

Use of a Combination of different Mesh Sizes for Roll-breakers in Orthodox Tea Processing for Quality Improvements

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Introduction

- **Sri Lanka world renowned for Orthodox Tea**
- **All Low Grown Tea Factories Produce Orthodox Teas**
- **Low Grown Tea Factories contribute 59 % for the total production**



Introduction contd..

- **Most of these factories operated under capacity of green leaf**
- **High competition for intake of green leaf**
- **Quantity and Quality depends on the price paid for green leaf**
- **Price/kg green leaf depends on Net Sale Average**



Introduction contd..

- **Factory Owners, Managers and Factory Staff concerned on enhancing the NSA**
- **Hence, used mesh No. 3 & 4 combination for Roll-breakers for extraction of all dhools.**
- **Aim:**
increase% FBOP / FBOPF1, PEKOE1 / PEKOE
and decrease % - OP / OPA



Experiment Objectives

- **Study the grade percentages of FBOP, FBOPF1, PEKOE1, PEKOE, OP and OPA**
- **Optimize the Grade Mix by using the combination of mesh No 03 and 04 in Roll Breakers**
- **Depending on results to make a fresh recommendation (Recommended Mesh No 4)**



Experimental Approach

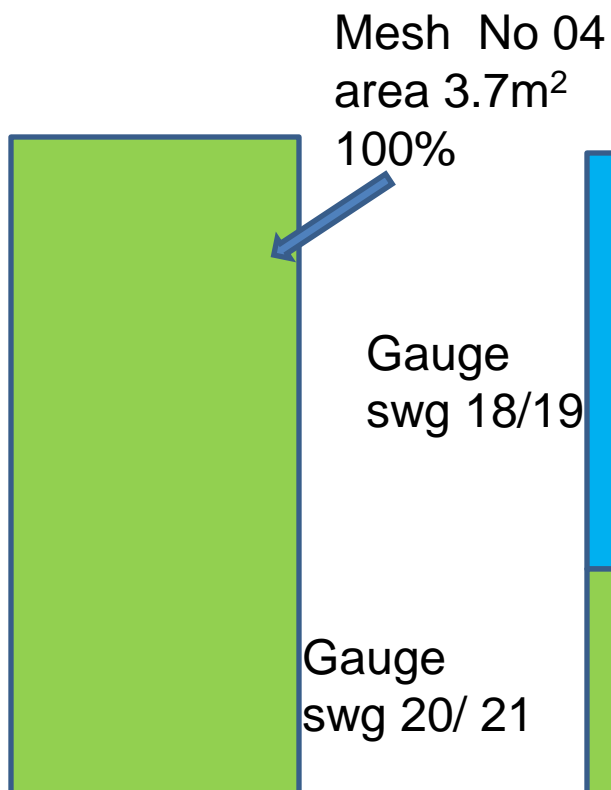
	1 st Dhool	2 nd Dhool	3 rd Dhool	4 th Dhool
Treatment 01	No. 04	No. 03&04	No. 03&04	No. 03&04
Treatment 02	No. 03 & 04	No. 03 & 04	No. 03 & 04	No. 03 & 04
Control	No. 04	No. 04	No. 04	No. 04



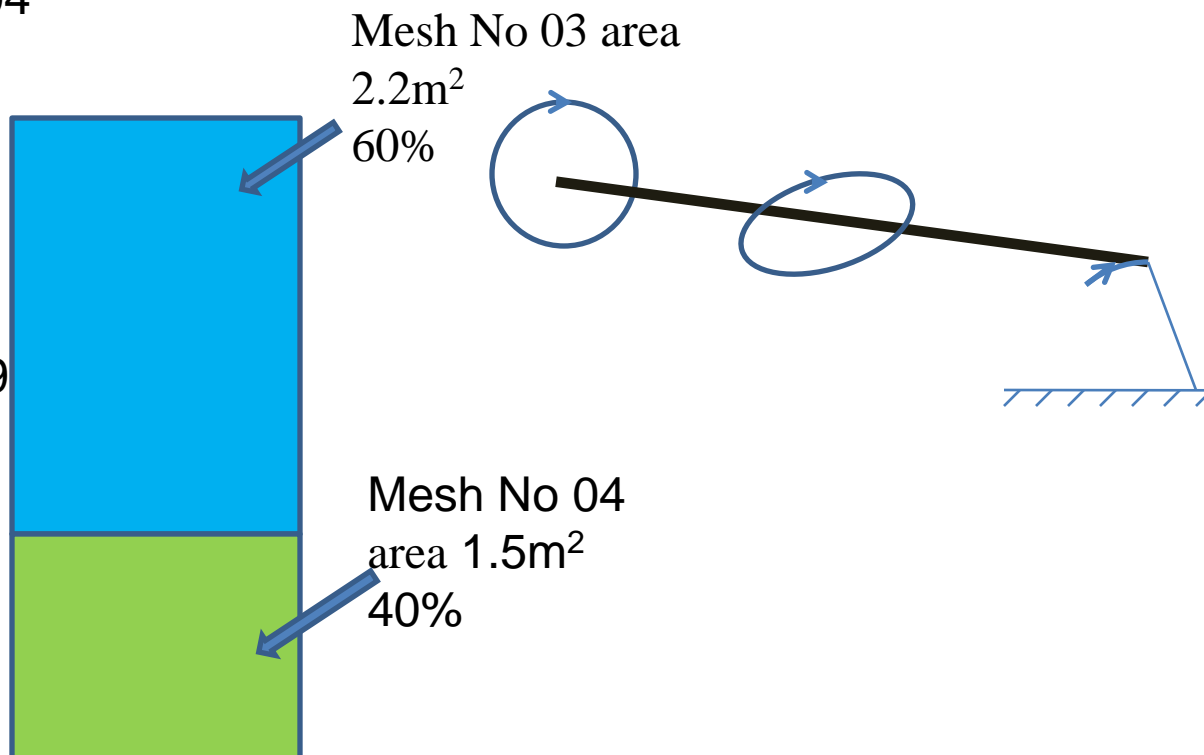
Experimental Approach contd..

Roll Breakers

Mesh No. 4



Mesh No. 3 & 4



Layout of the Design

B1	T1	C
B2	T1	C
B3	T2	C
B4	T2	C

B – Block, T – Treatment & C - Control



Statistical Analysis of data

- Partial incomplete block design (PIBD)

Parameters

Block size	= 2
No of blocks	= 4
No of treatments	= 3
No of rep per treatment	= 2
Associate Classes	= 2



Methodology

- 1. Two identical 70 ft withering troughs were selected.**
- 2. Troughs were loaded at the rate of 2.5 kg GL/ sq.ft.**
- 3. The standard of Green Leaf – bought leaf very poor**
- 4. Entrusted same conditions for both troughs during withering**
- 5. day 2- first two batches taken as Control / Treatment for rolling**
- 6. A 50 minutes charging interval was adopted between two batches (Control/Treatment)**
- 7. Maintained the hygrometry difference below 3° F**



Methodology contd..

The following Rolling Programme was adopted

**Initial Charge- 2X 270 kg withered leaf two 2 X 47" Rollers
No pressure application - 20 minutes rolling
Extract 1st Dhools**

**2nd Rolling – Bulk into 2X 47" Rollers – 20 minutes rolling
with touch pressure 5 ON / 5 OFF
Extract 2nd Dhools**

**3rd Rolling – Bulk into 2 X45" Rollers- 20 minutes rolling
with pressure 5 ON / 5 OFF
Extract 3rd Dhools**

**4th Rolling – Bulk into 47" Rollers- 20 minutes rolling
with light pressure 5 ON / 5 OFF
Extract 4th Dhools**



Information Recorded.

The following information was recorded

- 1. Green Leaf - weight, moisture content, standard of leaf**
- 2. Withered Leaf - weight, moisture content**
- 3. Weight of Wet Dhools and Big Bulk**
- 4. Dry Dhools - weight , moisture content**
- 5. Weight of Graded Teas**
- 6. Weight of Refuse Tea**



Wet Dhool Percentages

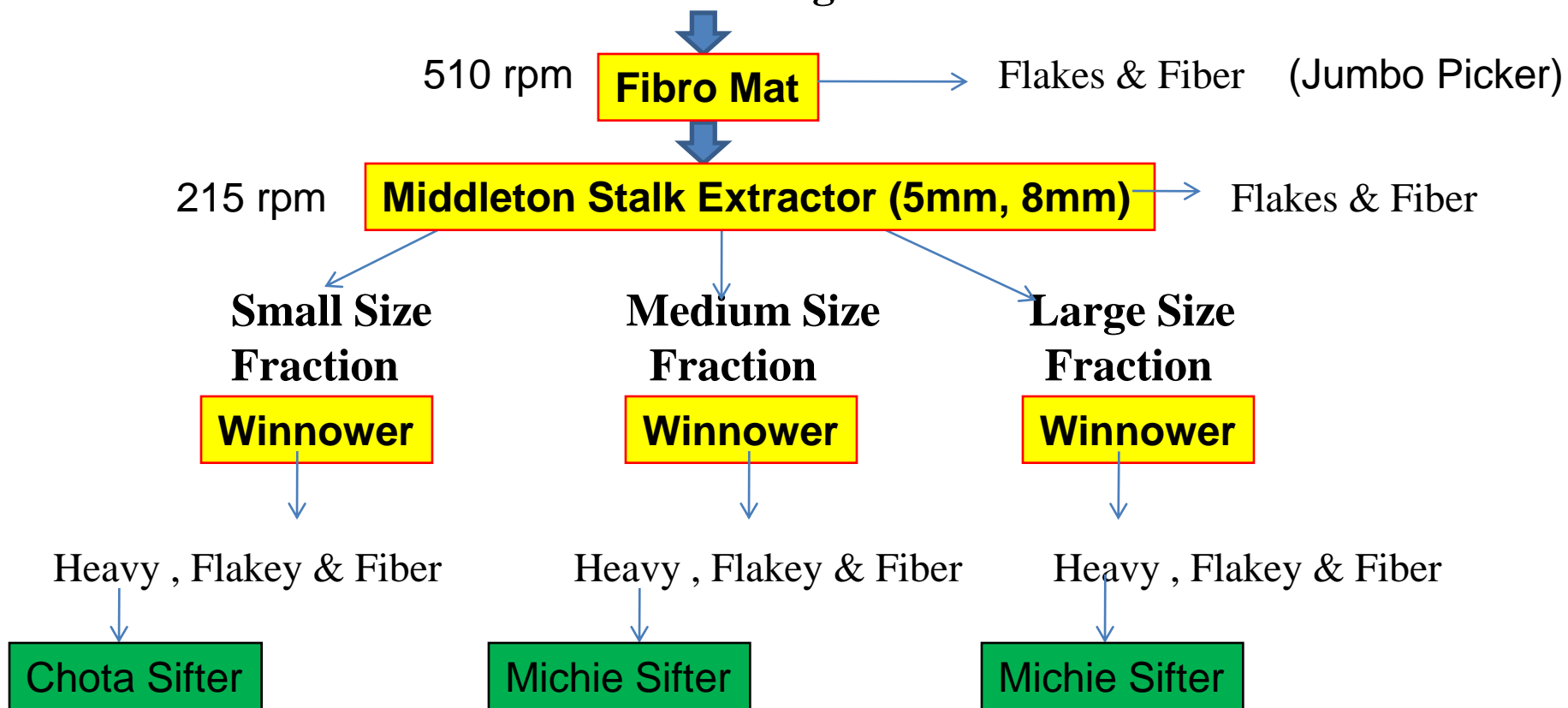
Dhool	Control %	Treatment 1 %	Control %	Treatment 2 %
1 st	5.7	6.0	5.1	9.0
2 nd	14.2	17.8	12.6	14.6
3 rd	14.7	17.1	14.9	18.1
4 th	12.5	15.6	13.8	16.5
Big Bulk	52.9	43.5	53.6	41.8



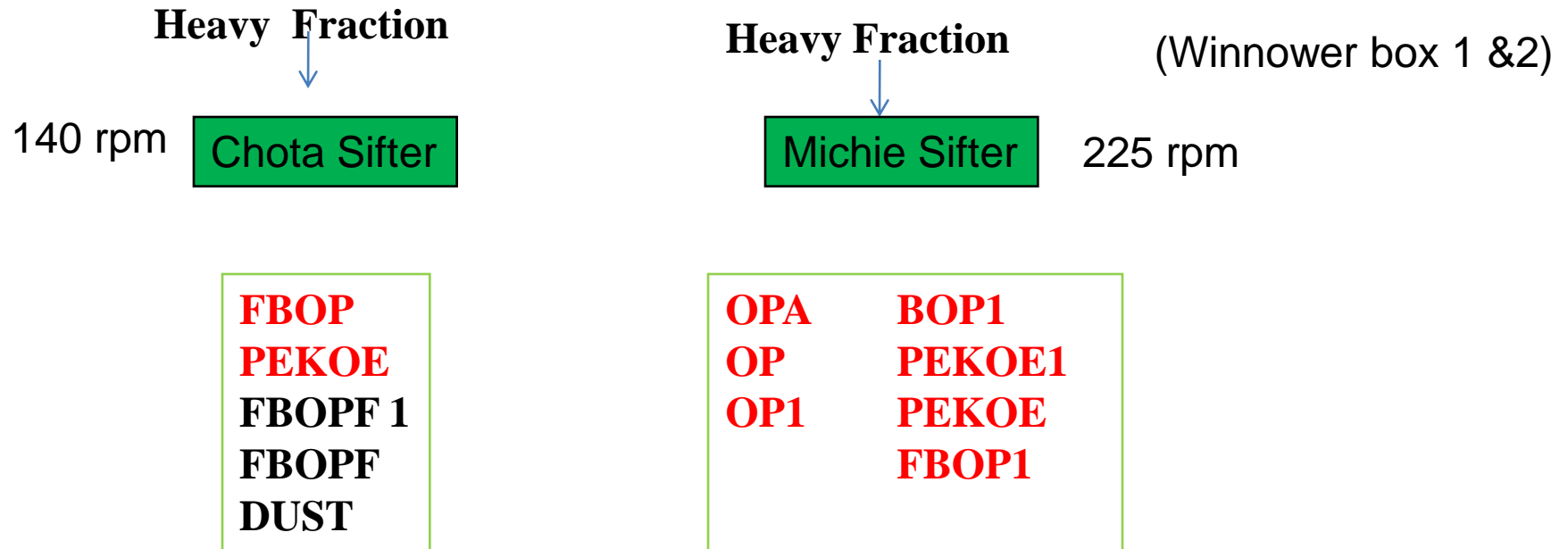
Methodology contd..

The fermented dhools and Big Bulk, Control/Treatment, were dried -

The Following Grading Procedures were adopted
Fired Dhools/ Big Bulk



Methodology contd...



All grades marked in red colour

Middleton Stalk Extractor

To enhance the evenness



Methodology contd..

Small Size Flakes from Winnower Box 3



Chota Sifter

**BOP 1A
FBOPF 1
FBOPF
DUST**

Small Size Flakes from Winnower Boxes 4,5 & 6



Chota Sifter

**BOP 1 A
BOP
BOPF
DUST**



Methodology contd..

**Large & Medium Size Fraction –
Flakes from Winnower Boxes 3 ,4,5 & 6**

Tarry Nipper 48 rpm

Middleton Stalk Extractor (5mm, 8mm)

Small Size Fraction

Chota Sifter

**FBOP, FBOPF1, FBOPF
BM , BOP 1 A
BOP, BOPF
FANNINGS, DUST**

Large & Medium Size Fraction

Tarry Nipper

Middleton Stalk Extractor (5mm, 8mm)

Large & Medium Size Fractions

Refuse Tea

Process continued until all grades and refuse tea separated



Methodology contd..

- **The graded tea samples were cleaned by hand picking.**
- **100 gm of cleaned tea samples from control (25 Nos.) and treatments (25 Nos.) from each replicate were sent for two Tasters for valuation.**
- **Statistically analyzed the treatment effect with respect to grade percentages and overall treatment effect with respect to FBOP, FBOPF1, PEKOE1, PEKOE, OP & OPA grades**



Discussion

Main & Secondary Grade Percentages

Grades	Control %	Treatment 1 %	Control %	Treatment 2 %
FBOP /FBOPF1	17.80	19.33	17.52	17.44
PEKOE /PEKOE1	21.28	23.87	23.02	22.42
OP / OPA	12.10	10.57	11.48	12.22
OP 1	2.54	2.66	2.17	2.34
BOP 1	5.90	5.31	7.93	7.29
FBOP 1	0.46	0.27	0.35	0.24
FBOP F	6.74	7.34	10.20	9.77
TOTAL	66.82	69.35	72.67	71.72



Discussion contd..

Main & Secondary Grade Avg. Prices

Grades	Control Rs/kg	Treatment 1 Rs/kg	Control Rs/kg	Treatment 2 Rs/kg
FBOP /FBOPF1	477.54	482.57	428.45	432.69
PEKOE /PEKOE1	401.16	403.23	378.04	377.31
OP / OPA	374.67	388.83	379.86	378.47
OP 1	511.62	467.31	427.88	431.40
BOP 1	489.65	497.25	426.63	436.75
FBOP 1	652.78	694.44	575.00	604.17
FBOPF	414.80	415.88	416.46	431.49
Average	431.83	435.28	403.61	406.91



Discussion contd..

Main Grades Sale Averages

	Control	Treatment 1	Control	Treatment 2
Main Grades Rs /kg	432.72	444.67	416.05	423.35
Main Grade %	41.18	44.42	40.58	41.43
Standardized Price for Main Grades Rs / kg	439.82	451.97	438.84	446.52

**Prices: Standardized for Rs. 400.07
- Low Grown Elevation Average**



Calculations for Standardization

Rep 1 Control

Average Price= Rs/kg A1

Grade % = B1

Ele. Average= Rs/kg E1

Std Ele. Average Rs /kg 400.07

$$\text{Then Stdzd. Price} = \text{Rs /kg} = \frac{A1 \times 400.07}{E1} = P1$$

Rep 2 Control

Average Price= Rs/kg A2

Grade % = B2

Ele. Average= Rs/kg E2

Std Ele. Average Rs. /kg 400.07

$$\text{Then Stdzd. Price} = \text{Rs /kg} = \frac{A2 \times 400.07}{E2} = P2$$

$$\text{Standardized Price} = \text{Rs/kg} \frac{P1 \times B1 + P2 \times B2}{B1 + B2}$$

$$\frac{\sum_{i=1}^n \{(A_i \cdot E / E_i) \cdot B_i\}}{\sum_{i=1}^n B_i}$$



Main Grade percentages

- **Treatment 1 : use of Mesh No 4 to extract 1st Dhool and Mesh No 3 & 4 combination to extract all other Dhools
– Significant**
- **Treatment 2 : use of Mesh No3 &4 combination to extract 1st,2nd,3rd & 4th Dhools
– Not significant**

Net Sale Average

- **Treatment 1 : use of Mesh No 4 to extract 1st Dhool and Mesh No 3 & 4 combination to extract all other Dhools**
 - Not significant

- **Treatment 2 : use of Mesh No3 &4 combination to extract 1st,2nd,3rd & 4th Dhools**
 - Not significant

Conclusions

- The grades such as FBOP / FBOPF1, PEKOE1 / PEKOE percentages not increased and OP / OPA percentage not decreased by using Mesh No.3 & 4 combination to extract all Dhools
- Use of Mesh No 4 for extraction of 1st Dhools and Mesh No. 3 & 4 combination to extract all other Dhools is an advantage of improving the grade mix.
- Use of above combination with *good standard* of green leaf will further enhance the *Net Sale Averages*.



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Thanking for your
attention



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