RELATION OF COARSE PLUCKING TO QUALITY OF MADE TEA.

By

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The present time seems to be appropriate for a realization of the importance of a high standard of plucking if Ceylon teas are to maintain their pre-war position in the world's markets. That good tea cannot be made from bad leaf is a dictum that is apparently ignored in planting circles today, if one is to go by the evidence collected in factory advisory work. It is discouraging to note that the knowledge acquired by research and experience all these many years is escaping the attention of many. No doubt the planter is beset by many difficulties, but there appears to be little justification for the production of stalky and fibrous teas. It would appear that one reason for this state of affairs is the plucker's strong disposition to remove all the leaf that her hands can get hold of. This practice started in the war years when the appearance and quality of made tea was of little importance. Still, it should not be a dificult matter to train the plucker to use her hands judiciously. The time wasted in the fields and factory compound in picking coarse leaf, an operation which it must be admitted removes only a fraction of undesirable leaf, might well be spent in selective plucking. There are some estates where the picking of coarse leaf even goes one stage further. Gangs of labourers are employed in the factory to pick over each batch of withered leaf before it is charged into the rollers and still very little is removed. Manufacture of such leaf then brings on a train of difficulties.

Claims are often made that the good results obtained in certain factories are mainly due to improved factory technique; but, if the matter is deeply investigated, it will be found that the chief contributory cause is a good standard of leaf. It is difficult to spoil leaf except through gross carelessness and it is the writer's belief, based on results obtained from countless experiments carried out on St. Coombs, where practically every aspect of manufacture has been investigated, that variations in manufacturing technique make very slight alteration to the final product. Workers outside Ceylon also support the contention that within certain empirical limits the value of a tea is hardly affected by variations in conditions of manufacture. Obviously then, what matters most is the type of material handled.

That plucking is not being given the consideration it deserves is evident from the numerous enquiries received by the Institute on the subject of flaky teas, plain liquors and dull infusions. Visits to factories where these troubles occurred revealed that the condition was for the most part attributable to a poor standard of leaf. When a simple correction in the field would have achieved the desired results, much time and labour was expended instead in improvising new rolling programmes, altering withers and times of fermentation, but to little avail. There

have been instances where even machinery was blamed for poor results and it is not surprising that in such cases attempts to improve teas by changing the design of battens on roller tables have failed. The large measure of success achieved on estates where due attention is given to field operations emphasizes the advantages of good plucking.

It is not intended to lay the full blame on plucking for the falling standards in quality on many estates. Much can be done in the factory. The system of bulk buying in the war years has naturally led to a considerable lowering in the standard of manufacture. Those estates which sold their teas on contract were, of course, likely to be least concerned about manufacture. The return to freer trade with the re-opening of the London market will undoubtedly focus greater attention on this recently neglected branch of the industry ; but the fact remains that, unless there is a better realization of the influence of the standard of plucking on the made tea, there is little reason to hope that improvement in the methods of manufacture alone will raise the standard of quality.

To understand the significant bearing that coarse leaf has on quality, quite apart from its contribution to ' reds ' and fibre in the made tea and ' floaters ' in the cup, it may be as well to make first a brief reference to the chemical and physical composition of a tea shoot.

Dr. Evans (1) has shown that as ' tannin '* forms the major portion of the water soluble constituents it is without doubt one of the chief factors influencing quality. The range of variation of the ' tannin equivalent ' in the different parts of the shoot is shown in Table 1.

Table 1. *Values of the ' tannin equivalent ' in various parts of the tea shoot.*

Part of Shoot	' Tannin equivalent '
Bud and first leaf	20
Second leaf	14
Third leaf	13
Main leaves	11
Fish leaves	12
Stalk between 2nd and 3rd leaves	9
" " 3rd and main leaves	7
" " 4th and 5th leaves	4
Green stem	4
Hard stem	2

The effect of coarse plucking is very well illustrated by these figures and needs no elaboration. Considering that as leaf gets older the bigger it is in size it is not difficult to see why good teas cannot be made from a pluck with a preponderance of coarse leaf.

Dr. Tubbs, in his article on plucking standards (2), has provided more than sufficient information on the composition of crop harvested. In his own words he summarises the position as follows :—" A good plucking standard must be one in which the proportion of ' normal ' (two leaf) shoots is as high as possible, and, as an interim standard it is suggested that an average of at least 75 per cent by weight of two leaf shoots be sought ". How far estates are away from this rule of practical guidance will be seen from the figures (Table 2) obtained in an analysis of flush, which by present day standards would be considered normal.

* *More correctly the tea catechin complex*

Table 2. *Percentage composition of plucked leaf*

Two leaf shoots comprising bud and two leaves, and banji bud plus tender leaves	50%
Third leaves, single leaves, stalk and less tender banji	50%

These figures indicate how widely former recognized standards have been departed from and convey some idea of what would be the effect of coarse plucking on the composition of a pluck. The writer has come across instances where not more than one third of the crop brought to the factory could by any stretch of imagination be regarded as suitable for manufacture. Little wonder then that on most of the estates where plucking was bad profits were low and in some cases nil.

The question that naturally arises is whether to pluck for quality or for yield. As it is the overall profit that matters the answer must inevitably depend on the relation between prices secured and cost of production. On the abundant evidence available there is no question but that teas from coarse leaf realize lower prices in the market than those made from fine leaf. The main thing to be considered, therefore, is whether in the case of coarse plucking the extra crop compensates for the lower prices obtained. As far as experience goes, too fine a plucking standard is uneconomical. At the same time it is safe to say that the other extreme can be no asset as well. The question requires serious examination before a definite answer can be given and it is hoped that the matters now to be discussed will provide sufficient information on this vexed question.

There is a general belief, although there is little scientific evidence to back the belief, that low crops go with good quality and *vice versa*. There is nothing further from the truth than this statement. Selection work on St. Coombs has shown that some of the best high yielding clones have produced teas much above the average in quality. Then again there are estates where, by the application of well balanced manures in conjunction with sound cultivation and regular plucking rounds, not only are high yields obtained but good teas also made. In contrast it is not uncommon to find low yielding properties making the poorest teas. From this evidence alone the only inference that can be drawn is that it is the composition of the pluck which is the most important factor affecting the quality of the leaf.

That coarse leaf is associated with long plucking rounds no one will deny. It is well nigh impossible to get over-developed shoots with short rounds, unless of course healthy bushes are allowed to become high and what is not plucked on one occasion is taken for manufacture the next time harvesting is done. Bushes react in a similar way to a very forcing climate. These are exceptional circumstances which do not explain the increasing tendency on the part of many estates to pluck at long and irregular intervals. Many reasons are given, but they all centre round plucking costs. The policy apparently is to pluck as much as possible on each occasion and this can only be done by allowing longer intervals between pluckings. It is argued that in this way less labour is needed and yield increased. It may indeed be asked whether this is true.

Opinion is still divided on the relative merits of long and short plucking rounds in relation to yield. Unpublished work, carried out by the Plant Physiology Department over a considerable period of time on the effect of frequency of plucking on yield, throws some light on this disputable point. The experiment was primarily drawn up for the purpose of determining the influence of the length of round on the chemical composition of the flush. However, valuable data on yield were collected as well. The fresh weight of flush harvested from bushes of a high yielding clone, plucked at weekly and fortnightly intervals, was recorded. At each plucking all broken back material between the third leaf and one leaf above the fish leaf, whether tender or not, was also weighed. The results are set out below (Table 3) :—

Table 3. *Effect of weekly and fortnightly plucking on amount and composition of material harvested*

Plucking interval	7 days	14 days
	gms.	gms.
Weight of flush—(Bud and two leaves)	12,887	8,709
Weight of broken back material	2,233	3,740
Total	15,120	12,449

The figures given above are the totals obtained after 88 pluckings for the weekly round and 44 for the fortnightly. That crop is reduced considerably by the longer round is indicated quite clearly by these results.

Without entering into any controversy the results of another experiment (3) carried out on St. Coombs on the effect of plucking on a fourteen day round as against a seven day round may be cited. The difference in yield over a period of forty eight weeks was in favour of the shorter round and highly significant. There is one aspect of this experiment which calls for emphasis. The standard of fineness of plucking was the same for both treatments and was attained by a large amount of breaking back and removal of hard banji for the longer round. Had such leaf not been rejected the fresh weight yield would have obviously increased, but it does not follow that the dry weight outturn would have been proportionately increased. A point apt to be overlooked is that more refuse tea would have been produced. Considering also that the yield of the seven day round was 25% higher than that for the fourteen day round it is open to doubt whether the inclusion of the leaf in question would have resulted in a higher yield for the longer round.

Before examining the influence of coarse plucking from the manufacturing point of view it must be pointed out that in the experiment just referred to no significant difference was observed in the teas made. It has also been found in India (4) that there is no difference in quality between two leaves and a bud plucked above the fish leaf and two leaves and a bud plucked leaving a leaf above the fish leaf. Besides, it has been shown (5) that there is no statistical difference in the chemical composition between leaf from bushes plucked at weekly and fortnightly intervals. From these results it may be concluded that, so long as the physical composition of the pluck is the same, there is no connection between the age of a pluck and the quality of the tea. The maturity of the pluck exerts a marked influence only when leaf from a long round, that should normally be discarded, finds its way into the factory. Not only is such leaf tough and hardened but with it also goes the over-grown stalk that produces the so-called 'reds' in tea.

The most serious problem arising from the manufacture of coarse leaf is without doubt the elimination of 'stalk'. It is of such magnitude that various machines are put on the market from time to time for ridding the tea of this undesirable feature. Yet none of these, to the writer's knowledge, has shown much promise and the extraction of stalk still goes on by hand, perhaps, aided of late by a new device employing the suction principle. It must be added that the cost of picking is an expensive item in any factory and has to be weighed against any saving in plucking costs likely to accrue from coarse plucking if overall profit is to be considered.

The next biggest effect is the marked increase in the outturn of the off-grades and waste tea. The percentage obtained is a true reflection of the standard of plucking and may be so high as to cause no little loss in the working of an estate. But, remarkable to say, the responsibility for this bad result is more often than not laid on manufacture, which is at the same time blamed for the production of open

leaf. It is no coincidence that in factories where coarse leaf is handled withers are invariably soft. The reason is not far to seek. If the tough leaf is to be withered at all withering must be prolonged but, if this is done, the tender shoots would suffer and so there is no alternative but to knock down the leaf as soon as the latter is ready. Thus a very uneven wither is obtained and it is no exaggeration to say that in such circumstances a considerable proportion of the leaf is in fact green. However carefully rolling may be carried out on such leaf it will never twist and flaky tea is bound to result. Quite apart from this effect the liquors will be light because sufficient pressure can not be applied without the showing up of too much stalk and fibre. To strike a balance between liquor and appearance under these conditions becomes a formidable task and manufacture, from being the straightforward process that it is, begins to be complicated. Infusions also become duller, a natural contribution from coarse leaf, and whatever is done is ineffectual in the end.

Experimenting with leaf similar in composition to that described in Table 2, significant differences were observed between the two fractions despite the fact that the fraction consisting of the harder leaves was not coarse in the real sense of the word. Table 4 gives the data showing the sort of effect produced.

Table 4. *Comparison of tender shoots and coarser leaves as taken for manufacture*

	Tender portion	Coarser portion
1. Percentage outturn of made tea to withered leaf	44	40
2. Percentage outturn of dhools	93	84
3. Percentage outturn of big bulk	7	16
4. Percentage outturn of grades	97	86
5. Percentage outturn of off grades, inclusive of broken mixed	2.5	7
6. Percentage outturn of waste tea, inclusive of pickings	0.5	7
7. Total percentage of off grades and waste tea	3	14
8. Percentage outturn of graded tea (off grades inclusive) to green leaf	18.3	17.4
9. Average valuation for the four main grades (B.O.P., Pekoe, Fannings and B.P.)	Rs. 1.82	Rs. 1.56

A glance at these figures is sufficient to show the benefits arising from a good standard of leaf. If the percentage of refuse tea is considered high when it exceeds 3% and that of broken mixed abnormal if more than 5%, the figures given above show what conditions can be on estates where a high proportion of coarse, hard leaf is plucked. Such teas, if graded on methodical lines, may produce even as much as 30% of off grades. It is not, therefore, hard to imagine the position when an estate is confronted with the problem of coarse plucking and has at the same time to produce certain predetermined outturns of grades. More often than not a set of conditions is imposed that in actual practice is unworkable if true grades are to be obtained. And the problem becomes more acute if the outturn of Broken Mixed Tea is limited to a ridiculously low figure that can only be associated with a high standard of plucking. The appearance of every grade, bad as it already is on account of stalk, fibre and open leaf, will then have to be further sacrificed in order to keep the outturn of off-grades as low as possible. All grades thus become diluted with leaf that should normally go as Broken Tea, Fannings, No. 2, Dust No. 2 and B. P. No. 2.

That a good class of leaf pays dividends is evident from the results of the experiment just described. The tasters, to whom these teas were submitted for report, were of the opinion that the teas from the coarser portion were very much inferior to the others in appearance, quality and infusion. In colour and strength

they were appreciably worse. The difference of 26 cents in valuation may not appear large but it must be pointed out that these teas were valued at a time when the market had declined by 60 cents in the short period of two weeks. Had market prices been on a higher level the difference in values would have been still greater and it is not difficult to visualise what the margin of preference would have been on a rising market at the height of the quality season when characteristics such as flavour and pungency are present and highly priced.

The results are worth reflecting upon by those who hold the view that it is more profitable to increase crop with the aid of coarse leaf rather than by selective plucking on shorter rounds. From what has been considered so far with regard to the influence of the length of a plucking round it has been shown that, for the same standard of fineness of flush, the reduction in crop for a longer round is so substantial that it does not offset the lowered cost of plucking. It would appear therefore, that the only practical advantage that could be gained from the lengthening of a plucking round is that leaf that should normally be rejected is included in the crop. From the figures given in Table 3 it will be seen that, even with the inclusion of broken back material, the total yield in the case of the longer round was less than the weight of the two-leaved shoots alone from the shorter round. Had some of the tender leaves not been broken back, but allowed to develop larger before being removed, a gain in crop would have resulted but whether this extra coarse leaf would have made up for the difference in yields between the shorter and longer rounds is difficult to say.

Assuming that under such conditions yields are the same, it is quite obvious that cost of production will be lower for the longer round but it must be remembered that the class of leaf so plucked would be of a lower standard than that obtained from the shorter round. In the present state of knowledge and absence of reliable data it would be rash to say which method would pay better. A fuller study is most desirable and indeed necessary if the economic aspect is to be considered but the fact remains that loss of crop is not likely to result from plucking at short intervals.

It is not the purpose of this article to weigh the relative merits of short and long plucking rounds. They have been brought into the discussion chiefly with reference to the part they play in the composition of crop and to the manner in which a longer round contributes to the production of coarse leaf. Of greater importance from the standpoint of manufacture, however, is the type of coarse leaf produced from feeble bushes and which is easily recognizable by its tough, leathery character and size. Such leaf is far coarser than the third leaf from a shoot from a long round and hardly withers. These old leaves are no doubt taken because there is little to pluck on the surface and the deeper the plucker's hands enter the bush the coarser becomes the pluck. The effect of such leaf on the made tea is too familiar to many to merit description.

Time was when it was the practice to pluck leaf that was young and soft. Former plucking systems can not, it is said, be adopted today because of the difficulty of getting pluckers to pluck to a certain standard. Can it not be said equally that one of the chief contributory causes of a poor class of leaf is a low yielding bush ? Given a bush that is vigorous, the plucker will have less temptation to search for leaf below the plucking level. Better leaf will thus be plucked and a higher yield obtained without stripping the bush and wasting energy. The answer to bad plucking undoubtedly is not so much more supervision in the field but more intensive cultivation.

Sufficient has been said of the overwhelming importance of plucking as a factor influencing the finished product and it only remains to add the viewpoint of a broker with twenty seven years' experience in the trade. The position cannot be summed up better than by quoting the late R. H. Horne's own words (6) on this question :—" The shorter route to better tea is essentially through the standard of plucking.....You can spend a lot of money on machinery or factories and you may, or you may not, make better tea, but if you improve your standard of plucking you can be confident of an improved product."

References

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