence, it must be healthy and well preserved for optimal germination and should maintain genetic purity.Tobacco seeds are very light and they weigh about 10,000 seeds per gram. Inview of this farmers tend to use larger quantity of seed for the nursery than the actual requirement. Use of pure seed of recommended varieties can easily ensure higher yields and quality.Keeping this in view, ICAR-Central Tobacco Research Institute (ICAR-CTRI), Rajahmundry is producing and supplying truthfully labeled (Flue Cured Virginia) FCV and lanka tobacco seed of popular varieties to the farmers through Revolving Fund (RF) Scheme. The sustained model is carefully designed and executed to serve the farming community. It received a grand success, in any given season, more than 90% of the tobacco acreage in FCV and Lanka is planted with tobacco seed supplied by ICAR-CTRI.Through this scheme every year around 9000-12000 Kg of truthfully labeled FCV and lanka tobacco seed will be supplied to the farmers. Though the 'RF Scheme' was initiated with a startup fund of Rs 3,00,000/- in 1990 by ICAR, the average receipts of RF scheme since its inception stands at Rs. 59.3 lakhs per annum and in the last decade it is elevated to more than Rs. 80 lakh per annum. In a move to higher transparency and traceability, recently seed is being distributed through dedicated Seed portal. The unique service under RF scheme in the past 32 years successfully completed silver jubilee and moving ahead towards ruby celebrations.

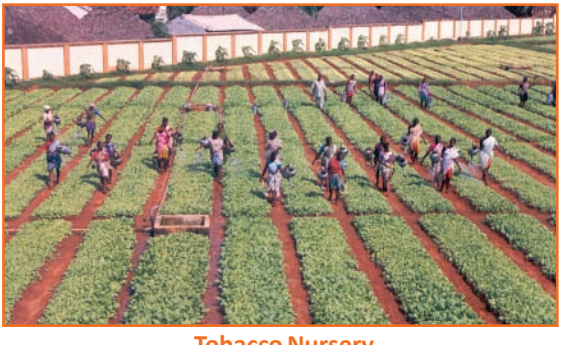
Throughout this successful journey the unwavering support extended by the present and past honorable Director Generals, DDGs, ADGs, and Directors of the Institute, HoDs & Scientists of Crop Improvement Division and the service rendered by staff of the Seed Production Unit is highly appreciated and greatly acknowledged.

Date: 24.01.2023

(M. SHESHU MADHAV)
DIRECTOR

Background

Tobacco, popularly known as the golden leaf is one among the leading commercial crops in India with a cultivated area of 0.43 million ha, producing around 760 million kg annually. Tobacco made a significant contribution in terms of excise revenue (Rs. 22,737 crore), export earnings (Rs. 6,880 crore) and provides livelihood security to 45.7 million people. As in other crops, raising uniform crop is essential to obtain higher yields and superior quality tobacco. Use of pure seed of recommended varieties can easily ensure high yields and quality. Keeping this in view, Central Tobacco Research Institute (CTRI), Rajahmundry has started producing and distributing the pure seed of approved tobacco varieties to the farmers since 1952. In view of the purity and quality of the seed produced by CTRI, the demand for tobacco seed supplied by CTRI has steadily increased over the years. Mean while, in 1956, a scheme was sanctioned to CTRI during the 2nd five-year plan for the production and distribution of pure seed and healthy seedlings of tobacco to farmers. The scheme was continued in 3rd five-year plan also as a committed expenditure scheme under developmental activity and later it was merged with the Institute's main programme from April, 1978 on wards.



Tobacco Nursery

Revolving Fund Scheme origin

In view of the popularity and efficiency of the seed production programme of CTRI, the Indian Council of Agricultural Research, in 1990, has sanctioned a "Revolving Fund Scheme" (RF Scheme) to

CTRI with the objective of supplying pure seed and healthy seedlings of approved tobacco varieties to growers to improve the yield and quality of flue-cured tobacco. Initially it was confined to FCV tobacco and in later stages Non FCV tobacco, Lanka was also included in the RF scheme.

ICAR-CTRI has created the Seed Production Section for efficient execution of the RF scheme. Under regular supervision of the Director, CTRI and Officer In Charge of the Section, as per the advisory of Seed production Advisory Committee (SPAC) a dedicated team of scientific / technical staff are working for the production and supply of pure seed to the farmers.

RF Scheme: Modus Operandi seed to seed

Flue Cured Virginia (FCV) tobacco is a regulated and export oriented tobacco cultivated by nearly 40000 registered growers in an area of 1.5 lakh ha in Andhra Pradesh and Karnataka. ICAR-CTRI



Seed Plot of FCV tobacco



Seed Plot of Lanka tobacco

is supplying seed of released varieties to all the FCV tobacco growers through Revolving Fund (RF) scheme. Usually, around 9000-12000 kg of FCV tobacco seed and 200-300 kg of Lanka tobacco seed (Non-FCV) are produced and distributed to the tobacco growers in Andhra Pradesh. CTRI adopts a novel methodology for the production of this huge quantity of pure seed. Every year, Seed Production Section raises tobacco nursery in an area of 2 ha and supply the healthy seedlings @ 30,000/ha to 100-120 seed plot growers of East Godavari, West Godavari district and parts of Prakasam district of A.P. Further, seedlings are also supplied to gap fillings, if necessary, in order to optimize the plant stand for achieving higher seed yields. Progressive farmers are chosen to raise the seed plots to maintain seed purity. In general seed plots are selected on the basis of their nearness to the Institute, willingness of the farmers and suitability of the variety to the region. The seed plot farmers are given a subsidy of Rs. 400/acre besides free supply of seedlings for planting and gap filling.

Seed multiplication

One seed capsule of tobacco contains 2000 to 10000 very small seeds and hence, a single plant may produce several hundred thousand seeds. Therefore, a single plant is selected from the original source crop (nucleus/breeder seed plot) based on the morphological identity, uniformity and genetic purity. Nucleus seed is produced by the breeder who develops a particular variety, or by other breeders of the Institution where the variety is developed. Due to its high degree of multiplication rate, a micro-level screening by dedicated and competent breeders is a must to keep up the high standards of quality seed. In each of the selected single plants, the panicle has to be selfed by bagging. After maturity, the seed of an entire panicle is collected and threshed carefully. The seed is dried and stored separately. The nucleus seed is directly used for multiplication of breeder seed. Breeder seed is directly produced by the breeder concerned or associated staff. Thus the breeder seed will be used to raise the seed plots and it provides the basis for further multiplication of foundation seed for distribution to farmers.

Monitoring of seed plots and roguing

The seed-plots are planted directly under the supervision of the Seed Production Section staff. Adequate isolation distance (3.0 m) is maintained while planting seed plots. In general, 100-150 ha of seed plots are raised in in the respective areas as per the seed requirement. The plots are regularly monitored by the scientific personnel and necessary instructions are given to the farmers for raising the healthy crop. The plots are regularly rogued to remove the off-types once at the grand growth stage and the second at the flowering stage to avoid varietal contamination.



Rouguing in Seed Plots



Monitoring of Seed Plots

Table: Field Inspection Schedule for monitoring of seed plots

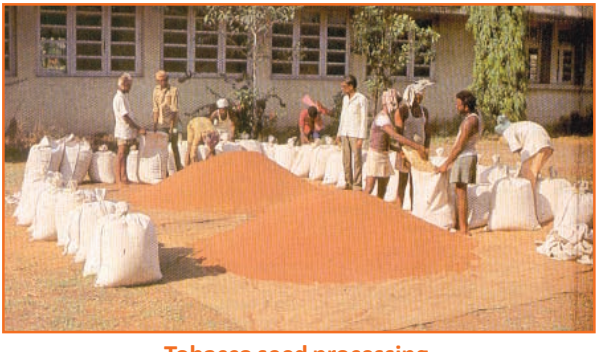
Stage of inspection	Crop Stage	No. of Visits	Observations / action to be taken
I. Pre-flowering	1. Pre-planting 2. Transplantation 3. Gap Filling	1 1 1	· Selection of Seed plot · Verification of Source · Varietal eligibility for certification · Verification of Isolation distance from source of contamination · Purity of seedlings · Plant stand · Plant stand · Monitoring varietal purity
II. Flowering	1.Button stage 2.Full bloom stage	1 1	· Confirmation of Plant type and Morphology (plant observations) · Removing off types
III.Post-flowering	1.Capsule collection 2. Seed processing	1 1	· Confirming the maturity and morphology of capsule (observations) · Issue of Instructions for harvesting, method of threshing, primary cleaning, initial drying, packing, storage · Elimination of chances of admixture of parental lines in case of hybrid

Harvesting and processing

As the leaf is the commercial product, the farmers harvest and market the leaf and get the price for their leaf produce. At the end of the season, SPU staff collects the seed capsules these capsules are dried, in the hot summer, threshed and winnowed to remove debris. The seed are later thoroughly dried to maintain seed moisture level below 4.0%, treated with insecticide and packed into half kg polythene sachets. Germination tests are conducted at regular intervals and only the tobacco seeds having more than 90% germination are supplied to the farmers.



Matured and dried seed capsule of tobacco



Tobacco seed processing

Seed supply and distribution

Tobacco Seed Portal: A New intervention for efficient and transparent seed supply

Annually ICAR-CTRI, under RF scheme produce and supply ~9000-12000 kg truthfully labelled tobacco seed of different varieties through various research stations of which 95 % is FCV tobacco and meets >90% seed requirement of tobacco farmers. In the RF Scheme seed will be supplied to the farmers either directly or through the indent received from the tobacco board. In the direct supply to the farmers, the credentials like grower's registration number will verified manually and the receipts are issued accordingly. It is a laborious, time consuming, requires more human resources and can supply to a limited farmer per day. Apart from these tracing and retrieval of the specified records of the farmer and monitoring the instantaneous day wise/variety wise/region wise seed supply is very difficult which is very much essential in planning the further seed supply in that current season. In order to overcome these difficulties, an efficient online digital seed distribution system **'Tobacco Seed Portal'** was developed and executed successfully in the year 2022. Using this software, seed of six FCV and one Non-FCV tobacco varieties was distributed to around 24,000 FCV farmers and 120 Non-FCV tobacco farmers in a short span of 15 days. It also has the user interface to view the cultivation/production practices of the popular released varieties. The specified software surpassed the bottlenecks in the manual process of seed distribution and enabled to retrieve the data in real time. The generated reports will also help in monitoring, development and evaluation of crop strategies.



Home page of Seed Portal

Accomplishments



Year wise revenue generation under RF scheme



Under the 'Revolving Fund Scheme', the institute produces seeds of recommended FCV and Lanka tobacco varieties. The quantity of seed production of a particular variety will be based on its demand and will be decided in the SPAC. Among the different FCV tobacco varieties, Siri was in continuous demand in the past decade in Southern Light Soils (SLS) and Southern Black Soils (SBS) region of FCV tobacco. In the recent year FCR15 the newly identified FCV tobacco variety is getting popularized in these regions and replacing the Siri. Non-FCV variety 'Lanka Special' seed production and distribution is more or less stable as the lanka tobacco is cultivated in a limited area.

Though the 'RF Scheme' was initially started with the aid of seed money Rs 3 lakhs from ICAR in 1990, it was remitted in less than 5 years. There was a gradual increase in the revenue generation and it attained the maximum receipts of Rs. 170 lakhs in the year 2009-10 and thereafter it got moderated and the receipts of the RF scheme currently stands at Rs. 75 lakhs in the year 2022. The average seed production in the last 15 years is 14000 kg and seed supply is 11,300 kg and it covers more than three times of the cultivated area of FCV tobacco with the recommend

seed rate. In the supply front, enough quantities of the seed of popular FCV tobacco varieties was made available to the farmers in the well ahead of the season in all these years. This phenomenal achievement is the testimony for the dedicated and relent less efforts of CTRI in the seed production arena.

Table. Seed Production and supply statistics in the last 15 years

S.No.	Year	Quantity Produced (kg)	Quantity Sold (kg)
1	2007-08	18000	15486
2	2008-09	24698	13410
3	2009-10	20524	21300
4	2010-11	14538	16179
5	2011-12	19522	10195
6	2012-13	15011	14187
7	2013-14	11675	15767
8	2014-15	34998	10475
9	2015-16	5073	5973
10	2016-17	2784	7841
11	2017-18	5279	6836
12	2018-19	10237	8688
13	2019-20	7661	9753
14	2020-21	6933	7988
15	2021-22	12945	6425

As the seed plot farmers are not losing the economic product and inturn they are provided with healthy, quality and true to type seedlings, they readily accept and go for the seed plots. In view of this, the cost of seed production will be relatively less and farmers will be supplied with quality FCV tobacco seed at reasonable price i.e Rs.900/kg for a licensed grower. Thus, ICAR-CTRI under RF scheme produces the truthfully labeled FCV tobacco seed of popular varieties and supply to the growers. In any given season, more than 90% of the FCV tobacco crop area is planted with the tobacco seed supplied by ICAR-CTRI.

The service rendered by the Institute, to the farming community in seed production aspects is paying richer dividends in terms of revenue to the institute and uniform crop growth and higher leaf yields to the farmers. The unique service under RF scheme in the past 32 years successfully completed silver jubilee and moving ahead towards ruby celebrations. In the process, it sustained on its own and stood exemplary and received much needed appreciation from the tobacco farming community for the persistent service irrespective of the extremities in weather and pandemics.

Way forward

Seed production and timely Supply of FCV and lanka tobacco under RF scheme to the farmers in all these years reaped the fruits in terms of qualitative crop, exports and thereby net returns to the traders and farmers. Under the changing climatic scenario, a gradual shift in the seedling production technology from conventional methods to relatively weather proof technologies like production of tray seedlings is required to cater the needs of farmers especially in harsh production Zones like SLS region. Further, having witnessed the success in FCV and Lanka Tobacco, the scheme may be extended to burley tobacco in view of its increase in occupancy in Vinukonda region of Andhra Pradesh. With the advent of new commercial crops in to the mandate of ICAR-CTRI, the successful saga of tobacco RF scheme model need to be exploited in crops like chilli, castor, turmeric and aswagandha for making quality seed available to the farmers at affordable prices for up-scaling and sustaining higher yields.

Popular tobacco varieties in seed supply under RF scheme



Siri



FCR-15



CTRI Sulakshana



Kanchan



FCJ-11



Lanka

Seed supply to tobacco farmers











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