

RESEARCH ACCOMPLISHMENTS IN COCOA IN TAMILNADU

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Cocoa is one of the important commercial crops of the world and mainly grown in the tropical regions viz., Africa, America, West Indies, Asia and Oceania countries. The species of *Theobroma* are widely seen in the Amazon basin and other tropical areas of South and Central America. Though there are about 22 species identified in the genus, the commonly cultivated species is *Theobroma cacao* L. The entire production of cocoa in the sixteenth and seventeenth centuries were Criollo type only, but during the eighteenth century Forastero types began to be cultivated and used. The first countries to produce Forastero cocoa were Brazil and Ecuador. Apart from these countries, the commercial growing of cocoa has extended from its center of origin in South and Central America to West Africa, the Far East and Oceania. Presently cocoa has become an important commercial crop throughout the humid tropics, mainly in Africa (Cameroon, Ghana, Nigeria, Ivory Coast and Cameroon), America (Bolivia, Brazil, Colombia, Costa Rica, Mexico and Venezuela), West Indies (Cuba, Grenada, Haiti, Jamaica, Trinidad) and Asian and Oceania countries (Indonesia, Malaysia, Papua New Guinea, Philippines, Sri Lanka and India) and research attempts have been made to increase the productivity in different parts of the world.

Cocoa Research in India

Central Plantation Crops Research Institute under Indian Council of Agricultural Research started systematic research on cocoa in 1969 at its Regional Station, Vittal in Karnataka. Before that Cadbury India Pvt. Ltd. established a demonstration cum research wing at Chundale, Wayanad in Kerala in 1965. Cocoa breeding

programme was initiated in Kerala Agricultural University in 1979 with the help of a World Bank aided project, which was terminated in 1984. Then cocoa research with long term trials gained further momentum in 1987 with implementation of Cadbury- KAU- Co-operative Cocoa Research Project (CCRP), with financial assistance from Cadbury India Pvt. Ltd. which is again assisting Tamil Nadu Agricultural University (TNAU) from 2008 onwards.

Cocoa Research in Tamil Nadu Agricultural University (TNAU), Coimbatore

1. Crop improvement

a. Germplasm collection

Cocoa breeding programme was initiated recently in Tamil Nadu Agricultural University for releasing cocoa hybrids/clones suitable for Tamil Nadu conditions. In May 2008, Cadbury India Ltd. joined hands with TNAU to promote Cocoa cultivation in Tamil Nadu. The varieties released from Kerala Agricultural University namely CCRP - 1, CCRP - 2, CCRP - 3, CCRP - 4, CCRP - 5, CCRP - 6 and CCRP - 7 and 3 hybrids CCRP - 8, CCRP - 9, CCRP - 10 and clones released from Central Plantation Crops Research Institute, Vittal (VTLCC-1 and 4 hybrids namely VTLCH1, VTLCH2, VTLCH3 and VTLCH4) are maintained in the cocoa germplasm block. Steps have also been initiated to collect superior genotypes of ICS series.

b. Survey

Performance evaluation and adaptability behavior of plus trees of cocoa (*Theobroma cacao* L.) was conducted in major cocoa growing regions

of Pollachi, Coimbatore district of Tamil Nadu during 2008 - 2013. Totally 151 clones were identified for high yield and better quality. On continuous evaluation, the 151 clones were screened and it was reduced to ten based on the high yield and documented based on GRest analysis. These ten clones were named as TNAUCC1 to TNAUCC10 and multiplied vegetatively and evaluation on the performance of these ten clones is in progress.

c. Developing high yielding hybrids

Hybrids were developed through Half-sibs and full sibs and their performance studies are under progress. The hybrid (TC 71 X CCRP 6) has been developed through hand pollination and it is confirmed for its hybridity through molecular technique using SSR markers. The F₁ generation hybrid seedlings were planted in the main field for further evaluation.

Apart from this, self incompatibility studies, hybridization programme through caging technique for developing hybrids for high yield, quality, resistant to biotic and abiotic stresses are also in progress.

d. Studies on cocoa pollinators

Pollinator studies have also been conducted and five different tiny dipterans visiting cocoa flowers were collected and identified both morphologically and through molecular means. As per morphological identification report specimens 1,2 and 3 were identified as Cecidomyiidae, specimen 4 was identified up to genus level as *Forcipomyia* spp, Ceratopogonidae and specimen 5 was identified as *Drosophila melanogaster*, Drosophilidae. All the five specimens belonging to the order Diptera. Molecular identification report revealed that specimens 1,2 and 3 resulted from BLAST analysis were *Asteromyia* sp. of family Cecidomyiidae. Specimen 4 was *Forcipomyia* sp of family Ceratopogonidae and specimen 5 was *Drosophila ananassae*, Drosophilidae.

2. Crop management

a. Standardization of vegetative propagation through cuttings

Studies were conducted to standardize the vegetative propagation method through cuttings and results of the study showed that two node cuttings from plagiotropic shoots treated with 5000 ppm IBA in sand media showed higher rooting percentage (10.70).

Even though the factors like media, growth regulator and type of cuttings had a role in increasing the rooting ability of cuttings, the success rate recorded in this study was far below and economically not feasible to adopt. Thus, the role of other factors such as age of the mother plant, nutrition status of mother plant, season and time of preparation of cuttings *etc.*, which normally play an important role in success of propagation, are being studied further to enhance the success rate.

b. Standardization of planting density of cocoa under coconut gardens for increasing the productivity

High Density Planting trial has/been initiated at TNAU and the trial is in progress with different spacing levels.

c. Safety of pesticides on cocoa pollinators

Laboratory experiment on safety of pesticides on cocoa pollinators is being carried out using dry film method and adult feeding method to test the impact of commonly used pesticides in the cocoa ecosystem on the pollinators of cocoa.

Profenophos 50 EC at 1.5 ml/1 caused the highest mortality of both *Drosophila* and cecidomyiid pollinators of cocoa at 6, 12 and 24 hours after treatment (HAT), followed by thiacloprid 21.7 SC at 0.6 ml/1. Dimethoate 30 EC at 2.0 ml/1 registered the lowest pollinator mortality. At 48 hours after treatment, all the insecticides recorded cent per cent mortality of the pollinators at the recommended dose.

Problems in cocoa cultivation

The soil and climatic conditions prevailing in southern states of India especially Kerala, Karnataka, Andra Pradesh and Tamil Nadu are suited for the cultivation of cocoa except that irrigation is required in areas prone to prolonged drought and fertilizer application is necessary, as the soils are poor in fertility. The important problems faced by the cocoa growers in the country are high cost of production, low productivity from existing plantations, inefficient procurement system by the companies, lack of technical know-how on secondary processing, damage to pods caused by squirrels & rats and incidence of Vascular Streak Die Back disease.

Future thrust

At the present productivity level of 30 pods/tree / year, the returns per hectare will be lesser.

The hybrids and elite clones have high yield potential of about 60 pods / tree / year and the average productivity and returns can be increased to a significant level by simply using good quality planting materials. Genotypes combined with high yielding capacity and ability to withstand both biotic and abiotic stress will be beneficial in the era of climate resilient horticulture. Cocoa is the only crop subjected to the monopolistic exploitation of different industrial units for a long time. Now adequate marketing facilities are provided by both co-operative and private firms with affordable prices. It creates security among the planting communities about cocoa farming, encourages good management and area expansion. There is a wide scope to replace the ongoing imports with domestic produce itself by introducing high yielding varieties and advanced production practices and plant protection techniques.

CASHEW PAYS MORE WHEN YOU CARE MORE

- GOOD YIELD ENSURED WHEN QUALITY, VIGOROUS, SOFT WOOD GRAFS USED FOR PLANTING
- MAXIMUM SURVIVAL GRAFTS ENSURED WHEN PLANTED AT RIGHT SEASON
- DOUBLE IS YOUR YIELD WHEN YOU PROVIDE WATER AND CONSERVE SOIL
- PROVIDE SUPPORT TO THE GRAFTS IMMEDIATELY AFTER PLANTING IN WIND PRONE AREAS
- HYGENIC IS YOUR ORCHARD WHEN YOU PRUNE YOUR TREES
- BESYT IS YOUR PRICE WHEN BEST MATURED AND DRIED ARE YOUR NUT