

THE PRINCIPLES OF MANUFACTURE

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At the outset I wish to state that the subject of my talk today is not how to make tea. So much has been written in the last two decades on what to do and what not to do in tea manufacture that this science — call it an art if you like — is no longer a closed book to most planters. What I propose to talk about are general principles and not whether you roll your leaf four times or continuously, or fire your teas on a slow or quick pulley. Specific problems there are, I do not deny, but the biggest single factor which contributes to the character of a tea is the quality of leaf from which it is made.

The overwhelming importance of plucking as a factor influencing the finished product was stressed in great detail in my last article in the "*Tea Quarterly*." It only remains to add that since the publication of this article a long-term experiment, comparing a 7 day plucking round with a 14 day one is being carried out at St. Coombs. The teas from these two treatments have been so dissimilar that one tea taster in fact remarked that he could hardly realize that they came from the same estate, let alone from the same field. You will be surprised to hear that even flavour, that rare characteristic which is so highly valued, is affected by the standard of plucking.

The extent to which leaf influences every stage in manufacture is, however, not clearly apprehended by many planters. An uneven wither can be traced to poor leaf; low dhool outturns can be due to coarse leaf; a dull infusion is a natural contribution from bad leaf—light rolling and low temperatures will not improve infusions from coarse leaf, as is generally imagined. A plain liquor and poor appearance are two other contributions from leaf of a low standard. But for all that if you look up any tea taster's glossary you will find that except for stalk practically every undesirable characteristic in a tea is supposed to result from incorrect withering, or incorrect rolling, or incorrect fermentation, or incorrect firing, or incorrect sorting. This, I believe, has lulled many planters to a false sense of security so much so that if something goes wrong with their teas they imagine it is in the factory and nowhere else. When a simple correction in the field would in some cases have automatically solved the problem, futile efforts are made instead, in devising new manufacturing techniques.

Now for manufacture proper. One of the primary elements of successful manufacture is factory organization no matter how high or how low your standard of plucking may be. Organization simply means an orderly arrangement of different operations. It does not mean merely keeping your driers fully loaded or the collection of a vast amount of figures. The real essence of proper organization is a system of control which ensures consistent results day after day. If a factory is well equipped as regards machinery and withering-space, there is no excuse for haphazard manufacture. And by haphazard manufacture I refer mainly to the following :—

- (1) Lack of intelligent anticipation of the amount of withered leaf to be expected.
- (2) Unweighed roller charges (believe me this is still being done in some factories), or charges measured by baskets.
- (3) Delays in rolling and roll-breaking.

- (4) Depending on the uncertain availability of rollers and roll-breakers.
- (5) Driers running empty, or delays in firing owing to lack of control in the rolling room.
- (6) Overcharging of rollers in order to work driers at their maximum capacities.

I now come to the next important consideration in manufacture, namely, factory hygiene. It is just as important *eliminating harmful bacteria in manufacture* as keeping foreign matter out of the tea. Cleanliness should be the watchword particularly in our rolling rooms. Fresh air and fresh water, and plenty of both are the only ingredients required.

As regards withering, which is really nothing more than a preparation of the leaf for rolling, the fundamentals to be observed are correct temperatures and thin spreading. So much stress has been laid on dry bulb temperatures and hygrometric differences that the wet bulb temperature of the air is often ignored. This temperature is also important as it governs the temperature of the leaf. The thinner the leaf is spread the quicker and more even is the wither and this fact should, when space permits, not be lost sight of whatever may be the apparent saving in labour resulting from thicker spreading.

In rolling the main thing to be observed is satisfactory circulation of the leaf under pressure whether applied from the top with a pressure cap or laterally with the less familiar E.P. fitting. To make the best of the leaf adequate pressure is necessary for twisting it and rupturing the cells. The importance of circulation of the leaf in the rollers need hardly be emphasized.

Fermenting of the dhool adds only colour and smoothness to the liquor. According to experimental evidence a serious loss of quality occurs after about 4½ hours and liquors are too green and raw up to about 2½ hours. In practice it will be found that if fermentation periods of the different dhools and of big bulk lie within this range there is no fear of under-fermenting or over-fermenting leaf under the conditions obtaining in Ceylon tea factories.

Firing happens to be a process which is taken too much for granted. Exhaust thermometers are rarely looked at, and I know of quite a number of factories that even do without these important instruments. The exhaust temperature is the only guide to correct firing and this statement applies to final firing as well. Yet how many estates are there that really observe any principle in the final firing of their teas? In the absence of moisture apparatus what guarantee is there that the correct amount of surplus moisture is driven off? Final firing, it must be remembered, only checks deterioration that has started in the tea. It does not bring back the original properties of a tea; it is important, therefore, that every precaution be taken to prevent teas from absorbing too much moisture after they have left the drier.

In grading the main principle to be followed is the taking out of true grades considering not only the size but appearance and liquoring properties as well because it is all these features which go to make any particular grade. That is to say, grades must conform strictly to their trade names. The practice of merely chopping up teas to produce grades such as B.O.P. and B.O.P. Fannings, for instance, only results in a marked lowering of the general standard. Good grades cannot be specified entirely by mesh size.

An outline of manufacture will not be complete, I am sure, without some reference to factory records. Percentage dhool outturns can be most misleading and convey no meaning unless the size of the dhool is taken into account. A 20 per cent dhool through a No. 4 mesh is obviously altogether different from a similar outturn through a No. 6 mesh. The amount of rolling leaf receives can, therefore, not

be gauged by figures alone. Another meaningless term in manufacture, in the sense that it does not measure the degree of wither, is percentage wither. All that it does is to indicate the amount of moisture lost in withering. Of what use is this figure to anybody unless the moisture content of the green leaf is known? The rational and only way of describing the extent of a wither is by calculating the percentage outturn of made tea to withered leaf. The period of fermentation can also lose much of its significance if there is no information on the period of fermentation of each dhool. A 2½ hours fermentation with an overall period of 2 hours is certainly not the same as a 2½ hours fermentation with a charging interval of 40 minutes. The percentage outturn of made tea to green leaf is yet another figure from which nothing can be inferred if arbitrary deductions are made for surface moisture in wet leaf and for waste in the fired tea. I have taken just four points from factory records that strike me as most unreliable when interpreting results.

To sum up, if you have good leaf, you may have short withers or long withers, hard withers or soft withers, long rolls or short rolls, and still make a good tea. But you can easily spoil that leaf by failure to observe what I regard as the five cardinal principles which are: organization, hygienic conditions, even withers, good circulation of leaf in the rollers and the correct moisture content of the made tea. These I consider to be the main factors other than the leaf which can either make or mar a tea. The period of fermentation is not so important. In short, an understanding of the principles is not enough unless you take into consideration the quality of the leaf as well.

Genetic variations in the leaf, commonly referred to as Jat, are, of course, difficult to correct. That these exist to a marked degree is beyond question. Those of you who have made a study of the characteristics of some of the individual bushes on your estates will no doubt have found some startling differences—infusions from the greenest you can ever imagine to that much sought-after “bright as a new penny look” and liquors that may taste like boiled cabbage water or leave your gums tingling long after they have been sipped. A high proportion of unsatisfactory jat can defy all attempts to improve teas. In such a case the only advice I can give is to develop some favourable characteristic inherent in the leaf. It may be appearance, infusion, colour, strength or pungency. If none of these is present, replanting with suitable material is the only solution.

One final word. Do not be misled by results obtained from isolated experiments. With the poor facilities available in commercial factories for strict comparison between one treatment and another you might find yourself backing the wrong horse. Tests over a prolonged period are necessary before a logical conclusion can be drawn. Even then dangerous and false ideas may be inferred.

There is no hard and fast rule in tea manufacture — there never can be — but I hope that the principles I have enumerated will lead to a better understanding of what takes place after the leaf has left the plucker's hands.

REFERENCE

1. KEEGEL, E. L. — Relation of coarse plucking to quality of made tea. “*Tea Quarterly*” Vol. XXII, Pt. III, pp. 112, 1951.