

THE FIRING OF TEA.

(REVIEW.)

An interesting article by Mr. C. R. Harler, dealing with the firing of tea in North-East India, appeared in the *Quarterly Journal of the Indian Tea Association* (*Quarterly Journal, Indian Tea Association*, 1930, 66-74). In view of the great attention which is now being paid to the question of the proper firing of the tea in Ceylon it is appropriate to bring the contents of this article to the notice of planters in general.

Harler explains that firing inactivates the Yeasts, and other Micro-organisms present in tea, and checks the loss of soluble matter which takes place during fermentation. Firing does not stop all chemical changes, since some changes which result in the mellowing or maturing of tea still proceed in the dry tea.

Some aroma is lost during firing, especially if there is any stewing of the leaf.

The drying of the tea should be carried out gradually, so that moisture is removed from the surface of the fermented leaf at the same speed as the moisture will travel from the centre of the leaf to its surface. In modern tea driers this is attained by submitting the moist fermented leaf to a blast of comparatively moist, warm air to start with. The partly dried leaf then travels into a region where it meets with progressively hotter and drier air so that an even drying of the leaf results. Harler points out that if the bye-passes fitted to some driers are open, then dry hot air passes direct on to the moist fermented leaf and case-hardening of the tea occurs. In the experience of the writer this is only too true, and, in passing, I should like to point out that in my opinion these bye-passes are not only detrimental and wasteful of heat but also useless. In many cases the hot air does not actually come in contact with the leaf at all but it escapes along the edges of the top trays, thus wasting heat. This is the case with a tilting tray machine as anybody can test if only he determines the temperatures near the edges of the top tray.

Fermentation should be stopped as quickly as possible once the fermented leaf enters the drier, otherwise flat teas will be obtained as a result of stewing. If the temperature just above the top tray is about 100°F flat teas are obtained, but if the temperature is about 120°F the teas will keep their pungency and briskness, and there will be no loss of tannin bodies during firing. The temperature below the top tray must be about 140°F in order to get a temperature of 120°F above the leaf on the top tray. The temperature of the leaf should then increase steadily through the machine.

It is necessary to heat tea to a temperature near 170°F otherwise it will not keep in storage, and it is suggested that 180°F should be

the minimum temperature of firing for North-East India. It is pointed out, however, that temperatures as low as 200°F have given teas with a "touch of fire" when dry teas are submitted to this temperature, and dry teas kept at 180°F for half-an-hour are reported as being "dry" although they do not exhibit high firing characteristics. Higher temperatures than 180°F result in loss of quality, but in rush periods it is preferable to raise the initial temperatures to 200°F or even more to discharging tea with a high moisture content, or allowing the exhaust temperature to drop below 120°F.

If the machine runs empty then the temperature of the exhaust air will rise, and it is advisable to reduce the time of fermentation of the next dhool so as to prevent a gap if possible. If the moist leaf meets a temperature of around 140°F it will be case hardened, and it will have poor keeping qualities.

Tea is liable to pick up moisture once it has been fired, especially during the storage operations. The moisture content may rise to 7 or 8 per cent, and tea with such moisture content should be final fired before it is packed. The final firing should be carried out between 120° and 150°F but it is very important that the tea is not dried too far. Observations made at St. Coombs indicate that Harler has even under-estimated the amount of moisture which tea can pick up after firing, as will be seen from the following figures in Table I.

TABLE I.
Moisture Contents of tea after firing.

	% Moisture.
After firing	2.73
Next day before sorting	4.7
B.O.P. after sorting	6.4
B.O.P. for packing	7.6
Flowery Pekoe after sorting	5.7
" for packing	9.1

The question of absorption of moisture by made teas has been well treated by Deuss, and reviewed in this Journal (*Tea Quarterly*, 1928, 1,) by Mr. Petch. The existence of this article seems to have been overlooked by planters in general, but I suggest that a search for it in the earlier numbers would be well worth the trouble.

In a previous article on the "Factory requirements for the making of good tea" (*Quarterly Journal, Indian Tea Association*, 1929.) Harler points out that the capacity of firing machines given by the makers refers to working temperatures of 210-230°F. Since it has been found that a firing temperature of 180°F is the most satisfactory as far as quality of the tea is concerned, firing machines working at the lower temperature have not the capacity stated by the

makers. The capacity can be increased by speeding up the fans, but the net result is a capacity somewhat lower than that rated. The drying capacity of a machine varies as the square of the fan speed, and it is safe to increase the fan speed a little above that stipulated by the makers.

In considering these two articles it must be borne in mind that firing practice in Ceylon differs from that in North India in two important respects: (a) Harder withered leaf is used for rolling and fermenting and (b) Firing is carried out in one operation in Ceylon.

These differences, however, are quite immaterial when the capacity of the machines is stated in terms of moisture evaporated per hour. From this point of view the above statements are applicable to Ceylon conditions, and the results of my investigation of a good number of drying machine supports Harler's conclusions which are summarised below:—

- (1) Tea must be heated to a temperature near 170°F if it is to have good keeping qualities.
- (2) The optimum temperature of the inlet air should be 180°F; in my opinion this can be increased to 195°F.
- (3) The temperature of the exhaust air from a drying machine should be 120°F.
- (4) Teas should leave the drier with 3 per cent of moisture and be packed with 6 per cent of moisture. In this connection teas may be turned out with 4.5 per cent moisture in Ceylon during the dry weather season when flavour is the most important factor, but in the wet weather 3 per cent should be aimed at.
- (5) Dry teas absorb moisture very quickly during sorting.
- (6) Teas containing more than 6 per cent moisture will not keep well.
- (7) Teas containing more than 6 per cent of moisture should be final fired before packing.
- (8) Final firing should be carried out between 120° and 150°F, but the tea should not be dried too far, otherwise it will not mature properly.
- (9) Firing machines in general have not the capacity claimed for them by the makers, but this capacity can be increased by speeding up the fans to a certain extent.
- (10) If the inlet temperature of the drying machine is fixed at 180-195°F, the load on the machine, and the time it takes the leaf to pass through the machine must be so adjusted that the exhaust temperature is 120°F and the tea turned out contains 3-4 per cent of moisture.

D. I. EVANS.