

REPLANTING IN THE LOW-COUNTRY AND ASSOCIATED PROBLEMS*

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I much appreciate having been asked to address your meeting to-day—especially because as a speaker here I find myself in very illustrious company. I refer not only to the Hon. the Minister of Finance who is addressing you to-day, but also to the speakers at some of your recent meetings including the Hon. the Minister of Transport and the Prime Minister himself. It is also gratifying as being an indication that you are once again concerned with increasing your yields, and I recall that only recently you were all more concerned with reducing them!

Now as you know already, I came over to this district several weeks ago to make my own observations as to what the particular problems of current importance are. I am glad to have had this opportunity of meeting many of the planters in the district, and would like to record my thanks to Mr. Abeygoonewardena for arranging such a comprehensive tour for me, including as it did a very fair cross section of the estates in the district; actually 7 estates were officially included in this itinerary, not to mention several others that I included for good measure. What follows is based entirely on what I saw in this district—the main theme being replanting and associated problems with special reference to the worst and most difficult areas. I have also included a section on the various pests which are causing concern at the moment in the district.

Low-Country Sub-Station.—Before starting this review, however, I would just like to take this opportunity of saying a few words regarding the latest developments in connection with the low-country sub-station. The present position is that plans made some time ago to enlarge the scope of our activities are being implemented along the following lines:—

(1) **FURTHER V.P. EXPANSION.**—An offer of a large block of flat and very uniform old rubber land in the Kalutara District was received in October of last year, and negotiations regarding the lease of 25 acres of this land have now reached the final stages. Approval in principle with this scheme was given at a recent meeting of the T.R.I. Experimental and Estate Committee, at which representatives of low-country districts were present. I would add that several other possible alternatives had been investigated, but in every case the land was found after further inquiry to be unsuitable. It may also be of interest to this district to note that a further clonal proving trials area is being established at Peradeniya where the Department of Agriculture has been very co-operative.

(2) **SHOT HOLE BORER.**—Experiments are continuing in the Ratnapura district under the supervision of Mr. Austin and his assistant. Further plans are being made for setting up the necessary laboratory for the intensification of this work, so that the Ratnapura district may become the centre of what amounts to an entomological sub-station. In addition a senior Entomologist has been seconded to the T.R.I.

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from Messrs. Fison's Pest Control Ltd. for a minimum period of 2 years to work on the shot hole borer problem; a bungalow has been put at his disposal near Ratnapura and his additional services should be of great value.

(3) **MANURING.**—A further manuring experiment, entailing the use of 162 plots, has been laid down on Endane Estate to investigate the requirements of high yielding low-country tea. To start with 3 levels of nitrogen and 3 levels of potash are being applied (phosphate levels remaining constant); a third treatment will be added later to enable the effects of some other elements such as magnesium to be investigated. An assistant has been specially recruited for this experiment.

New Plantings.—Coming now to my survey of this area, I would like to start by saying a few words concerning new plantings, with particular reference to the danger of indiscriminate opening up of jungles as is taking place on some estates. Now on my recent tour I was amazed at the phenomenally steep slopes which have recently been cleared, and which many of you are now trying to plant up. In fact I saw some new clearings whose slope in parts could not have been less than about 75° or even more. My first photograph* illustrates graphically the results of the usual policy of trying to grow tea on every available square yard of land, and before going any further, let me say that my following remarks in this connection should not be taken as implying criticism of the careful work which has obviously been done on this clearing. The particular estate which provides the subject for the photo was one of those I looked at (unofficially) in passing, so I am afraid I cannot give you any details of the clearing. There are, however several points which I want you to notice particularly,—firstly the establishment of albizzia wind protection belts down the middle part, and secondly the fact that on the really steep part in the middle it is extremely difficult to pick out any tea plants at all! The inference from this is that the land in question would have been put to far better use if a strip of jungle had been left on the steepest part, both from the point of view of preventing soil erosion and as an effective wind-break. In fact the results achieved on such precipitous slopes here and elsewhere merely indicate that it is not worth while trying to plant them up with tea.

By way of enlarging on this point; as you know it is an established principle of Government policy not to alienate land with a slope of more than 45°. In the case of privately owned land, however, there is apparently no limit at all to the slope which many proprietors consider suitable for growing tea, in spite of the obvious practical difficulties of plucking such areas. In putting forward the suggestion which I have just outlined, I am of course fully aware that one often finds patches of excessively steep land occurring in blocks which are otherwise suitable for tea, and obviously small patches of jungle cannot be left scattered about; the treatment I suggest for such patches is that they could be put to better use by growing Guatemala grass instead, not only to provide a really effective soil binder but also as a permanent source of organic matter for thatching and soil rejuvenation, which aspects I shall be enlarging upon later.

I have given priority to this question of correct land usage as it should obviously be the first point to be considered in any large scale scheme for the expansion of the tea industry by new planting, bearing in mind firstly that this district is pre-eminently suitable for the growing of tea, and secondly that there is no land shortage here. This plea for correct land usage should be taken in conjunction with the necessity for doing everything possible in the hill areas to control soil erosion and to limit the annually recurring floods which menace the lowlands. It is of course customary to blame these floods like most other things on the Government, who in turn blame the tea estates for opening up jungle land; they in turn point to the small

*It is regretted that it has not been found possible to reprint any of Mr. Walter's photographs. Ed.

holders who in turn pass the baby on to the Government, thus completing the circle. The small holders are now becoming increasingly aware of their responsibilities in this sphere, owing largely to the recently introduced system of grants for terracing and draining, so the alibi held previously by estates is no longer effective.

Lest you should think that I have been unduly critical of the methods adopted by big land owners in opening up land, I have much pleasure in showing some photographs taken on the 1954 new clearing on Kobomella Estate, which is undoubtedly the best I have seen anywhere. In fact, if I had any prizes to give, I would unhesitatingly award the first prize to the Superintendent of this estate. These photos illustrate far more graphically than any verbal description of mine what should be done on all steep slopes where it is not enough to be satisfied merely with planting on the contour. On this clearing the slope varies between about 45°-60°, which is not really steep by comparison with some other areas. Obviously it is possible to get good results on these slopes, but only by the outlay of very considerable expenditure, which many proprietors and company directors are somewhat reluctant to allow. The proprietor of Kobomella—Mr. Jayasuriya—is apt to suffer from temporary deafness, particularly when asked about the actual costs involved so far on this clearing: however, I understand that this deafness is only very temporary and not likely to recur when it comes to answering questions on the enormous yields (and profits) he rightly expects in a few years.

I will just run quickly through some of the practical points illustrated which you should note particularly; first the very fine stone walls, the stone for which came from the contour trenches which were dug for the lines of tea plants; note that on this slope not more than two lines of tea plants can be accommodated on each terrace, the planting distance being 4' $\times$ 1½'; then note particularly the very neat lines of stylosanthes growing along the edges of the walls and kept well cut back to form hedges; these are supplemented by a further line of bush green manures in between the tea lines to act as low windbreaks and as protection from the sun. Finally note the gently sloping drains, not more than 25 feet apart, with their reverse saw tooth construction and the paved leader drains. I can well believe that with all these measures there is no waste at all on this clearing, even during the heaviest storm. Incidentally, these photos are being forwarded to the officer-in-charge of the T.R.I. small holdings service to make a selection for distribution to the small holdings officers and tea instructors.

A further point is that the plants shown in the photos have just reached pencil thickness and on such steep slopes I would recommend that layering be adopted; this encourages a hedge type of growth which makes a further valuable contribution towards holding up the soil.

Replanting.—So much for new planting and I now come on to the question of replanting (and soil reconditioning) of old uneconomic tea areas. The whole subject of replanting is of course of great topical importance in view of the proposed tea replanting subsidy scheme, which after the recent total eclipse (I refer, of course, to the crisis in the tea trade) is in the limelight once more, and though I naturally cannot enlarge upon this scheme while it is still "sub judice", it is obvious that suitable financial inducements will be necessary to make large scale replanting a practical proposition.

Now on my recent tour I was particularly struck by the enormous variation in yield between the highest and lowest yielding areas; these often varying on different fields of the same estate between 3-400 lbs. per acre and 12-1,300 lbs. per acre. Obviously differences in management cannot account for such a wide variation and, although most of the younger higher yielding fields in this district are showing an encouraging tendency to rise, the oldest and lowest yielding fields are barely maintaining their already low levels. This latter tendency is fairly universal and is not

at all surprising when one recalls that many of the oldest and lowest yielding fields are at least 60 years old. Now it may well be feasible to improve the yields of middle aged tea by intensive re-supplying and intensive cultivation combined with resting and soil improvement measures; high potash manuring, designed to assist in the promotion of new wood growth, is also worth consideration. But in the case of old tea nearing the end of its natural life span the expenditure involved in such measures is wholly unwarranted and here the problem of increasing yields can only be solved adequately by replanting; please note particularly that I do not mean merely re-supplying, but complete re-planting, which is the only logical way firstly of ensuring that the tea is re-aligned on the contour and secondly of allowing soil improvement measures.

UPROOTING OF OLD TEA.—Before going on to the question of soil rejuvenation, it would be as well to refer briefly to uprooting of old tea. Various techniques have been evolved for this work and the costs vary widely according to the equipment used; on St. Coombs this variation was between Rs. 475/- and Rs. 1,350/- per acre. Naturally the type of terrain and the number of bushes per acre affect the costs very considerably and, lest you should be unduly alarmed by these figures, I would mention that on Balangoda Group 23,000 bushes were uprooted at a cost per acre of only Rs. 215/-, or Rs. 300/- if depreciation of equipment is included; this was achieved by a Hesford Hercules winch working in conjunction with a Ferguson tractor, and 1 acre per week was uprooted. You may have heard of some estates which claim to be able to do this work at even lower figures than the ones quoted, but in my experience such claims are usually based on a stand of no more than about 1,000 bushes per acre. However, whatever the cost of uprooting may turn out to be in practice it represents only a small fraction of the total cost of replanting, since, including soil reconditioning, this is likely to add up to a figure of around Rs. 5,000/- per acre by the time the new tea comes into bearing.

Such high expenditure can only be fully justified if there is every assurance that the best possible returns will be obtained from the replanted areas. These optimistic results can only be achieved, firstly by soil reconditioning of worn out areas, and secondly by the use of high yielding V.P. material.

SOIL RECONDITIONING.—Here I must emphasize that soil reconditioning is no mere scientist's dream, designed to harass planters, but an essential preliminary to any long term replanting programme. This is especially so where the soil has been exposed for a considerable length of time, for there is nothing so damaging to the crumb structure of the soil, or more lowering of its content of humus, than prolonged exposure to the elements.

Unfortunately I cannot give actual comparative figures at this stage to show the value of soil reconditioning, but an experiment has been laid down at St. Coombs in an area of old tea which is being replanted, part of the field being reconditioned, and part replanted straight away. I have also seen other new clearings (in the low country) where partial soil reconditioning has been carried out by means of trenches filled with whatever loppings and vegetation were available; in some cases ordinary holing has been adopted on an adjacent clearing, and where this has been done a very marked difference in growth has been evident.

The technique of soil reconditioning with Guatemala grass (after the old tea has been uprooted) consists of the following operations:—

First the drains should be dug and the contour marked; the contour lines are then cut to form a series of trenches 18" deep and 12" wide; Guatemala grass is then planted in between these trenches and the loppings used to fill them in. After about 18 months—2 years the Guatemala grass plants are finally cut back at ground level, the accumulated loppings being first treated with sulphate of ammonia at the rate

of 1 cwt. per acre to accelerate decomposition and then covered with soil. The rate of decomposition naturally depends on the weather, but under suitable conditions the trenches should at this elevation be ready for planting within about 3-4 months. Of course, thatching the surface of the ground with Guatemala grass is also effective, but this process is really more applicable to new clearings after planting.

Before going on to the question of V.P. materials I would like to develop a point I mentioned earlier, namely that under tropical conditions at low elevation even the richest soils deteriorate very rapidly when exposed to the elements. The inference from this is that every effort should be made to form and maintain a canopy at all levels; in other words this cover should consist ideally of a high shade canopy of *Albizzia moluccana*, then a cover of medium shade such as *glicicidias*, then the cover of tea (which I am not forgetting is what you are in fact trying to get) and finally protecting cover crops. I noticed on my recent tour that quite a number of you are still afflicted with large unwanted legacies in the shape of old and derelict albizzias and I was glad to see that these are being rapidly removed. I would, however, urge you to replant with this species and, as I am aware that there is considerable divergence of opinion on this point, I should like to quote the following figures from a low country estate to support my argument. In 1940, the yield on this particular estate was 800 lbs. per acre; in 1941-42 all the albizzias were cut out and an immediate temporary increase in yield resulted, in fact the peak figure of almost 1,200 lbs. per acre was reached in 1942. After that, however, there was an alarming drop to 925 lbs. per acre and this decline continued until in 1950 the yield was 725 lbs. per acre. Now what makes these figures all the more remarkable is the fact that those quoted for 1940 and 1942 (viz. 800 and 1,200 lbs. per acre respectively) were obtained during the fertiliser rationing period when only 45 lbs. of nitrogen per acre were given; in 1948 nitrogen applications almost doubled to 80 lbs. per acre, but in spite of this the yield in 1950 was only 725 lbs. per acre. The only possible deduction from these figures is that the removal of the albizzia shade was primarily responsible for the sensational fall in crop; so please pay particular attention to the immediate replacement of old shade trees (as necessary)—especially in the fields that you have no doubt earmarked for replanting, bearing in mind that the new stand should be well established before removing the old trees.

Regarding cover crops, it is not so easy to obtain reliable figures of their beneficial effects on yields. Several estates are known, however, where substantial yield increases have been obtained since gotukola was established, though there have of course been other contributory factors in these increases. Although this cover is non-leguminous it has the great advantage that no control is needed, except possibly occasional strip forking, and this should make it particularly attractive to small holders. I have already drawn your attention to the value of *stylosanthes*, which does of course need a certain amount of control, (though not so much as *desmodium* for instance), and I will conclude this section by pointing out that these covers are also of great practical value in keeping down weeds, which are obviously a major problem here.

VEGETATIVE PROPAGATION.—I come now to the second means I mentioned of ensuring that the best possible results are obtained in new plantings, namely the use of high yielding V.P. material. Now with one or two notable exceptions I was rather disappointed at the lack of progress made with V.P. work in this district and, for the time being at any rate, there does seem to be a strong tendency to "take no thought for the morrow". It may therefore be of interest to note that some of the big (company owned) estates in other districts are holding up their planting programmes until sufficient high yielding clonal material is available. At this stage I must point out that a considerable time lag is inevitable in this type of work and after the high yielding clones have been obtained, 4 years will elapse before sufficient planting material will be available for large scale field planting; it is therefore all the more important that the initial steps should be taken in this regard without further delay.

Now in the time at my disposal I cannot do more than summarise some of the more important aspects of V.P. work. Firstly regarding selection work; while I do not wish to dampen your enthusiasm for making your own selections of V.P. material, it would really be better to make use of those T.R.I. approved clones which are currently available, since these are the product of some 20 years of selection work. Many of the St. Coombs selections are highly successful under a wide range of climatic conditions and elevation, and, although no actual yield figures for this elevation are as yet available, clones Nos. 2024 and 2025 are outstanding both up-country and in the low country, while 2023, 2026 and 25 are outstanding in the low-country. Now in the present context the term "outstanding" is used for clones which are giving yields of the order of 3,000 lbs. per acre and above—in fact No. 2024 has almost touched 4,000 lbs. per acre in the first year of its second cycle at St. Coombs. As the demand for these approved clones is naturally far greater than the supply, it has been decided to limit the number of cuttings that can be made available to any one estate to 100 cuttings of any individual clone, with a limit of 5 clones. In other words a maximum of 500 cuttings can be obtained by any estate from St. Coombs, which supply should produce anything up to 250,000 plants in 4 years time.

Of the few low-country clones, for which yield figures are so far available, only three of our collection, namely S 106, S 123 and S 215 merit consideration at present. Unfortunately the Directors of Sirikandura Estate, where these clones originated, are not willing to fall in with our approved policy of making all our proven clonal material freely available and these clones can at present only be obtained from Sirikandura Estate, at prices ranging between 1 and 2 rupees per cutting; there is also a considerable weight of legal documents attached to these particular clones, prohibiting their re-distribution, but in spite of this they do really grow which is the main thing.

The second point is that—as you will have noted—I have consistently referred to the distribution of cuttings to estates and in fact it is no longer possible to obtain rooted plants through the T.R.I. This policy was adopted, partly owing to the danger of transporting soil borne pests such as eelworm in the soil, and partly owing to the very poor results achieved when rooted plants are moved to a different climate. Keeping cuttings fresh in transit now presents no difficulty at all with the latest technique of using polythene tubing for packing (exhibit), and in fact I have kept some cuttings quite fresh in these bags for over a week at Pembroke.

A third point which concerns the propagation of V.P. cuttings in the nursery, is that an overhead pandal of coir matting is a far more satisfactory method of shading than bracken fern. If, however, you propose to continue using bracken fern then better results will be obtained by using it as an overhead pandal rather than just stuck in the ground.

To summarise this section it has been established that yields of 3,000-4,000 lbs. per acre are a definite possibility with selected clonal material, and I strongly urge, that planters in this district should regard the early establishment of multiplication plots with T.R.I. approved clones as being a matter of the utmost importance and urgency.

Pests.—Coming finally to the pests which are causing a good deal of concern in this district, namely yellow mite and red spider. Taking yellow mite first (exhibit), the symptoms are readily visible—even in the early stages—on the under surfaces of the flush, becoming apparent later on the mature leaves; considerable defoliation may be caused on the young shoots. Affected bushes are normally found in patches, often under heavy shade. The pest is to some extent controlled by weather conditions, and outbreaks usually diminish or disappear entirely after heavy rain; should an attack persist, however, it is advisable to control it artificially, as loss of crop may be very considerable. It is fairly easy to control, by either of the following

methods:—(i) two rounds of hard plucking (to limit the amount of young leaf on which the mites feed), followed by a corresponding period of rest to allow the bushes to recover from the physiological effects. (ii) If this is not entirely effective, then it may be necessary to apply sulphur to the affected bushes—either in the form of dust or a dispersible sulphur spray. Two applications at an interval of one week should be sufficient, the first being given immediately after plucking. Although sulphur is highly effective, it has the disadvantage that it causes serious taint, and accordingly it is essential that the leaf from treated areas be discarded for a period of 3 weeks following the last application; obviously therefore this means of control is only worth carrying out if fairly large patches rather than individual bushes are affected.

Turning to the other type of mite which is now fairly wide-spread in this district, namely red spider mite (exhibit), this mite first attacks the mature foliage, causing a coppery discolouration on the upper surfaces; soon the flush becomes similarly affected, and in fact seriously affected bushes may have no flush at all. In common with yellow mite this pest is also controlled to some extent by weather conditions, but not entirely, and I understand that one estate in this district had a major attack last year which has to some extent persisted. Sulphur is very effective in the control of this pest, but on the various estates where it was seen, my impression was that it was confined to scattered bushes, so again this method of control has its limitations. However experiments carried out with a new non-tainting acaricide, chlorobenzylate, have so far proved highly successful and, although this product is double the cost of sulphur, (Rs. 80/- per gallon) it has the great advantage that there is no taint in leaf plucked one week after application. Two or three applications at intervals of a week should bring any outbreak under complete control and, in view of the possibility that outbreaks may assume epidemic proportions, it would be advisable to carry out this simple but effective control measure. The recommended application rate for chlorobenzylate is $\frac{1}{2}$ pint of the chemical in 50 gallons of water per acre per round. (I should be glad if anyone who does decide to undertake this control measure would please keep me informed regarding the results achieved.)

I hope that this survey has covered your problems adequately. I will conclude by saying that if you require my services at any time in connection with any problem which may arise, all you have to do is to get in touch with me.