

VEGETATIVE PROPAGATION IN TEA (ITS PRACTICAL APPLICATION)

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This article by a well known low-country planter should serve to convince any remaining sceptics that, given the necessary interest and enthusiasm on the part of the superintendent, vegetatively propagated material is perfectly suitable for growing under low-country conditions. Mr. Bean's own experience amply demonstrates that successful replanting with selected, high yielding, clonal material is neither more difficult, once techniques suited to local conditions have been developed, nor more expensive than replanting with unselected seed. The fact that, once established, vegetatively propagated bushes have been found to be more drought resistant than seedling bushes is also worthy of note.

These notes are written with the idea of co-ordinating the experience gleaned since 1948, when I wrote my first article on the subject of vegetative propagation.

It is hoped that the results achieved may be of assistance to those Proprietors and Companies who intend to embark on large scale replanting or new planting with clonal material. I should, at the outset apologise for quoting my own experience *in extenso* as this may presumably be interpreted as a medium of self-advertisement, which it most certainly is not. The fact is that by reason of reserve land, and the transposition of old rubber land to tea I have perhaps been more fortunate than most on the practical aspect of V. P. research, and, perhaps what is more significant, in being placed in a position of being able to assess the comparative performances of V. P. as against seedling clearings of exactly equivalent vintage and with adjacent terrain and indentical cultivation methods. I hope I may be excused in referring to my original article as some of the remarks and conclusions therein reached may now need rectification, clarification or expansion. It should again be emphasised that these experiments have been carried out in a south west district, subject to severe droughts, at an average elevation of 800 feet, and a badly distributed rainfall of 160 inches a year. It is not, therefore, suggested that the methods employed will necessarily be successful in other districts with varying climatic conditions, although I am of the personal opinion that the principles adumbrated are fundamentally and universally sound. Growth and development of clearings, of course, will be progressively slower in proportion to altitude.

Original Selection of Mother Bushes.—This technique is now well known to planters and needs no further elaboration. Generally speaking an initial selection of perhaps 50 mother bushes per 100 acres of cultivated tea would be reasonable and, for low-country, I would suggest that the yield factor (plucking points) should be the main, if not the only, criterion, in this primary selection.

Test Plots.—The next stage would be to establish, via the nursery, rows of say 50 or 60 bushes of each clone, in experimental plots, preferably adjacent, and in a surveyed area, so that clonal, and field yields may be readily available. Thus, on a stand of 6,000 bushes to the acre, 100 clones could be tested out, and the individual (clonal) and aggregate (multi-clonal) yields ascertained.

After perhaps four years, the discarding process can be commenced after preliminary yield trials, or if not already done, for reasons of horizontal or poor rooting, poor manufacture, or other undesirable characteristics. In a further two years an estate should be in a position to identify its outstanding clones and concentrate on proved high yielding material for all future replanting or supplying programmes.

Between 1947 and 1954, I was able to reduce this estate's clones from an original 974 to the present 12, and, with the addition of a few T.R.I. clones, we are concerned here with 20 first class clones only for future work.

It may be of interest to readers that a surveyed 2½ acres of 100 primarily selected mixed clones, planted in 1948, gave in 1955 a yield of 2,370 lbs. of made tea per acre, compared with 1,231 lbs. from a seedling area of the same vintage. For the same year an assessment, after test plucking for 3 months our best 20 clones (50 bushes of each), gave calculated yields of between 4,916 and 5,796 lbs. per acre of made tea. Although naturally it is not claimed that such astronomical figures could be obtained over large acreages, I am quite confident that yields in advance of 3,000 lbs. per acre will be achieved.

Nursery Technique.—The procedure described in my previous article has proved fully effective here and we are able to maintain an average of between 75 to 80 per cent. success throughout the year. Despite regular watering the percentage drops as low as 50 per cent. in drought months and reaches 95 per cent. in months when rainfall is well distributed. Herring or cylinder transplantation is recommended only where experimental work is being done with valuable material. In ordinary commercial planting it is not economically justified because of (a) the prohibitive extent and cost of nurseries and (b) the tremendous cost of transplantation to the field.

We have found one acre of nurseries more than adequate to supply up an average of 30 acres of V.P. replanting per annum, or sufficient to maintain 300,000 cuttings. Leaf cuttings can be placed at distances of an inch apart in nursery beds and space can be further conserved if the leaf is halved.

In dry weather watering at dawn and dusk is imperative and I have found fern shading quite adequate. In no circumstances should cuttings be removed to the field in under 9 months and they can with advantage be left up to 15 months, if planting out is done in monsoon weather.

Transfer to field.—Experience has amply demonstrated that in the early stages V.P. material is much more sensitive than seedling and it is vital that immature V.P. plants should on no account be used in the field *i.e.* under 9 months of age in low-country conditions.

The time of planting is also vital and in the south west monsoon districts the only really safe period is at the outset of the south west monsoon rains, when up to 2 months wet weather can be safely anticipated.

Extreme care must be taken in transplantation not to injure or compress the tender laterals and this work requires the strictest supervision. In view of their early susceptibility to drought, good top soil is desirable for establishment with constant attention to hand forking, manure, shade and after care generally.

Field Technique.—It may sound presumptuous to expand on this subject as there are many and various methods of planting out tea, according to type of land, elevation and climate etc. and the varying whims of visiting agent and superintendent. It may, however, be of interest to relate the procedure adopted here, with success and relative economy, in regard to old rubber land. The rubber trees were felled

and utilised as firewood in January/March of the year prior to planting. The area was lined on the contour ($4' \times 1\frac{1}{2}'$) and trenches cut $1' \times 1'$. Guatemala grass was then established between the rows. *Gliricidias* were planted in every 3rd. row ($12'$) and *Albizzia sumatrana* in every 12th. row ($48' \times 48'$), giving an abundance of shade for later thinning out. Weeds and loppings were placed in the trenches for mulch, and all planting completed by the end of July of the following year.

Drought resistance.—One of the original objections to replanting with V.P. material was a doubt expressed that, by reason of the lack of tap root, the vegetative material would not stand up to prolonged drought conditions.

In the early stages (up to 2 years) it is indeed true that V.P. material is very susceptible to drought and requires the utmost care until complete establishment in the field. After maturity there is to my mind no doubt whatsoever, and this is borne out by experience and visual observation, that V.P. material in production is very much more hardy than the seedling counterpart.

I have seen V.P. tea yielding vigorously and profusely after a month's severe low-country drought whilst seedling tea, of the same vintage and in the same field, almost closed up, was wilting badly and suffered serious casualties. I can only assume that the V.P. material with its system of root multiplicity, is more able to find nutrient and moisture which is denied to the normal plant solely reliant on its tap root and a few laterals.

It is not perhaps generally realised that the V.P. bush, with its equally substantial and more balanced root system, is probably enabled thereby to forage and procure nourishment which is denied to the ordinary seedling bush.

Costs.—After nursery establishment and preliminary research, I do not think there is any significant difference in the costs of bringing the two types of tea into production. As I have indicated above, the normal nursery procedure can largely be followed, and there is no justification for the tremendous additional nursery expansion and transport costs involved in cylinder transplantation in large scale replantings. The cost of tea seed to the estate is also avoided by the use of leaf cuttings.

Layering.—All clearings since 1948 have been "layered", and, although this technique is not confined to V.P. areas, I am personally confident that it has contributed to a very great extent in securing the satisfactory yields obtained. Unfortunately no "control block" was left in either the V.P. or seedling areas so that the full effect of its influence on yield cannot be ascertained.

Conclusions.—The real value of the experience gleaned in V.P. commercial practice over the last 10 years is, to my mind, the significant data given in comparative yield records *vis-a-vis* counterpart seedling areas, and, although further improvement can be expected, this comparison is reflected in the yield figures of 2,370 lbs. per acre (V.P.) against seedling returns for tea treated, similarly in every way, of 1,231 lbs. per acre. The fields are adjacent, the soil conditions identical and the stand 6,000 to the acre. On a percentage basis the comparison reads

$$\frac{2,370}{1,231} \times \frac{100}{1} = 193 \text{ per cent.}, \text{ or in other words V.P. yields can be expected to be}$$

almost twice as high as those of seedling tea. It should also be remembered that the yields given above refer to 100 primary selected clones, most of which have now been discarded as inadequate, so that with future replantings, restricted to the use of the 20 clones finally selected as outstanding, further very considerable improvement can be confidently anticipated.

The experience here in regard to comparative yields is borne out by the T.R.I. experiments and similar data gleaned from other planters in the low-country.

The V.P. and seedling plants are generally indistinguishable in appearance, size and vigour, and the only conceivable reason for the better performances of the V.P. areas is in the multiplicity of plucking points and profusion of available flush. In addition, all selected clones have a strong and vigorous root system.

General.—It would appear to be the Government policy to encourage expansion of the island's tea areas, and the figure of an additional 100,000 acres has been mentioned as the immediate target.

It seems vital, therefore, that the best possible material should be utilised and, from the data supplied by the Tea Research Institute and from the experience of practical planters, it is incontrovertible that V.P. tea is capable of commercial yields of 3,000 lbs. per acre or more, or nearly double that obtainable by using selected seed. Experience has also shown that the development of V.P. must inevitably be through the individual estate and needs consistent and long term planning in the selection of mother bushes, nursery technique, and planting out.

Apart from the possibility of clonal seed development there is no short cut, and I would assess the time factor between selection of suitable mother bushes and planting out at a minimum of 6 years in the low-country, and probably 8 or more at higher elevations, if really proved material is to be utilised.

In other words, after about 8 years of experimental work, it is only now, after planting out 74 acres of V.P. tea and recording yield tests of many promising and 20 outstanding clones, that this estate is in a position to be completely confident that the best V.P. material (both estate and T.R.I.) suitable for local conditions, is being utilised.

I do not think that further discards will be necessary, as the danger of large monoclonal blocks (manufacture, disease, etc.) should not be minimised and I am reasonably confident that all finally selected clones will give a yield of upwards of 3,000 lbs. per acre on a stand of 5,000.