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**THE BREEDING, SELECTION AND TESTING
OF TEA CLONES**

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Efficiency is a common feature of any modern agricultural industry. Just as much as improvements in cultural practices have increased tea yields, so has the introduction of improved planting material. In many plantation crops including tea, improvements in yield and quality have been obtained by vegetative propagation of specially selected or bred plants. The vegetatively propagated progeny of a single seedling plant is referred to as a clone. By definition, all plants of a single clone have the same genetic constitution and the advantages of a clone accrue from this uniformity among the progeny. Any other variability within a clone will therefore be due to the effect of the environment.

An elite clone should possess a combination of some or all of the desirable characteristics, such as high yield, good manufacturing properties ('quality') ease of vegetative propagation, tolerance to pests and diseases, favourable reactions to cultural treatments and regional adaptability. Clones possessing these characteristics may be

obtained by one or more of the following methods:

- a) Introduction of new clones from other tea growing countries
- b) Selection from existing mature seed tea fields
- c) Hybridisation
- d) Production of new clones by physical means or by the use of chemicals or through biotechnology - Non - Conventional Breeding.

Introductions

The experience we have had with tea clones introduced from outside has been limited. Clones introduced from outside need to be tested for their suitability to local growing conditions and tolerance to local pest and disease situations, before they can be recommended for commercial planting.

The need for, or the importance of, exotic germplasm in the development of new clones to meet the changing demands of the tea industry must not be overlooked. Exotic germplasm in the form of clones or a good source of seed is necessary if new clones are to be produced at a faster rate and if great strides are to be made in improvements in yield. It is significant to note that the high yielding 2020 series of TRI clones, the TRI 62 series and some of the TRI '3000' series clones were all developed from seedlings raised from seed brought from India from a single mother bush found in a seed garden at Tocklai.

Selection

Tea is naturally cross pollinated and therefore every seedling bush is unique. There are probably over one billion mature seedling bushes in Sri Lanka, and the scope for selection of clones from the existing seed tea may appear excellent.

The screening of such large populations is however laborious, time consuming and expensive. Selection of mother bushes for testing as clones can therefore only be done from random populations. It is doubtful whether all the desirable characters, and recombinations to evolve a desired type suited to different environments, exist, in such randomly selected populations.

The paucity of objective criteria for recognizing and differentiating between those bushes which would make superior clones, from a population has been a great handicap. It appears that the yield of a clone does not always necessarily run parallel with the yield of its seedling mother bush. This is because when mother bushes are being selected for yield, it is to be expected that a fair number will owe their selection merely to their favourable location in the field. Selection of only the genetically highest yielding types has therefore been a difficulty and the selection and subsequent development of an outstanding clone necessarily involves a series of field trials as the separation of the true from the spurious high yielders can only be done in the vegetatively propagated progeny.

It should also be noted that much of the existing seed tea are of the hybrid China type not desired commercially. It has also been said that at least part of the hectarage has been planted with seed haphazardly collected from any seed producing bush in tea fields. Areas planted with such seed cannot be expected to produce good yielders since it is the least vigorous and poorest yielding bushes in a tea field that are seen to flower and seed profusely. Experience has also shown that several of the apparently seedling tea fields have been heavily infilled with clones which are no longer in use today. Thus the scope for selecting high yielders from the existing seed tea is limited. However there appears to be much scope for selecting and developing pest/disease/drought resistant clones as well as high quality clones from the existing seed tea. These clones could be used in future breeding programmes for incorporating these traits into otherwise outstanding clones. Work in this direction is in progress.

Estates too should participate in a programme of germplasm conservation by clonally propagating any outstanding seed tea bushes in fields due for uprooting, which have withstood periodic droughts even under bad soil conditions and/or those which are seen to be free of pests/diseases. It is recommended that each estate sets aside a small area of land for the establishment and evaluation of these selections (germplasm banks).

Hybridisation

Hybridisation appears to be the most fruitful line of work at present. This is quite simply the crossing of selected clonal parents and selecting, from the seedlings and subsequent vegetative generations, one or a few of the best recombinants for development as clones. Hybridisation programmes have been initiated using a number of outstanding clones as parents with a view to identifying which clones and which crosses produce superior progeny for development of improved clones. Selections have been made from within such specially bred populations and outstanding clones are now being released to the Industry for experimental planting. Biclonal families and polyclonal seedling populations and clonal lines developed from selections made from within some of these populations are under test and will be released to the Industry in the very near future. Ultimate decisions on which clones are most suitable for planting are based upon trials replicated over sites and through several seasons.

Non conventional breeding methods

These are an array of special techniques which are essentially accessory to and complement the conventional methods described above. They are induction of polyploidy, homozygous plants through anther culture as a means of expediting the breeding process, mutagenesis as a means of generating variability that is not naturally available, and *in vitro* methods involving genetic engineering. Employment of some of these techniques to hasten the breeding process has commenced.

Supply of cuttings to estates

On the assumption that both selection of clones and their subsequent testing has been carried out effectively the next step is to supply the estates with the material of the finally selected clones for experimental planting. It is at this stage that final assessments on the resistance of the clones to pests/diseases/drought and/or cold as well as on their manufacturing potential are made. Should performance on estates prove satisfactory then these clones may be considered for large scale planting.

For the present the list of clones approved by the TRI should serve as a guide to the selection of clones in replanting programmes. For the future we hope to add to the list of new clones for experimental planting.