

THE DISTRIBUTION OF BRANCHES AND FLUSH WITHIN A TEA BUSH.

F. R. TUBBS.

The growth of an uncultivated plant from seed to maturity is accompanied by definite and often characteristic changes of form. Tea seedlings, for example, first produce long straight stems which later bear lateral branches at varying distances above the ground level. The more crowded the stand of seedlings, the longer is lateral branching delayed, but given sufficient space for lateral growth, the young tree soon assumes the form of a pyramid. This is due to the fact that the central leader is "dominant" over the lateral branches born upon it, and always surpasses them in height unless its further growth is delayed by injury.

The various methods of pruning adopted to maintain the bush in a shape and size conformable to economic demands act by preventing the bush from attaining too great a height and by attempting to prevent the centre of the bush dominating the outer branches. In other words, pruning and plucking operations are devised to ensure a more equal distribution of growth over the surface of the plucking table. The methods employed are various. The dome-shaped surfaces of a bush towards the end of its cycle is once again reduced to the level surface of a pruned bush, while certain types of pruning seek to encourage the growth of the branches situated near the edge of the bush; in addition during plucking the operation of breaking back is devised to keep the bush level as long as possible.

These methods are, however, only partially successful. Even as early as the tipping stage, more shoots per unit area are produced in the centre of the bush than in areas nearer the edge. This may be observed either on a bush in the tipping stage or by cutting across a bush about three inches above the level of the previous clean prune. This cut being below the tipping level the shoots made at this level at tipping and subsequent to it are exposed to view.

To facilitate an examination of such questions, a wire gauge was made composed of concentric circles having radii of six inches, twelve inches and eighteen inches. This, when laid upon the pruning surface, enabled counts of the number of branches within each zone to be made. From these data the mean number of branches per square foot (or "branch intensity") in each zone could be calculated. The results obtained from a total of 60 cut across bushes show that the branch frequency was highest in the centre zone and fell as the distance from the centre increased. The mean for each zone A (centre) to C (periphery) was:—

A.	B.	C.
22·7	14·9	3·3 branches per square foot.

It would be expected that if this phenomenon is to be ascribed to the tendency of the bush to grow more rapidly in the centre of the bush, the distribution of flush on the plucking table would parallel that already described for tipping shoots. This expectation is borne out by the following figures for number and weight of pluckable shoots per square foot, obtained from 30 bushes 2 years old from clean pruning:—

Zone.	A.	B.	C.
Number of shoots per sq. ft.	5.0	4.1	2.4
Weight of shoots per sq. ft.	0.743	0.536	0.291 grms.

Cohen Stuart, in Java, found that the mean yielding intensity over the whole of the plucking surface is smaller in large bushes than in small bushes. It would appear therefore, considering yield alone, that a large number of small bushes is preferable to a smaller number of large bushes having the same total plucking area. Since, however, the spacing of tea is fixed in all but future clearings, the question arises whether the reduction of average yielding intensity in large bushes is sufficiently great to nullify the effect of the enhanced plucking area. Judging from Cohen Stuart's results, it appears that large bushes yield more than small bushes, though the increase in yield is not proportional to the increase in area of the bush. In 1920, a correlation of 0.683 ± 0.021 was found between the area of the plucking surface and the yield of flush. In 1924 a correlation between area of the pruned bush and the subsequent yield of flush of 0.626 ± 0.019 was found. Thus in general large bushes yield more than small ones.

Since a large pruning area implies a large plucking surface later, the influence of the type of pruning upon the radius of the pruned bush is of interest. The mean radius of sixty bushes each for three types of pruning show that clean pruning results in a definite reduction in the radius of the bush compared to rim lung pruning and cutting across. The values obtaining were 1.35 feet, 1.74 and 1.63 feet respectively. The difference between the latter two types is not statistically significant.

The number and distribution of the branches within the bush is also considerably altered by the type of pruning. The mean number of branches at the pruning surface in clean pruned bushes was found to be 14.0 compared to 22.2 in the case of rim lung and 70.0 in the case of cut across bushes. The distribution of the branches is shown in the following table, giving the branch frequency in each zone:—

Zone.	A.	B.	C.
Cut across	22.7	14.9	3.3
Rim lung	5.9	3.3	1.6
Clean Prune	4.1	3.3	0.7

The effect of the latter types is to produce a much greater reduction in branch intensity in the centre than in the outer zones. In other words they tend to even up the distribution of branches within the bush.