

THE PRINCIPLES OF BUSH MANAGEMENT

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My original suggestion for a title for this talk was "Points of Agricultural Interest", since it is my intention to deal with a number of aspects of the cultivation and management of the tea bush which will, I hope, be of general interest.

Vegetative Propagation

Firstly a few words about Vegetative Propagation. As many of you know I have only recently returned to Ceylon after 8 months' leave. However, in the short time I have been back I have already been somewhat disappointed in receiving reports concerning a decline in the interest shown by estates in V.P. work. If these rumours are indeed true then I can only say that they reflect a most short-sighted policy on the part of those responsible. In the present state of our knowledge the vegetative propagation of selected high yielding clonal plants undoubtedly offers the greatest possibilities of rapidly and cheaply increasing our overall yields per acre, with a consequent lowering of cost of production. The inherent possibilities of this method are well illustrated by the yields given by some of our 1947 series clones in their second year of plucking (1951-1952). (Table I).

TABLE I
St. Coombs 1947 Series Clones
Yields in Second Year

| <i>Clone No.</i> | <i>Lbs./Acre</i> |
|------------------|------------------|
| 2024 | 2,295 |
| 2025 | 1,830 |
| 2023 | 1,685 |
| 2022 | 1,650 |
| 2021 | 1,500 |
| 25 | 1,405 |

None of these clones have been protected against blister blight and it should be noted that our one time best clone—No. 25—has now been soundly beaten for yield by five more recent selections. This is mainly due to No. 25's greater susceptibility to blister blight since, prior to the advent of this disease, its yields were consistently high. (Table 2).

TABLE II
St. Coombs No. 25 Clone
Yields Prior to Blister Blight

| <i>Year of Bearing</i> | <i>Lbs./Acre</i> |
|------------------------|------------------|
| First | 1,270 |
| Second | 1,665 |
| Third | 2,295 |

These results conclusively demonstrate that not only much higher yields but much increased resistance to diseases such as blister blight can be obtained by continued selection and propagation of new clones. In the case of a clone such as No. 2024 it is obvious that protection against blister blight is quite unnecessary. Similar progress has also been made in the selection of clones resistant to eelworm, a subject which will be dealt with by Mr. Loos during his talk this afternoon.

Now a point of practical importance which has come to the fore in the last year or so. V.P. plants, and to a lesser extent seedlings, are apparently very susceptible to having their stems buried too deeply. Accordingly, when transplanting, care must be taken to ensure that the stems are not buried below the original soil level. Too deep planting holes are a frequent cause of trouble since, when these are filled in, several inches of the hitherto exposed stem may be buried and lead to otherwise unexplained casualties.

Whilst on the subject of transplanting I would like to draw your attention to the new type of transplanter invented by Mr. C. Cameron of Diyagama.

Mr. Cameron is, I understand, here today and I have no doubt he will be pleased to answer any questions regarding his machine during the discussion.

Pruning

When I addressed you at our last Biennial Conference I made a number of not very complimentary remarks about the hard pruning which had been done so extensively in the past and strongly advised you to adopt the light high prune we recommended. Although this advice was extensively followed, a number of you at that time expressed doubts as to whether this lighter type of pruning would run the full cycle. Now fortunately I am able to demonstrate to you by actual yield figures of representative St. Coombs fields that this lighter pruning will run. (Table 3).

TABLE III
St. Coombs Estate

| Field No. | Pruned | Yield Lbs. Per Acre | | |
|-----------|----------|---------------------|-----------------|-----------------|
| | | Months 1—12 | Months 13—24 | Months 25—36 |
| 4 | Nov. '48 | 482 | 753 | 1003 |
| 7 | Jan. '50 | 287 | 1104 | 1063 |
| 8 | Jan. '50 | 491 | 1185 | 1125 |
| 12 | Nov. '49 | 443 | 1017 | 1204 |

All these lighter pruned fields have given over 1000 lbs. acre in their third year and three are continuing in plucking for a fourth year.

It must, however, be emphasised that fields will only continue to yield, however they have been pruned, if they are given adequate manure. With lighter pruning recovery takes place more rapidly and it is, therefore, important to ensure that your first manurial application goes in earlier in the cycle than was necessary with the old fashioned hard clean prune.

Those of you who have visited St. Coombs recently will have noticed that many of our fields are now pruned on the slope. There is much to recommend this method but let me give you a most serious word of warning. Please, please do not destroy the much improved frames you have so carefully built up over the past few years by cutting away the branches on the lower sides of your bushes in order to get your

slope. Get your sloping table by pruning higher on the upper side of your bushes, followed by rather higher tipping on the upper side. On steep hillsides even a combination of proper pruning and tipping can hardly be expected to give you a fully sloped table in one operation. So please do not be impatient and destroy half the yielding capacity of your bushes for the sake of appearances. Instead please wait for the next prune, when if the previous one was carried out carefully, you should have enough new wood developed to enable you to produce your perfect slope without harm to your frames.

Plucking

With regard to plucking I do not propose to say much today except to draw your attention to the results of our long term fish leaf plucking experiment which completed its fourth cycle last year. In addition to records of yields throughout the cycle, samples showing the amount of maintenance leaf carried and pruning wood developed were taken when the bushes were pruned down at the end of the cycle. The figures obtained are shown in Table 4.

TABLE IV
Fish Leaf Plucking Experiment
4th Cycle, 1949-52, Results

| | <i>Plucking System</i> | | <i>Fish/Normal</i> |
|------------------|------------------------|--------------------|--------------------|
| | <i>(1) Normal</i> | <i>(2) To Fish</i> | |
| | <i>Lbs./Acre</i> | <i>Lbs./Acre</i> | |
| Flush Plucked | 2,207 | 1,993 | 90% |
| Maintenance Leaf | 3,286 | 972 | 29% |
| Wood | 5,830 | 1,617 | 28% |
| TOTAL GROWTH | 11,323 | 4,582 | 40% |

In this cycle the bushes have obviously become so debilitated that even continuous plucking to the fish leaf has not been able to produce more than 90% of the yield given by normal plucking, whilst the enormous reduction in the amounts of maintenance foliage and pruning wood carried by the fish leaf plucked bushes is truly alarming. The results of this experiment should indeed serve as a most timely warning to those who may be tempted to take too much and leave too little for the bush. Let me add that in this experiment we do always leave the fish leaf!

Maintenance and Improvement of Fertility

This shocking example of man-made deterioration naturally leads on to a consideration of the other side of the picture, namely, what are the best ways in which to maintain and improve our existing levels of soil fertility.

Now one of the most important operations carried out in connection with the cultivation of our bushes is that of forking. Accordingly, it would appear to be highly desirable that we should attempt to get a clear idea of how this operation may influence fertility levels. For our part, we at the Institute are becoming more and more of the opinion that, under a good cover of tea and probably only under a good cover of tea with a certain amount of mulch under the bushes, too much deep forking is not only unnecessary but definitely harmful. This opinion is mainly based on observational data but it is fully corroborated by one of our long term field experiment, which shows a regular depressant effect on yields, of about 3 to 4 per cent, to result from thrice yearly cultivation as compared with normal once yearly cultivation. Anyway, in support of our opinion, we are now only deep forking our St. Coombs fields once during the cycle, whilst manure is applied in both rows approximately

every 6 months and dibbled into the top soil by means of short forks with about 4 inch tines. That this forking and manuring system is actually achieving practical results can scarcely be gainsayed in view of the fact that last year St. Coombs estate secured its all time record yield of 952 lbs. per acre.

Thatching with Guatemala grass or loppings is another practice which would appear to hold out considerable possibilities for improving our fertility levels. At the moment we are inclined to favour the use of all pruning leaf, leaf-fall and green manure and shade tree loppings to form a thatch or surface mulch rather than have this material incorporated directly into the soil by means of envelope forking. This again is a matter of opinion rather than a concrete recommendation, but we do feel that the benefits to be derived from a thatch, through its action in protecting exposed soil from undue insolation and in conserving soil moisture, far outweigh those which can be obtained by the direct incorporation of the same amount of organic matter into the topsoil layers. In fact the direct incorporation of green manure into our soils may actually turn out to have the effect of reducing their total humus content, since recent experiments in the U. S. A. with sudan grass have shown that the addition of such an easily decomposable material so stimulates the soil organisms that they do not only attack the added green material, but also decompose in the process some of the more resistant organic matter already in the soil.

So far we have very little in the way of clear cut experimental results in connection with thatching. However, it may be of interest to record that an estate scale experiment, in which Guatemala grass thatching at the rate of 15 tons per acre is being compared with compost of an equivalent nutritive value buried in pits, does show an increase in yield of some 50 lbs/acre in favour of the thatching treatment after one year.

The best time to make use of material such as Guatemala grass, grown outside your fields, for thatching is, of course, at pruning when the maximum amount of bare soil is likely to be exposed. Besides protecting the soil, such a thatch is likely to have a marked effect in suppressing weed growth and so will reduce weeding costs.

Another method of protecting exposed soil and improving fertility is by the use of ground covers. One of the best of these would seem to be *Stylosanthes gracilis*, which is now being tried out with considerable success on a number of estates. Let me quote from a letter we received from the Superintendent of an estate in the Galaha district, who has had an area of *Stylosanthes gracilis* growing in his tea for some two and half years. After taking the trouble to have samples of soil taken from under *Stylosanthes gracilis* and from a similar clean weeded area, analysed, he reports as follows—

"No weeding was necessary on the cover area for the last two years. It has shown itself to be quite prostrate with no tendency to wind in the bushes and very easy to control. The marked improvement in porosity and water retention, combined with the crumb structure, would seem to show that the theory that deep cultivation is needed to aerate the soil is fallacious, while the change in soil colour is evidence that organic matter is metabolised into humus and retained in the soil when the surface is protected, whereas it is largely destroyed when the surface soil is exposed to the elements."

The advantages of a suitable cover could not have been put better and I have nothing to add except to say that on St. Coombs the increase in the earthworm population under *Stylosanthes gracilis* cover is quite phenomenal.

Little time is now left me so I will conclude by expressing the hope that at our next Conference I will be in a position to report that a proper policy of high shade rotation has been put into operation on many more estates than is apparently the case today.