

THE EFFECTS OF HARD PLUCKING

(WITH SPECIAL REFERENCE TO BLISTER BLIGHT)

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Among the diverse cultural methods that the Institute recommends for the control of Blister Blight the most immediately practicable is resort to hard plucking. Experience has shown that at times of severe attack the third leaf of a flushing shoot is particularly susceptible. Before such a leaf has matured sufficiently to make it relatively immune from attack, there is usually ample time for it to pass through all stages of the disease from invisible infection to the production of a large blister actively disseminating spores. Results obtained so far also

show that if the shoot is plucked to the fish-leaf when only two additional leaves and a bud have developed, the number of active blisters is very considerably reduced.

Speaking generally, the tradition of plucking to the fish-leaf is one which has not hitherto commended itself to Ceylon planters; though in other tea areas, notably Assam, it has long been accepted practice. In 1940 an experiment was started at St. Coombs to determine what effect such a system would have on tea under conditions of climate and pruning cycle noticeably

different from those obtaining in N. E. India. This experiment is still in progress and its results have in many respects been surprising. Until a longer period of survey has been undertaken, the more fundamental aspects of the results cannot be interpreted with certainty, but the data from the first pruning cycle of four years are available and can be considered in relation to the new problem that blister blight has created. As far as up-country areas are concerned, *i.e.*, at elevations above the critical 3,000-3,500

during the limited periods that such treatment is likely to be necessary.

The first noticeable effect of plucking two leaves and a bud to the fish-leaf, in comparison with leaving the third leaf was an immediate increase in yield. This occasioned no surprise, because the time of development of the flush was shorter on fish-leaf plots and more pluckable flushes were produced in a given time even on the same plucking round of nine days. This was subsequently confirmed by a flush count.

TABLE I
Cumulative Yields of Plucking Experiment
Comparison of Fish-leaf and Single-leaf Plucking

Date	Round	Cumulative Yield lb. per acre			% Difference (on single)	
		Fish	Single	Difference		
	Pruned	September 11-12	1940			
	Tipping	1	January 22	1941		
		2	March 7	1941		
		3	March 26	1941		
	Last Round	September 7	1944			
1941	April 22	10	74	66	8	12.1
	July 21	20	276	218	58	26.6
	October 21	30	610	444	166	37.4
1942	January 17	40	888	702	186	26.5
	April 18	50	1346	968	380	39.4
	July 17	60	1716	1258	458	36.4
	October 15	70	2026	1448	578	39.9
1943	January 13	80	2440	1728	712	41.2
	April 13	90	2638	1832	806	44.0
	July 12	100	2928	1994	934	46.9
	October 11	110	3224	2184	1040	47.6
1944	January 7	120	3614	2462	1152	46.3
	April 7	130	3978	2726	1252	46.0
	July 6	140	4292	2950	1342	45.5
	September 7	147	4428	3024	1404	46.4

feet that forms the upper limit of danger from carbohydrate deficiency, the results are definitely reassuring. They suggest that though hard plucking may go against the grain of tradition, it is unlikely to have any harmful effects on the vigour of the tea

It was of considerable interest that this superiority in yield persisted throughout the pruning cycle, and that at the end of four years nearly fifty per cent more crop was harvested from the fish-leaf plots than from the normal single-leaf plucking.

The progress of the experiment is shown in Table I where the cumulative yields are set out at intervals of ten pluckings (ninety days) throughout the cycle.

There has always been an opinion that hard plucking reacted adversely on yields during the following two or three months. Such may be the case if, in addition to hard plucking, bad plucking with loss of buds prevails, but this experiment gives no support to the view that so far as yield is considered, hard plucking prejudices future crop. For two years after plucking commenced, the fish-leaf plots continued to gain on the others though at an even decreasing rate, till, during the last eighteen months a stable increment was achieved roundabout 46 per cent.

The second visible effect of hard plucking was a progressive diminution of individual flush size on fish-leaf plots. By the time the field was eighteen months out of pruning, this diminution was very noticeable. To confirm this a sample period of five rounds was chosen and flush counts were taken from all plots. From these and the dry weight yields two data of interest were derived, (1) the weight of the average individual flushes of both types, and (2) the average number of flushes plucked per round. These are given in Table II and show that flush size on fish-leaf plots had diminished by about 30 per cent. The derogatory effect on yield that this had was more than counter-balanced by an increase in number of flush to the extent of 80 per cent. A simple calculation shows that had the fish-leaf flush been of smaller size throughout (which was not the case), the yield from fish-leaf plots would still have been about 26 per cent greater. In actual fact, because the diminution in size was gradual, the excess yield at the period of

flush count was about 37 per cent. It may be mentioned here that this reduction in flush size, which gave leaf of rather different type, was accompanied by some falling-off in the quality of the made tea as reported on by the Institute's team of tasters.

TABLE II

Diminution in Flush Size
(Average of 5 rounds):

	Single	Fish
Average Dry weight in mgm.		
individual flush	112	79
Average No. of plucked shoots		
per bush	22	40

Rounds 57 to 61. June 20—July 25, 1942.

The superiority in yield and the diminution of flush size suggested that radical changes in the growth processes of the fish-leaf bushes might be taking place. In particular these results raised the question whether, in order to produce higher yields, the bush was drawing on its carbohydrate reserves. Under the system of fish-leaf plucking the area of foliage remained almost static from the time of tipping. Indeed since leaves grow old and drop off, and since new growth from below the plucking table is limited, it appeared at this period that these bushes were less heavily clad with foliage leaf than at tipping time. They were of course very sparsely covered in comparison with the normally plucked bushes. How efficient old foliage leaf is in synthesizing carbohydrate is not known; by analogy with temperate annual crops, such as the potato, probably not highly so. The doubt recorded above was therefore a real one.

Tests for starch in the roots were accordingly made and were continued at approximately six-monthly intervals for the rest of the cycle. Four sample roots

randomly chosen were taken from each plot, giving 64 roots from each style of plucking. They were stained with iodine which in the presence of starch gives a deep blue-black stain and the intensity was gauged by a scale of marks from 0 to 3. Though this is a crude test, it was judged accurate enough to show the sort of differences that were likely to affect growth. The scores on five different occasions are shown in Table III.

The salient feature of these data is that the differences between fish and single-leaf

about 36 per cent, when compared with the normal plots.

TABLE IV.
Cycle Yields.
lb. per acre.

	Flush	Foliage	Pruning Wood
Fish	4428	1074	9350
Single	3024	2858	17396
Diff.	+1404	-1784	-8046

Summing up these results and relating them to operations during blister blight attack, it is evident that hard plucking has

TABLE III
Starch Reserves in Root.
Total points scored (Maximum possible 192)

Months after pruning	Plucking to		Fish-leaf deficiency
	Fish-leaf	Single leaf	
26	176	181	- 5
32	165	177	-12
37	176	187	-11*
42	186	188	- 2
48	177	187	-10*

bushes were unimportant. Only on two occasions, marked with an asterisk, were these differences statistically reliable. Throughout the observations the roots appeared to have abundant starch reserves.

The main effect on signs of virility that fish-leaf plucking produced was, as previously remarked, a great difference in amount of foliage leaf and a very great falling-off in the amount and quality of the pruning wood. This was given quantitative expression by sample-pruning at the end of the cycle, followed by weighments of the foliage leaf picked off the prunings and of the residual woody branches. Table IV gives the yields of the three categories, flush, foliage and pruning wood. When all these are totalled there is revealed a loss in growth on fish-leaf plots amounting to 8,426 lb. of dry matter ;

no immediately harmful effect on the bush as regards yield, but just the opposite. Only after prolonged hard treatment do signs of deterioration begin to show. The first is diminution of leaf size, and the second the reduction of pruning wood. At no stage was there any sign of depletion of stored food reserves. After pruning in 1944 the fish-leaf plots were not prejudiced in their recovery and those that in accordance with an alteration in the scheme of treatment, have been restored to single-leaf plucking, show a ready response and grow good wood.

The indications are that plucking to the fish-leaf does no permanent harm so long as the bush has already built up its canopy of foliage leaf. During two or three months in the year it may be necessary to pluck hard in order to control blister blight. When

the severity of attack is checked by the combined effect of this treatment and improvement in weather, ordinary plucking can be recommended.

At mid and low-country elevations the risk of depleting starch reserves is naturally

greater than at the elevation of St. Coombs, (4,500 feet) but this experiment shows how little foliage leaf is required to keep a bush actively flushing. Whilst therefore greater care will be required at lower elevations, limited periods of hard plucking should be quite innocuous.