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SEPARATION OF COARSE LEAF IN TEA MANUFACTURE

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Introduction

In the processing of tea leaf, which comes from diverse sources, various difficulties and problems are bound to occur. Of these, the poor leaf standard could be considered as a major obstacle in producing good quality tea. This paper suggests a simple method to separate coarse leaf in the orthodox-rotorvane type of manufacture.

Leaf standard

Green leaf is the starting material for tea processing. Therefore, it is vital to pluck good leaf to ensure the production of good quality tea. Good leaf is usually defined as the tender leaf, since tender leaf contains more polyphenols, which undergo oxidation during processing and also results in compounds, which contribute to the final quality of made tea. It is well established that the amount of polyphenol decreases with the maturity of leaf.

For processing, it is preferable to pluck two leaf and a bud in the up-country and in the case of low-country, sometimes the third leaf could also be plucked, if it is tender. However, in practice, one comes across a fair amount of mature leaf. This is intentionally done to keep down the cost of plucking, which is the highest component in cost of production. Needless to say, it is far more advisable to leave the coarse leaf in the bush and harvest only the tender portion for processing. However, once this coarse leaf is brought to the factory, the obvious choice is to process it, rather than reject it altogether.

The common orthodox –rotorvane type of manufacture practiced could be summarized as follows (Figure 1):

1. Preconditioning in orthodox rollers for 15 – 20 minutes
2. Pass through 8" rotorvane, roll break and extract about 20 – 25% 1st dhool

3. Pass through 8" rotorvane, roll break and extract about 30 – 40% 2nd dhool
4. Pass through 8" rotorvane, roll break and extract about 30 – 35% 3rd dhool

Big Bulk – 10% (approximately)

P.C – Preconditioning, RV – Rotorvane, RB – Roll Breaker

Usually, the roll breakers with the following meshes are used i.e No. 6, 6 & 7 or 6,7 & 7 or 6,7 & 8

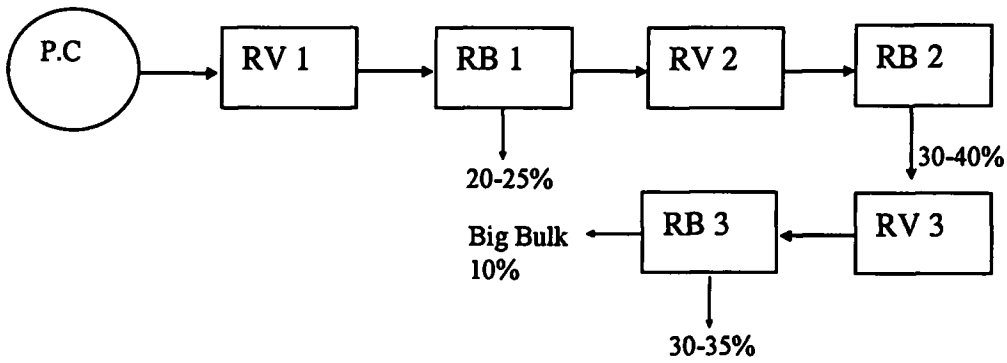

Figure 1

Coarse leaf separation

A method to separate coarse leaf after withering, by fixing a blower under the withered leaf sifter, was tried out but was not considered as being successful. Furthermore, withered leaf sifters are hardly used in factories producing orthodox – rotorvane type of teas.

The coarse leaf could be separated as follows: The rolled leaf discharged from the 1st rotorvane is passed through a roll breaker consisting of mesh sizes No 6, 7 & 4 or 6, 6 & 4. Fine particles (dhool) could be extracted through No 6 & 7 meshes. The fraction coming through No 4 mesh should be sent to the next rotorvane for rolling and dhool extraction. (Figure 2). The fraction over No 4, consists of mainly coarse particles could be collected from each batch and cut again by passing through another rotorvane, fermented and dried, at the end of the day. By this method, the big bulk can be separated after passing through the 1st rotorvane. Coarse particles thus separated would not get over-fermented, as the fermenting rate of these particles is very slow. This is why the big bulk from each batch is collected together and fired at the end of the day, when Fluid Bed Driers are used for orthodox-rotorvane type of manufacture.

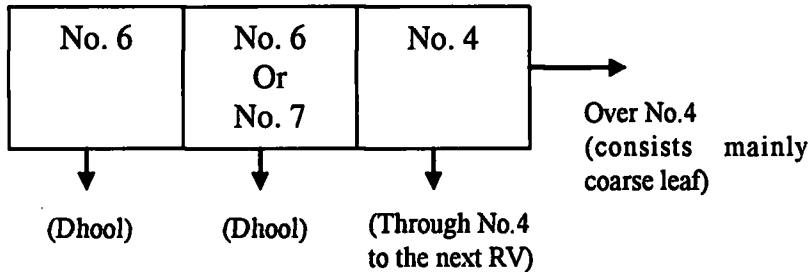

Figure 2

Advantages of separating the coarse leaf

1. Quality of the 2nd, 3rd, 4th (if any) dhool etc would increase, since only the tender portions are sent to the respective machines. Under normal conditions, the particles sent for 2nd roll would consist of tender as well as coarse particles.

2. Cleanliness of the 2nd, 3rd, 4th (if any) fired dhool etc would increase. These dhool particles would consist of minimum amount of stalk and fibre. This would also minimize handling in the grading room and as a result the "bloom" in made tea would be retained.

3. The refuse tea percentage would decrease since the stalk and fibre are removed from the bulk after the first pass. Lately, TRI has been receiving several complaints of higher percentage of refuse tea in factories. This is due to the following two reasons:
   * poor leaf standard
   * excessive maceration in the rotorvane

   Each additional pass in the rotorvane results in a higher percentage of refuse tea, as a result of stalk being converted into fibre (which is easily extracted during drying/grading operations) due to maceration, under normal condition. If the stalk is not converted into fibre, some of the stalk would end up in secondary grades like Broken Mixed (BM).

1. Worker productivity would improve, since the quantity handled would be less, after extraction of first dhool and separation of the big bulk.

2. Wear and tear of the machinery would be less and thus the machinery productivity too would improve.

However, a word of caution should be expressed. The above separation takes place smoothly, when the wither is "medium" i.e 43 – 45% made tea/withered leaf (MT/WL) i.e 55 – 57% moisture. On one hand, if the wither is "soft", some tender

particles would also come over with the coarse fraction. On the other hand, if the wither is "hard" some coarse particles would also come through (No 4 mesh) with the tender fraction. Under these conditions, the coarse leaf separation will not be satisfactory and hence would not serve the purpose.

Some data from experiments carried out are presented in Table 1. From Table 1, it is clear that when the wither is ideal (Treatment 1), the coarse leaf fraction separated over No 4 mesh is comparable to that of the big bulk percentage extracted under control. However, when the wither is soft (Treatment 2) the amount collected over No 4 mesh was higher (20.47 %). Visual observations too indicated the presence of fair amount tender particles in the fraction collected over No 4 mesh.

Fraction collected through No 4 mesh was subjected to three cuts in 8" rotorvane and dhools (2^{nd}, 3^{rd} & 4^{th}) extracted after each cut. Balance left, only about 5 kgs (which is negligible) was mixed with fraction over No 4 mesh, given an additional cut and dhool extracted and big bulk separated. The 2^{nd} dhool thus extracted was treated separately. However, under commercial conditions the fractions over No 4 from each batch could be collected and given an additional cut at the end of the day and the dhool and big bulk could be separated.

Dhool samples were analyzed for chemical parameters and also forwarded to Professional Tasters for organoleptic evaluation. Results from chemical analyses of samples indicated that there was no significant difference in quality parameters (Theaflavin, Thearubigin, colour & brightness of the liquor) between control and treated samples. Tasters' evaluation too did not report any quality difference in first and second dhools, from control as well as treatment samples. But, they preferred the 3^{rd} and 4^{th} dhools from the treatment samples to control. Therefore, it could be concluded that the quality of treatment samples had improved overall.

There was considerable improvement in the appearance of made tea samples as a result of the treatment. This was evident from presence of lesser amounts of fibre in 2^{nd}, 3^{rd} & 4^{th} dhools of the treatment. Presence of lesser amounts of stalk and fibre minimizes sifting room operations i.e minimizes handling of made tea in sifting room. This in turn, will assist to preserve the quality in tea while directly reducing the cost of cleaning of made tea.

Table 1. Experimental data on "Separation of coarse leaf in tea manufacture"

	Green leaf			Withered leaf		Dhool Wt (kg) / %							BB
	Standard (%)		MC (%)	Wither (%)	Charge (kg)	1st	Through No.4	Over No.4	2nd	3rd	4th	2nd	
	Count	Weight											
Control	78.9	76	75.88	45.2	208.7	69.3	-	-	58.35	21.90	18.20	-	34.05
						(34.34)	-	-	(28.91)	(10.85)	(9.02)	-	(16.87)
									Through No.4			Over No.4	
Treatment1	74.9	85.2	75.08	43.5	209	95.6	71.45	36.40	44.70	12.30	10.60	21.70	18.10
						(45.31)	(35.12)	(17.89)	(21.18)	(5.83)	(5.02)	(11.13)	(8.58)
Treatment2	71	80.3	75.41	39.2	225.8	80.35	99.50	46.30	62.95	18.65	16.75	17.60	29.90
						(35.52)	(44.00)	(20.47)	(27.83)	(8.24)	(7.40)	(7.78)	(13.22)

MC – Moisture content
Wither % - Percentage made tea/withered leaf

Figures in parentheses denote percentages