

EXECUTIVE SUMMARY

ICAR- Directorate of Cashew Research, Puttur conducts research and extension activities for improving cashew production and productivity in the country. During the year 2017-18, institute projects on germplasm collection, evaluation and conservation, genetic improvement of cashew, integrated water and nutrient management, phenology, integrated pest and disease management, post harvest storage and processing and knowledge management and under progress. One flagship program on important pests of cashew and two externally funded projects are also in progress during the year.

The germplasm survey conducted in West Bengal and Jharkhand state has resulted in collection of one profuse bearing genotype and an accession of *Semicarpus anacardium*. Eleven accessions collected earlier have been planted in the evaluation block. Three accessions which are evaluated and characterized as per cashew descriptors were included in the conservation block. Further, for the first time in cashew, a core collection of 61 accessions from 478 accessions was arrived following advance maximization strategy with heuristic approach and this collection has been established in the field. Further, CNSL content of 61 germplasm accessions has been estimated. Fourteen accessions have been evaluated in the project on evaluation of cashew germplasm for apple yield and quality traits.

A jumbo nut hybrid H-130 having high yield and precocity in flowering with positive response for pruning has been identified and released for further evaluation in farmers' field. The hybrid is highly suitable for ultra density planting due to its good response to pruning. The shelling percentage is quite high (29.9%) with kernel grade of W-130 which is a unique feature among the released varieties. In the project on identification of molecular markers linked to economic traits, 138 SSR primers from Cashew, Almond, Pistachio and Mango were screened in parents and the F_1 population of Ullal-3 x NRC-492, and out of these,

39 were found to be polymorphic. The morphological observations were recorded for 12 vegetative and reproductive characters on 84 progenies as part of phenotyping. In order to develop new molecular markers, 60 mango EST based SSRs have been synthesized and these will be evaluated for their transferability and genetic analysis in cashew. Towards development of dwarf and high yielding varieties, 27 promising accessions were selected from 15 dwarf x tall crosses. In back cross breeding efforts, 13 promising accessions are identified out of 471 progenies. New crosses (15) have been made for improving nut size in cluster bearing genotypes. Prebreeding efforts involving the progeny of wide hybridization and cultivated genotypes were carried out to develop potential material with Tea Mosquito Bug (TMB) tolerance. In mutation breeding project for developing TMB tolerant genotypes, the seeds and scion sticks of two popular varieties i.e. Bhaskara and Ullal-3 were exposed to gamma rays and the seedlings are established in the main field for evaluation. As part of the DUS project, 30 reference varieties for the purpose of DUS testing have been established.

Ultra density planting in cashew using precocious cashew varieties such as VRI-3, NRCC Sel-2, K-22-01 and H-130 was developed and demonstrated in farmers field with which a record yield of more than 3 tonnes/ha could be achieved in 3-4 years. The technique has shown tremendous potential for improvement of raw cashewnut production in the early years. Phenological studies were carried out in cashew cultivars Ullal-3 and Bhaskara using BBCH scale. The study culminated in eight principal growth stages and within each of these stages, different secondary stages were identified and documented with images. In order to establish nutrient diagnostic norms in cashew, the soil nutrient status of different cashew growing regions was assessed. Accordingly, it was found that the soils of cashew growing areas in Vridhachalam, Tamil Nadu were deficient in organic carbon, nitrogen and potassium. The micronutrients such as Fe and Mn were sufficient,

with sporadic deficiency of Zn and Cu. During the year, the ICAR network project on micronutrient management in horticultural crops for enhancing yield and quality was concluded.

Evaluation of entomopathogenic fungus, *Metarhizium anisopliae* for its virulence in causing mortality of CSRB grubs revealed that it could cause 100% mortality within 15 days after treatment of topical application and 21 days of application of spores through bark as feed. In the investigations on semio-chemicals for management of TMB, it was found that virgin TMB females aged 4 and 5 days after emergence elicited maximum response when they were used as live bait in Delta sticky traps. The efficiency of sticky trap was increased by modifying the trap into cylinder form with the total sticky outer surface. As chemical management of TMB is concerned, thiamethoxam was on par with the recommended insecticide lambda cyhalothrin. In case of CSRB, imidacloprid was on par with the recommended insecticide chlorpyrifos. The nesting behaviour and life cycle of two important pollinating wild bees of cashew viz., *Ceratina hieroglyphica* and *Braunsapis picitarsus* were studied. Performance of *Apis cerana* bees in cashew ecosystem was also studied and its honey quality was found superior. Artificial bee nests were designed and found to be successfully occupied by wild bees. The inflorescence pests of cashew were documented and it was observed that about 7-9 % infestation levels this year.

Six post harvest technologies developed at this Directorate were commercialized with a MoU with the M/s Pro B Products, Bengaluru on the basis of non-exclusive licensing. Further, efforts were taken to register institute logo as trademark. In the project on developing quality standards for raw cashewnuts, it was observed that among the varieties tested, 'Vengurla-7' recorded 91 nuts per kg (minimum) and 'Anagha' registered maximum of 250 nuts per kg (maximum). As far as outturn is concerned, 'VRI-Cw' (62%) observed to be the highest and 'Raghav' (45.4%) found to be the lowest. An empirical relationship was developed to represent the quality of raw cashewnuts. In the project on design and development of

mechanized slicer for cashew apple, an attempt was made to slice cashew apple using string and staggered disc type cashew apple slicer. The studies on comparative performance of cashewnut processing systems in India revealed that that cost of processing ranged between Rs. 1200-1400 for labour oriented processing and in the range of Rs. 1700-2000 per bag of 80 kg raw cashew nuts depending upon the level of mechanization in the processing line.

During the year, the new value added products of cashew apple such as pulp, jam, jelly, cashlime and cider were assessed for their nutrient composition and storage life. The major problem in cashew apple utilization is its high astringency due to presence of tannins in juice. In the experiment to reduce tannin content of juice with low cost food grade materials, it was found that defatted soybean meal (2%) is more effective in reducing tannin (34.3% reduction) compared to dried potato powder (28.6%) and Bajra flour (24.0%).

Under transfer of technology programs, visits were made to fields of Tribal Sub Plan (TSP) beneficiaries and financial assistance was given to 71 farmers for encouraging and adopting the technologies in cashew cultivation. Training programs on nursery management and cashew production technology were conducted. An educational tour of tribal farmers to Kerala was also organised. World Environment Day, World Soil Day, DCR Foundation Day and Agricultural Education Day were celebrated. The DCR participated in several exhibitions viz., World Food India-2017 at New Delhi, Mega Kisan mela and Agri-business expo-2018 at CPCRI, Kasargod, Mega National Horticulture fair-2018 at IIHR, Bengaluru. Mera Gaon Mera Gaurav program was conducted in Irde-Bettampady and Aletti villages. A field day and awareness program on soil health management was conducted in different villages of Puttur taluk in Dakshina Kannada. AICRP cashew workshop was also conducted at the Directorate during the year. Further, 4.25 lakhs of cashew grafts were sold to farmers. The website of DCR was continuously updated along with facebook and twitter accounts for online dissemination of information.

