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EFFECT OF PERIOD OF FERMENTATION ON THE LIQUORING CHARACTERISTICS OF MADE TEA

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A study was made on the effect of the period of fermentation on the quality, colour, strength and overall valuation of made tea. As fermentation proceeds the quality decreases while the colour and strength increase.

Tea obtained by a modified procedure of fermentation was compared with that obtained by the traditional method and the former was preferred to the latter by the Taster.

INTRODUCTION

Fermentation is an important stage in tea manufacture. The liquoring characteristics of the tea could be, to a large extent, controlled by this stage. One of the parameters widely used to control fermentation is the period of fermentation. This is the interval between the initiation of rolling and the commencement of drying, of a batch of leaf. The period of fermentation widely practised at present varies from 1 to 3 hours. During the quality season short periods are given so as to pre-preserve quality, but the teas so produced lack sufficient colour and strength. On the other hand, long periods are given during the non-quality season, resulting in teas with good colour and strength but with little quality.

The magnitudes by which the liquoring characteristics vary with the period of fermentation, for different dhools, were investigated and a modified procedure of fermentation based on the results obtained has been compared with the traditional method of fermentation.

EXPERIMENTAL

The dhools for this study were extracted using a mixed rotorvane-orthodox programme (De Silva *et al.*, 1964). They were fermented on concrete tables in the rolling room humidified with centrifugal humidifiers. The average temperature of the rolling room was around 20°C (68°F) and the relative humidity was about 95%.

In the first experiment samples of 1½ pounds were taken from each of the dhools at regular intervals, corresponding to periods of fermentation ranging from 1 hour to 7 hours, and dried in the experimental drier (Keegel, 1962). The dried samples of dhools were individually hand sieved and the grades of BOP and BOPF were obtained. This experiment was repeated five times.

In the second experiment a total of 30 pounds of dhools was taken from a batch, in proportion to their respective dhool percentages. The sum of the 1st and 2nd dhools was in the region of 55—60% that of the 3rd and 4th dhools was in the region of 30—35% and the biff bulk was 10%. These dhools were given a period

of fermentation of 2½ hours in the conventional manner and dried. This was taken as the control while a similar quantity of dhools was taken as above for the treatment. In the treatment the 1st and 2nd dhools were dried at the end of a period of fermentation of 1 hour. The 3rd, 4th and the big bulk were dried at the end of a fermentation period of 4 hours. In the control as well as treatment, the fired teas were bulked, graded and the grades BOP and BOPF were obtained. The experiment was replicated 13 times during May to July 1975, which was part of the non-quality season of the Dimbulla District.

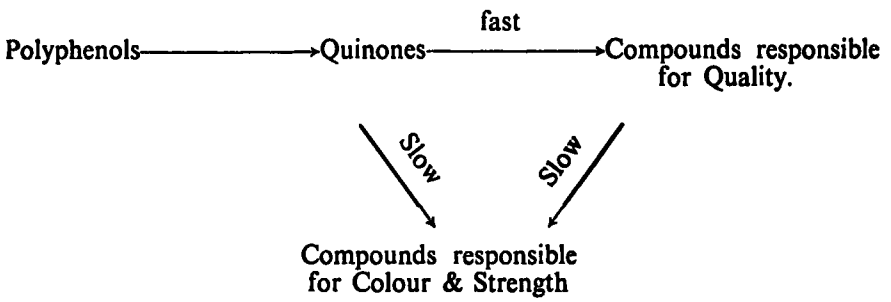
The BOP and BOPF samples were tasted by the TRI Taster according to the scheme suggested by Keegel (1959).

RESULTS AND DISCUSSION

The variation in colour, strength, quality and overall valuation of the made teas with period of fermentation for the different dhools is given in Figs. 1, 2, 3 and 4. Each point in the graph is the mean of five replicates.

Maximum quality is found in the 1st and 2nd dhools around periods of fermentation of 1 to 1½ hours. The quality of the later dhools starts at a lower value and that too declines. The colour and strength increase with time for all the dhools.

Several schemes have been proposed for tea fermentation (Roberts, 1962 and Sanderson, 1972) and the patterns of the graphs obtained in this study may be explained by the following scheme:



The rate of reaction for the formation of compounds responsible for quality being fast, more quality is formed initially. The concentration of compounds responsible for quality however decreases with time as part of it is being converted to compounds responsible for colour and strength and also because the concentration of quinone, which is being transformed in two directions, decreases. The quality would hence reach a maximum and then decline. This maximum is observed only in the case of the 1st dhool. It is not observed in the case of other dhools, as they are produced after the leaf had been in the rollers for a longer time. While the leaf is in the roller its temperature rises resulting in acceleration of all reactions. The maximum therefore would probably be reached while the leaf is still inside the roller.

From these results it follows that if the maximum quality is to be harnessed a short fermentation of around 1 hour should be given. This is in fact the procedure adopted during the quality seasons in Sri Lanka. This procedure has certain practical difficulties and in addition would generally produce teas which lack sufficient colour and strength. Such a tea may be acceptable to the trade when quaity is predominant, but during the non-quality season however it is desirable that the tea should have sufficient colour and strength.

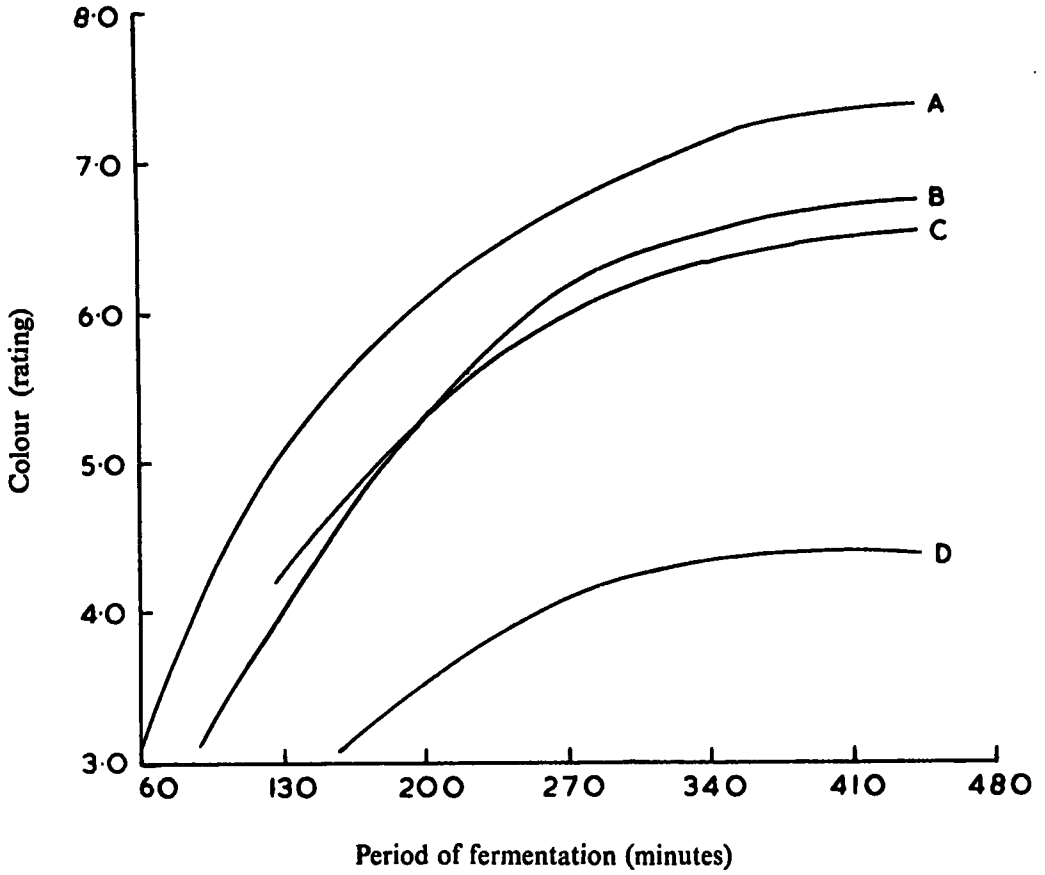


FIG. 1 — *Variation in colour with period of fermentation*
A — 1st Dhool; B — 2nd Dhool;
C — 3rd Dhool; D — Big Bulk;

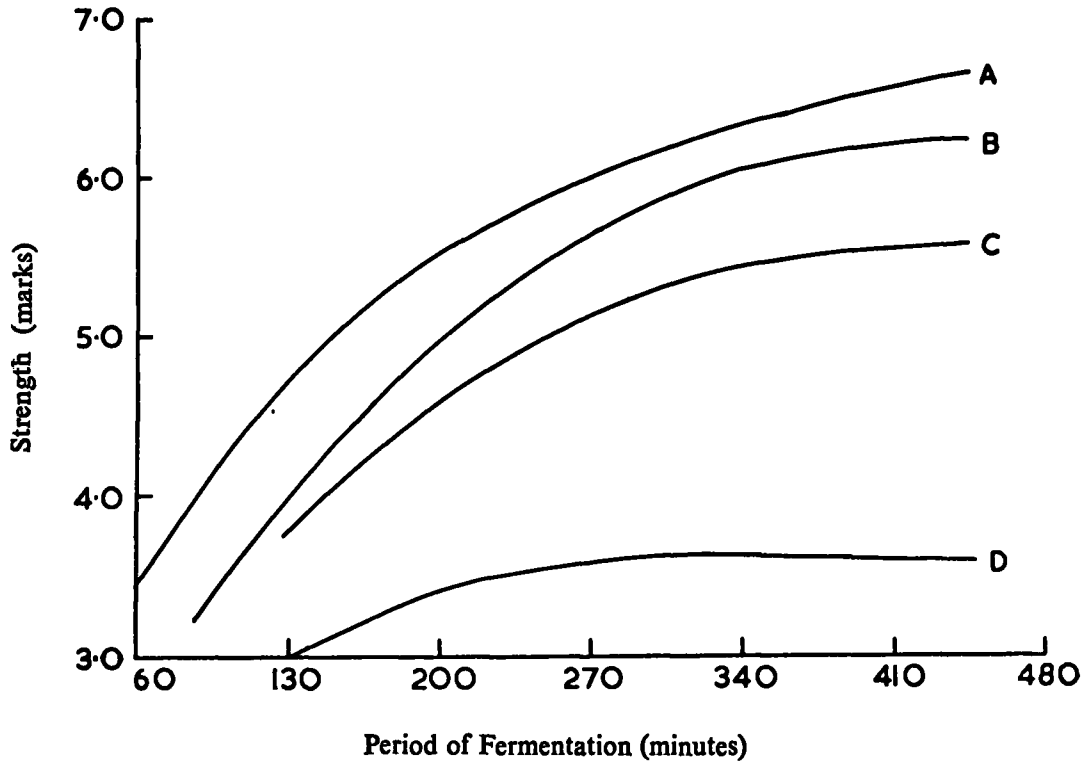


FIG. 2 — *Variation in strength with period of fermentation*
A — 1st Dhool; B — 2nd Dhool;
C — 3rd Dhool; D — Big Bulk.

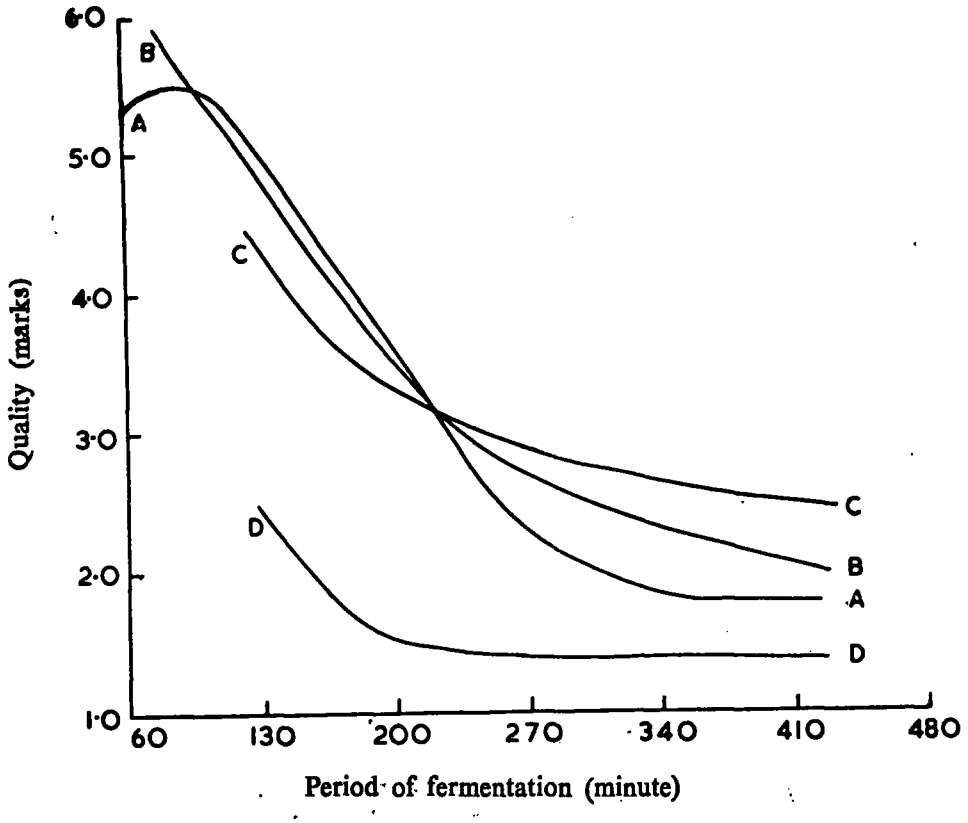


FIG. 3 — *Variation in quality with period of fermentation*
A — 1st Dhool; B — 2nd Dhool;
C — 3rd Dhool; D — Big Bulk.

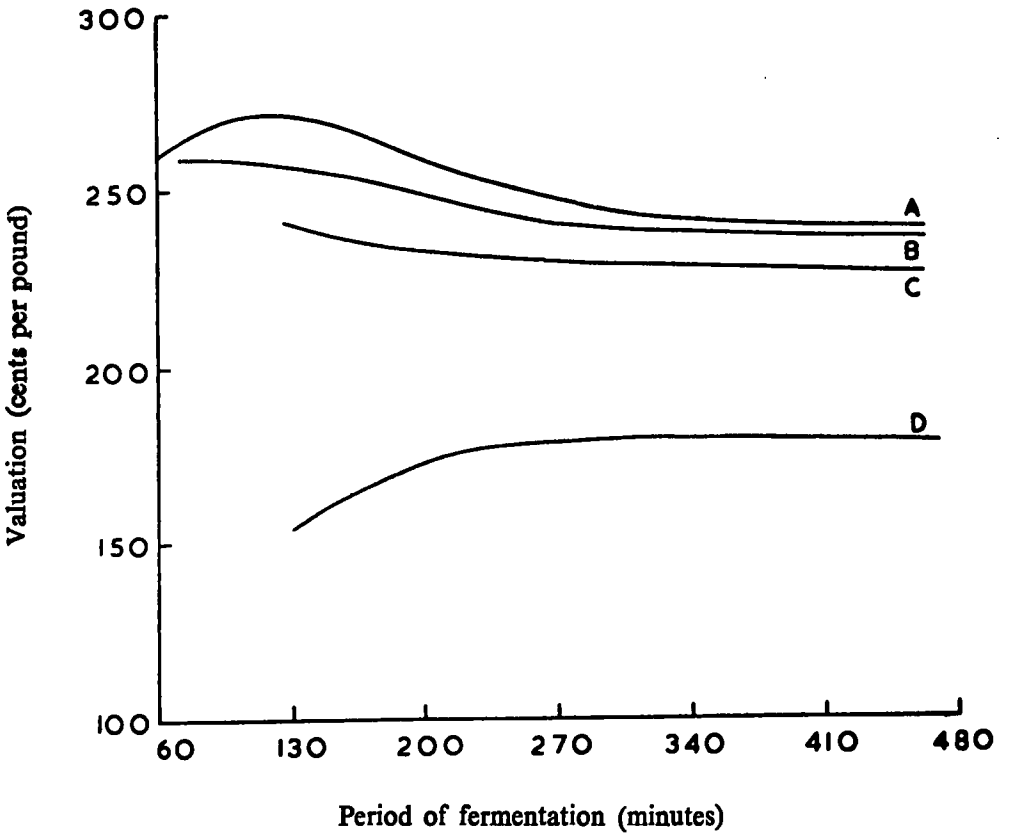


FIG. 4 — *Variation in valuation with period of fermentation*
A — 1st Dhool; B — 2nd Dhool;
C — 3rd Dhool; D — Big Bulk.

In the second experiment the early dhools have been given a short fermentation of 1 hour and the later dhools have been given long fermentation of 4 hours. The Tasters marks for the various liquoring characteristics and the overall valuation between the teas produced by the modified fermentation procedure (treatment) and the conventional procedure (control) are given in Tables 1 and 2.

TABLE 1 — *Mean marks obtained for the liquoring characteristics and the overall valuation in cents per kg for B O P teas.*

		Infused leaf	*Colour*	*Strength*	*Quality*	*Valuation*
Control	...	5.75	5.75	5.52	3.33	739
Treatment	...	5.52	5.04	4.85	4.17	760
L.S.D. (P=0.05)	...	0.17	0.16	0.18	0.18	3.6
L.S.D. (P=0.01)	...	ns	0.22	0.25	0.24	4.8

TABLE 2 — *Mean marks obtained for the liquoring characteristics and the overall valuation in cents per kg for B O P F teas*

		Infused leaf	*Colour*	*Strength*	*Quality*	*Valuation*
Control	...	5.81	5.96	5.76	3.21	748
Treatment	...	5.58	5.27	5.15	4.15	767
L.S.D. (P=0.05)	...	0.11	0.21	0.24	0.08	4.5
L.S.D. (P=0.01)	...	0.15	0.28	0.33	0.10	6.1

The quality of the tea resulting from the treatment is higher than that of the control, while the colour and strength are lower. The overall valuation is also significantly higher than that of the control, thus indicating the overall preference for the tea produced by the modified fermentation procedure. One of the factors on which the results depend on, is the ratio in which the dhools were divided for short and long periods of fermentation. By altering the ratios of the early dhools to later dhools and giving short fermentation for the early dhools and long fermentation for the later dhools, the liquoring characteristics of the final product can be correspondingly altered. The modified fermentation procedure could be easily carried out in factories where two driers are in operation.

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