REPLANTING—I.*

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Your Chairman was good enough, while suggesting the subject of "Pruning Cycles," to give me my head as to the subject for today's talk. Longer cycles have been extensively discussed at the last Tea Conference and also in the various publications of the Institute, and while I will be glad to answer any questions on that subject to the best of my ability afterwards, it was felt to be of advantage to discuss today a movement which may well become as wide-spread as that of increasing the length of the cycle has done already. I refer to replanting. A few years ago, replanting was a rarity. Today, in almost every district, there are one or two small areas being done. If the movement grows and spreads, operations involving considerable sums of money will be involved, and it may not be inopportune, therefore, to consider what is involved.

I do not propose to discuss the question of the material with which replanting is to be done, as that of itself raises very large issues which I hope to discuss with the Dimbula Planters' Association at the end of the month. Instead, let us deal with the primary questions of when is replanting desirable, what preparations are necessary beforehand, and on what lines should the actual operations be carried out, of which the first is possibly the most debatable.

The usual reasons given for replanting the relatively small areas that have been done so far are that the area concerned was far below the average productivity of the rest of the estate owing to the condition of the bushes, or was planted with a much poorer jât, or had been placed for a time, under some other crop. What we have to consider is whether these reasons are the only ones justifying replanting. Emphasis was, at the beginning of restriction, placed on the desirability of a thorough supplying programme. This has been fairly widely accepted and acted upon, and some may perhaps ask "Surely continuous and adequate supplying is sufficient. Why talk of replanting." Well, other countries have found it desirable to pull out and replant tea areas containing fewer "passenger" bushes than ours, on the average, include. Further, as a long range policy they

* Lecture given to the Nuwara Eliya District Planters' Association on May 14, 1938.

are probably right, even when one realises that the areas being replanted are fully up to what in up-country Ceylon districts would be called a good hybrid of relatively uniform type. In fact, they are uprooting and replacing what, in some cases, we are still planting. We must also realise that when Ceylon bought large quantities of seed from abroad in the earliest days of the industry it is possible that we may not have been given the cream of the local varieties! Replanting is a subject that should not be ignored in Ceylon and in my opinion there are reasons that may justify the replanting of areas that are not worse than the general average of the estate, where that average is not high.

The spread of the tea industry into new countries, and the position in parts of India where there are not only areas of young tea which have not yet been fully cropped owing to restriction, but also large areas at present being replanted or available for new opening on individual estates, provide the possibility of even lower costs of production being achieved. They are in general already low compared to Ceylon, as far as I was able to judge on a fleeting visit. Now, Ceylon tea has long been in the happy position of commanding a premium in the world's markets. But the apparent value of that premium will become fictitious if the disparity between the cost of production in Ceylon and in other countries, situated more favourably than Ceylon in this respect, is allowed to increase. It is, I think, generally admitted that at the termination of restriction, large acreages of the world's tea will be capable of yielding far more than the present standard assessments. Is this generally the case in Ceylon? And yield per acre is a very cogent factor in cost of production.

I realise that this thesis brings us to a very knotty point — if yields are to be increased to allow of the maintenance or reduction of our present costs of production, what about quality? Frankly, I do not think we know enough yet to be able to answer this question properly, but two observations appear to be justified. Firstly, there are a sufficiency of examples to show that increases in yield achieved by cultural methods are not necessarily associated with decreases in valuation. Secondly, I see no reason why this should not be equally true in the case of increases achieved by replanting. The task before us, in my personal view, is to maintain our market premium while preparing to face even greater competition resulting from disparity in costs of production.

The consideration of costs of production, with the sequence of thought to higher yields and thence to replanting, is not the only direction in which the importance of a correct decision upon the subject becomes important. It is also necessary to consider the

future of the existing bushes. Take for example, an estate of five hundred acres, on which the tea is thirty years old, whose Directors are willing to adopt a permanent policy, which today would be revolutionary in Ceylon, namely that of steadily replanting five acres every year. Some of that tea will be 130 years old before it is replanted!

It may be justly objected that this is not quite a complete picture and that the supplying of vacancies will result in the replacement of a large proportion of the bushes before then. Granting this, if we rely indefinitely on supplying, we are faced with the consequence that existing conditions will be perpetuated, whether we like them or not. Lines must still run up and down hill, bush heterogeneity is to be further accentuated by supplying with whatever jât happens to be available when required, and no radical improvements are possible. It may be replied that firstly no one here is likely to be interested in 2038 A.D., and secondly that it is better to wait for the production of improved types of tea before considering replanting. The first is, I think, met by the fact that we are all here in greater or less degree as trustees, but the second has more force. I hope, since it is now my job, that improvements will be made in the types of tea plant available for planting purposes, but I am under no illusion about the lengthy nature of the task I am engaged in. However, the point must not be lost sight of that, in an unselected crop like tea, even the roughest methods of selection can give marked results. It should not be difficult to achieve not only replanting, but also replanting with improved material, even if that material is not as good as what may later be obtainable. We cannot postpone the consideration of replanting until the Cox's Orange Pippin among tea plants has been located and distributed to the industry. Can we afford to delay for ten or twenty years or more a process which, if replanting of five per cent of the acreage per annum is envisaged will take still a further twenty years to achieve?

The cost of replanting properly must give us pause. Replanting is really the payment in a short time of depreciation that has fallen due over many years. Something of a stir was made in the local papers over the statement that the rubber tree was a depreciating asset — but is not the same as true of tea as of all living organisms? The expectation of life of a mature organism must always be decreasing and its capital value therefore depreciating.

If depreciation has to be met, the best way is to make it as easily paid as possible. Now, under normal circumstances, the cost of replanting would be the expenditure plus the loss of profit until yields equalled that of the old tea, after which returns would be

expected to accrue in the form of an increase of crop above what the old tea would have yielded. But, provided coupon purchases have not been so great as to result in the estate being cropped to capacity during restriction, the loss of crop from the replanting of small acreages can be made up on the rest of the bearing acreage. In other words, restriction allows of replanting being done more cheaply now than will be possible after its termination. This point it seems to me has a particular application in Nuwara Eliya, where supplies and young plants grow so slowly.

These general observations on replanting are my own opinions, and it is not suggested that they are complete or necessarily entirely correct. I do, however, think that the considerations I have mentioned are too important to be ignored, whatever the decision arrived at in the case of individual estates.

Turning now to the second of the three questions I mentioned earlier, assuming replanting is decided upon, what preparations are advisable beforehand?

Firstly, the programme should be mapped out well in advance. There is no point in paying special attention to pruning, mossing and ferning, root growth, etc., on an area that will be replanted in the next five years. If the land is to be redrained, existing drains may be partially blocked and allowed to silt up previous to replanting. Thus substantial savings may be made and offset against the cost of the programme. At the same time as preparations such as these are made, active steps to put leader drains into good order should be taken, since they are likely to remain untouched even if new lateral drains are dug.

There is thus much that can be done before the actual replanting is started. But one of the most important steps of all has been left out — I refer to the preparation, well in advance, of nursery sites sufficient to provide plants for at least two-and-a-half times the area to be replanted, and preferably more, if selection is to be carried out. Nursery sites are admittedly a problem but in this connection there are two points to be stressed — firstly, that if a field is to be replanted, nursery sites can be prepared in it beforehand by cutting out the tea on the area required beforehand, and secondly, that water can usually be got by piping. One of the most pungent comments I have heard by visitors to the Island, if tea types are not considered, referred to our habit of taking nurseries to water, irrespective of soil, rather than water to nurseries.

Some may feel that seed-at-stake or basket plants will save the necessity of worrying about nurseries for stumps. Before they decide upon this, however, I suggest that they make themselves

familiar with the results obtainable by nursery selection, an account of which is appearing in the next number of *The Tea Quarterly*. I am optimistic that the next few years will see a greater evenness in the type and vigour of seedlings produced from seed gardens whose managements determine to work for it. But so long as tea is propagated from seed, the desirability of nursery selection will remain. Even if we end up with clonal seed gardens, there will still be some variation in the progeny, though very much less than at present, to justify the policy of taking the good and discarding the bad.

Turning now to problems associated with the actual process of replanting, the three main considerations appear to me to be, leaving planting material out of the account, reduction of erosion, close planting and a speedy attainment of yielding capacity.

The first requires special attention during the uprooting of the old tea, and it is very desirable that drains in the area which are not already converted to lock-and-spill or reverse slope types should be attended to beforehand. Grass clods or thick rows of bush green manure on the edges of drains will hold up a great deal of soil that would otherwise be lost during the process.

After uprooting, care should be taken to ensure that the soil is not left fallow. If uprooting is done thoroughly, "cultivation" is very deep and thorough, and a plain forking soon after to remove root fragments and permit of the burying of all small twiggy matter and leaves will be all that is required.

Lining should follow as soon as possible, and this brings us to the problem of contour planting. It is not going to pay to hold up the work and leave the soil exposed to rain and sun while we try to produce an array of pegs that would evoke the admiration of the Survey Department. If the contour is followed with reasonable accuracy, but with sufficient latitude to allow of spacing to eliminate short rows, all the major effects of contour planting on erosion will be obtained and with far less time and trouble. The Institute has recently adopted a spacing of 4×2 feet, giving 5,300 odd plants per acre; this is a compromise, as such a decision must be, between the aims of high, but still reasonable, bush numbers per acre, the need for close planting in the row if soil is really to be held up by the bushes, and a sufficiency of space between the rows to allow of cultivation and the growth of green manure. I do not say this spacing is ideal but it seems to me to form a fair compromise. We have also areas of $5 \times 1\frac{1}{2}$ and $4 \times 1\frac{3}{4}$ planting which will later form interesting comparisons.

Immediately pegs are in, the holes should be cut; and here I would point out that there is no point in leaving the holes open — once you have seen that they have been properly cut, they should be filled.

In passing, it may be noted that recent experiments have suggested that soaking stumps overnight in a dilute solution of a nitrogen compound before planting may exercise a distinct beneficial effect on the percentage of plants establishing themselves under difficult conditions.

When the plants are established, plucking them as early as possible is suggested — but very lightly and very carefully. Early light plucking, provided it is done with care, does no harm and may help to offset the cost of replanting.

It may be of interest to close with a short account of methods of replanting that I saw in a part of North-East India. When I tell you that the advisability or the reverse of tractor ploughing of the uprooted area prior to replanting was a subject of discussion, you will have some idea of what we are competing with!

Planting is carried out with magnificent nursery plants, lifted with balls of earth attached to the root, and transferred with great care to the field. The result is that they have the equivalent of a two-year-old clearing in as many months. The nurseries are always made closely adjacent to the area to be planted, and frequently only a small proportion of the seed — that germinating most quickly — is used. The seed, incidentally, is about twice the size of ours, and the young plants are remarkable for their size and uniformity. Growth is aided by copious applications of liquid manure — made by mixing about six inches of dung in a barrel with water sufficient to fill it and allowing the whole to stand, with an occasional stir, for three or four days. I would strongly recommend this being done more frequently in Ceylon, but would stress the point that a thorough soaking of one bed will do more good than a driblet applied over the whole nursery. Perhaps because of the difference in seed size, nitrogen has been found to have little or no effect in the first year of growth, whereas in Ceylon I think the seedlings respond as young as six or eight months.

The eighteen-month or two-year-old plants, sometimes four and five feet high, are planted out untouched, so that what was a clear space yesterday becomes a field of tea today. Grass is applied around the plant to shade the soil and a few days later any plants which have flagged are replaced.

It was of interest that on one, at least, of the estates seen, the spacing was being reduced. In the area I was in, I was informed that from 20 to 40 per cent of the tea was being, or had been, replanted with higher and more uniform jât.

In the Wynaad District of South India, the case is different, for all their tea is relatively young and certainly very even, and I gained the impression that in many cases the estates have not yet been fully cropped. Nurseries were again magnificent and the evenness of the jâts was second only to what I had seen in North India.

My impressions are those gained from restricted areas on an all too short visit, and I would not therefore claim them to be complete; I certainly recommend those of you who can, to go and see for yourselves — but I warn you in advance that the kindness and hospitality you receive will be overwhelming.

DISCUSSION

The Chairman thanked Dr. Tubbs and invited discussion.

Mr. Thornton asked whether there was any evidence that young tea necessarily yielded more than 30 to 40-year-old tea.

Dr. Tubbs replied that it was quite impossible to give a general answer to such a question. He would not deny that possibly even very old tea could give high yields if the soil was good, it was well-manured, and the bushes were not suffering from the effects of past treatment. In other words, the answer to the question was entirely dependent on the local conditions and it was quite impossible to state that at a certain age the tea bush would cease to be as profitable as a younger one. If such a statement was feasible, it would have been possible in the past to depreciate the tea at a fixed rate in preparation for replanting the tea on a given date. There was no doubt that tea growing on deep fertile soil would remain profitable much longer than tea on less fertile soil, where the effects of wood rot in the frames tended to be much greater. Even when the frames were distinctly poor it was possible to renovate the tea by collar pruning and thereby carry on for some considerable time longer, but he felt that such a suggestion did not eliminate the possibility of the necessity for replanting occurring later. No one would willingly contemplate replanting large areas in a very short time, and what he was asking them to consider was whether the time had not come for the process to be started, so that it could be done in relatively small areas at a time. What had first to be decided was whether we were willing to face the question of future replanting. The date at which the process is started and the acreages dealt with annually must be decided subject to the conditions obtaining on individual estates and individual fields.

Mr. Thornton further asked whether the lecturer knew of any tea actually dying out from old age.

Dr. Tubbs replied that it was unlikely that a tea bush would die purely of old age, but as the bush became older the prejudicial effects of the accidents of environment and of treatment in the past reached a greater cumulative total and the capacity of the bush to withstand a new set of prejudicial circumstances became less. Very little indeed was known of *purely* age effect on trees but it was known that different species varied considerably in the average age attained; compare, for instance, the Chestnut and the Churchyard Yew. It was possible that individual tea bushes would also vary in this respect.*

Mr. Howard asked whether collar pruning might not prove a much cheaper alternative to replanting.

Dr. Tubbs replied that he had not sufficient knowledge of collar pruning in that district to say for how long yield would be lost, but if it was for some considerable period, could the process be called economic when viewed from a far-seeing point of view ? He had attempted to raise the question whether, if replanting had at some time to be undertaken, it was not desirable to start the process now. Renovation by collar pruning gave little opportunity of increasing the bush numbers, or of increasing the effectiveness of anti-erosion methods.

In a reply to a question by **Mr. Tunnard,** as to whether it was worth replanting areas where there were only a few inches of soil left,

Dr. Tubbs said that where beneath very shallow soil slab rock occurred, he would not consider it a suitable area for investing the sums necessary to carry out proper replanting, but where there was a good sub-soil thorough cultivation, using the term in the widest sense, would permit of what was practically the making of a new soil layer. He considered that the question of the depth of penetration of the taproot had been given undue importance in Ceylon where, in general, it in any case rarely penetrated deeply. Where the old planting methods had resulted in the course of time in loss of all the upper soil, it was very necessary that any method of replanting considered should allow for efficient contour planting to prevent the remade soil being lost once again.

Mr. Tunnard asked whether Dr. Tubbs would advocate removal of China tea which was forming a good cover over the soil, and raised the question of interplanting with other jâts.

Dr. Tubbs replied that the possibility of interplanting old tea was already a subject of experiment at St. Coombs, but that he would not advocate mixing jâts. He wished it to be clearly understood when speaking of jâts that he was not in a position to say that any one jât of tea was superior to any other jât, and that in a case like this he would require to know more details of the local conditions and history of the fields before he would advocate replanting China just because it was China.

* It may be added that if replanting of 5 per cent of the acreage each year is encouraged, it is desirable to start the programme 20 years before casualties, from whatever cause, become very numerous.

Mr. Tunnard gave further details of his experiences, stating that high jât tea replacing China had taken a considerable time to come on.

Dr. Tubbs said that he would wish to see the particular area before expressing an opinion. If, after considering the question of whether progressive replanting would become desirable in the relatively near future, it was decided to embark upon such a policy, it was necessary to make up one's mind to leave out of the programme those areas which a reasonable man might consider to be incapable of making a fair return. It was very important that improved planting material and methods should not be wasted on areas which could never repay the attention spent on them. He was, therefore, by no means an advocate of a policy of replanting only the worst areas since it might lead in the long run to loss rather than profit.