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VARIETAL IMPROVEMENT IN PLANTATION CROPS

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Researches on varietal improvement in plantation crops are beset with a variety of problems such as narrow genetic base, long juvenile phase, self incompatibility barriers, exclusively seed propagated nature of some of the species and highly heterogenous nature of the phenotypes involved. Unlike most others, the polymorphic origin and consequent wide genetic diversity and amenability to vegetative propagation makes crop improvement in tea through clonal selection easy. This method of improvement has resulted in a number of clones with high yield potential and quality and about 40% increase in productivity has been achieved in the last quarter of a century. In coffee rust resistance breeding had precedence over all other requirements. Of late double cross and inter-specific hybridisation followed by back crossing have resulted in improved rust resistant hybrids with yield potential of about 1200 kg/ha/year. Starting with a yield level of 150 kg dry rubber/ha/year through selection and hybridization in a complementary manner an average yield of over 850 kg/ha/year has been achieved in India. A yield potential of about 10,000 kg/ha/year has been predicted by Malaysia.

In coconut and arecanut selection procedures adopted have yielded varieties like Lakshadweep Oridinary, Mangala, VTL-11 and 17 having higher yields upto 70%. Coconut hybrids involving different dwarfs and talls have yielded about 130% more compared to the best parent. In addition, single trees yielding over 400 nuts/palm/year are already available in the natural population. A quantum jump in the yield of coconut from its present national average of 30 nuts to even 200 can be achieved if an efficient method of tissue culturing of such palms can be standardised. The monotypic nature of coconut will, however, continue to be a limiting factor in breeding coconut varieties suitable for cultivation in diverse ecological situations.

In cashew 16 varieties and hybrids have been evolved having yield potential of about 15 kg/tree/year when the plants are about 10 years of age. This success if could be exploited extensively through vegetative propagation methods will have decisive impact on cashew production in the country. Though intra-varietal variation in this crop is fairly wide broadening of the germplasm base through introductions from Brazil and African countries will have to be undertaken.

The Panniyur-I pepper released has a yield potential of 10-15 kg of green berries/vine/year. The available genetic diversity in this crop is extremely good and yield evaluation trials in progress in Karimunda and Kottanadan holds out

considerable promise for evolving not only varieties having high yield potential but also capable of performing well under diverse ecological situation. Intensive search for resistance to quick wilt of pepper has yielded useful results and a number of wilt resistant lines are under evaluation. In cardamom, through selection, clones capable of yielding upto 1000 kg/ha/year have been isolated against the national average of 65 kg/ha/year. Katte resistant lines evolved through mutation breeding are in the final stages of yield evaluation.

Though the success achieved in the varietal improvement is creditable there is an evident need to further intensify exploitation of the available variability through wide crossing and selection. In doing so it is essential that parents having specific qualitative traits such as disease resistance, quality superiority, stress tolerance etc. are identified and used in crossing programmes. Sustained efforts to develop homozygous lines for exploiting hybrid vigour are also called for. Since *in vitro* screening for disease resistance and stress is possible large number of parents can be subjected to such micro techniques and the gene sources identified in the parents. Performance prediction of seedling progenies and clones using biochemical and physiological markers should be prefected for making the seedling selection in the nursery more purposeful. The dwarfing genes available in coffee, arecanut and coconut have to be used for developing types suited for mixed cropping systems. Efforts to develop varieties to meet special needs such as mechanised tapping in rubber and plucking in tea, uniform ripening in cashew and coffee have to be planned.

In the prediction of the progeny performance both statistical tools like D^2 statistic for selecting parents and molecular techniques such as mitochondrial complementation will have to be thought of to cut short the time lag involved in such programmes. While the self-sterility and self-incompatibility mechanisms are handicaps in pure line selections, commercial production of hybrids using biclonal parents become easy in such cases. While choosing parents for hybrid seed production due consideration may be given for this. The possibility of attaining yield plateau in many of the crops is imminent and to have further break-throughs in yield increase, breeders will have to work hand-in-hand with bio-chemists, biotechnologists and physiologists. These aspects are discussed in the light of the achievements so far obtained.