



Multi Tray Self Cleaning Sifter (MTSCS) for Grading Low Grown Teas

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Introduction

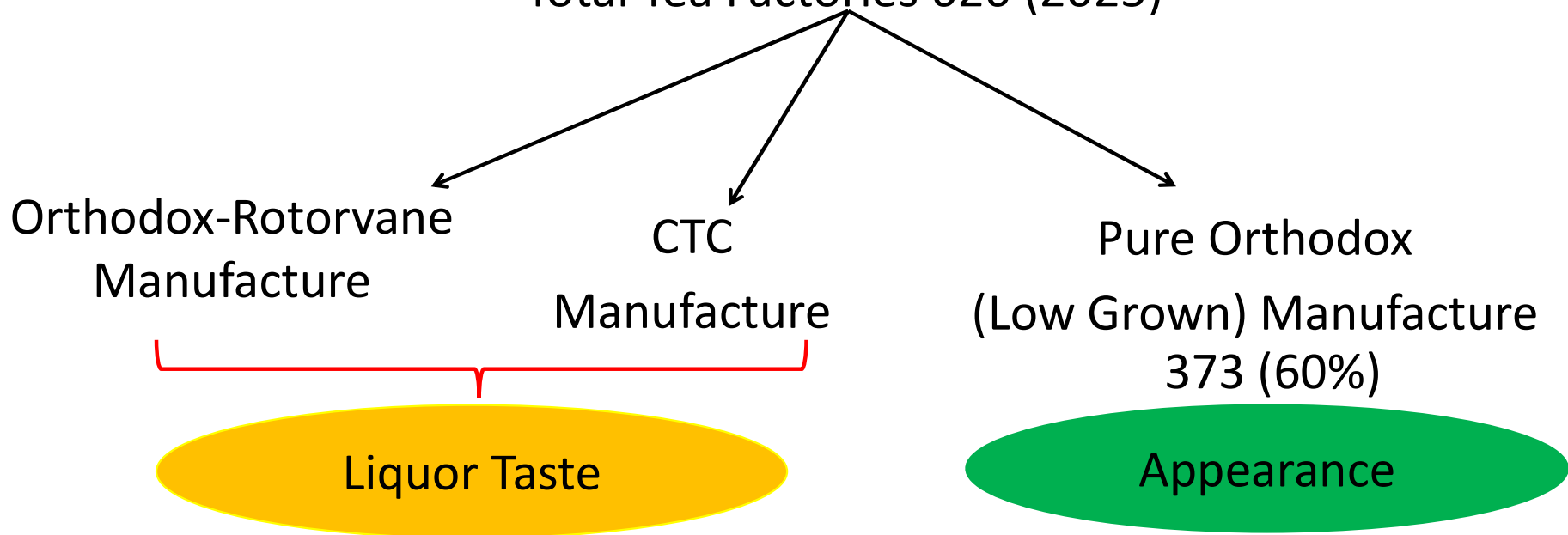
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Introduction

Sri Lankan Black Tea Processing

Total Tea Factories 626 (2025)



Low Grown Tea Grades

OP A
OP
OP 1
BOP 1
Pekoe
Pekoe 1



BOP 1A BP Fngs
BM Dust

FBOPF_{EXSP}
FBOPF_{EXSP1}
FBOPF_{SP}
FBOP
FBOPF 1
FBOPF
Dust 1

Low Grown Tea Grading –
Tedious, Worker Intensive, Skillful Operation

Low Grown Tea – Grade Evaluation

Degree of Twist

Blackness

Cleanliness

Evenness

Tip Content (Certain grades)

Tea Manufacturer's Task

- Enhanced NSA
- Higher main grade percentages
- Minimum secondary grade percentages
- Less off grade percentages
- Higher Net Outturn percentages
- Lower Cost of Manufacturing

Low Grown Teas -Classification



1. Small Leaf Family Grades

FF 1, FF, Dust 01

2. Pekoe Family Grades

Pekoe, Pekoe 1, FBOP

3. Long Leaf Family Grades

OP A , OP , OP 1, BOP 1

Separation of Pekoe Leaf Family & Long Leaf Family tea grades by particle sizes –
Michie Oscillatory Sifters -(Mesh No. 04, 06, 08 & 10)

Low Grown Tea – Michie Sifter Involvement

Minimum of 05 Michie Sifters

- No. 04 Mesh – 01
- No. 06 Mesh – 01
- No. 08 Mesh – 02
- No. 10 Mesh - 01

Michie Oscillatory Sifter

- Single tray
- Oscillation - vertical plane
- Particles jump forward
- Extracts irregular shape particle
- Mainly used for Long & Pekoe leaf family grades



Michie Oscillatory Sifter – Operational Difficulties

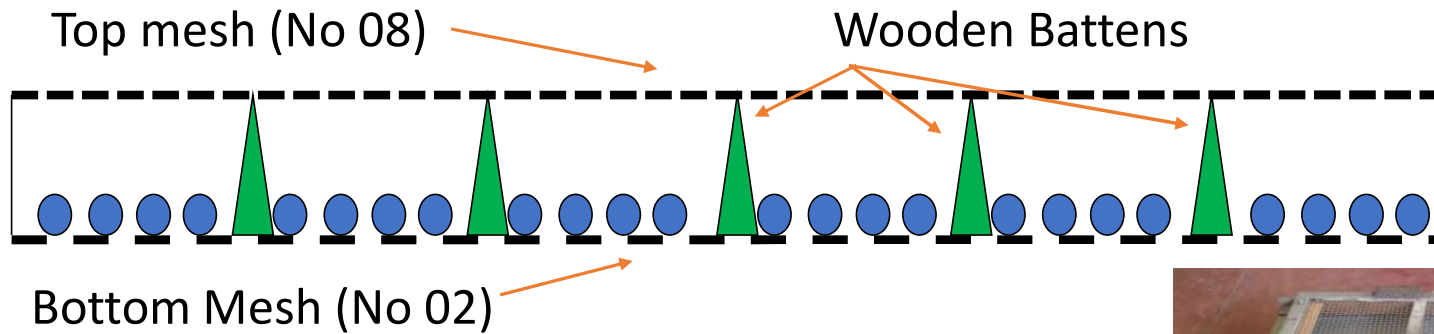
- Continuous clogging & cleaning of mesh
- Sagging of mesh
- Worker intensive
(01- Feeding, 01- Cleaning)
- Less efficiency & productivity
- Difficult to conveyorize/ automate the process

To overcome
the
problem.....

Developed a self-cleaning mechanism for
existing Michie Sifter Mesh

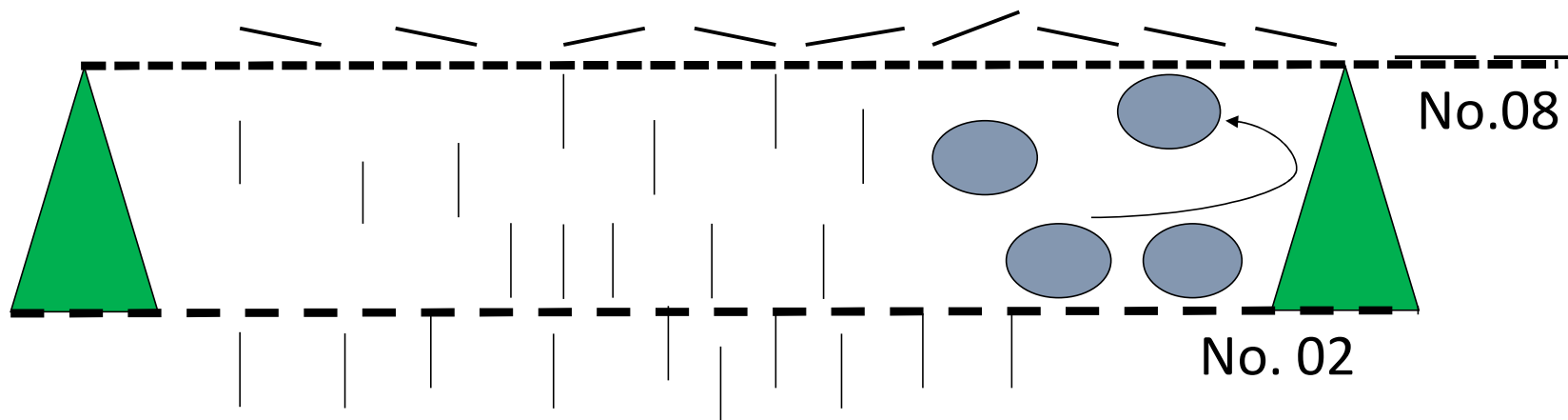
Mechanism:

To introduce a mechanism to dislodge
clogged tea particles continuously



- Top No. 08 mesh
- Bottom No. 02 mesh
- Gap 7 cm
- Separate six compartments with triangular shape wooden battens
- 36 Nos high bouncing food grade balls in each compartment

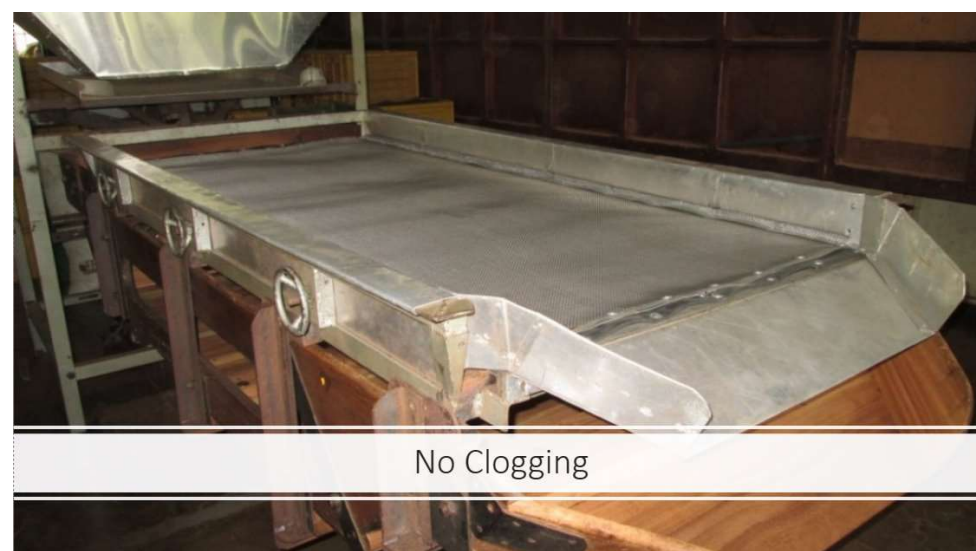
Ball tray arrangement - cleaning mechanism



Due to...

- Oscillatory motion in a vertical plane of the Ball Tray
- Triangular shape of wooden battens.....
- Bouncing balls directly hit the upper mesh
- Continuously dislodges clogged tea particles

Ball Tray Arrangement - Fixed on Michie Sifter (SCS)



No Clogging

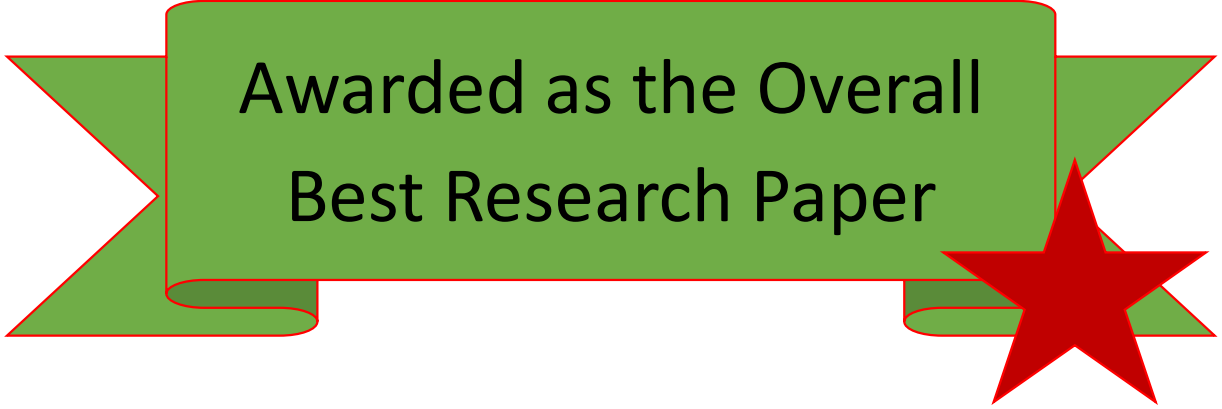


Continuous Operation

Self Cleaning Sifter - Results

Price improvement (Rs/kg)	= Rs. 9.70 (Mesh No. 08)
Impact on NSA (Rs/kg)	= Rs. 1.94
Worker saving	= 01

Presented at 6th Crop Research Symposium



Awarded as the Overall
Best Research Paper

Self Cleaning Sifter..... Way forward

- Successfully tested Self Cleaning mechanism for No 08 mesh
- Planned to introduce into a commercial type triple deck machine for meshes No 04, 06 & 08 together (for long leaf family)
- Initiated a Public Private Partnership (PPP) project funded by the National Research Council (NRC)
- Selected M/s Helix Engineering as the Industrial Partner
- TRI – Research Partner
- Total Project value 1.31 mn LKR
 - 50% NRC
 - 50% Industrial Partner
- The Multi Tray Self Cleaning Sifter (MTSCS) was fabricated at Industrial Partner's workshop



Multi Tray Self Cleaning Sifter - MTSCS

Multi Tray Self Cleaning Sifter - MTSCS





Brewing Innovations
1925 | TRI | 2025



Existing Michie Sifters – Long Leafy Family

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RI
Rising Innovations
1925 | TRI | 2025





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Methodology – Performance Evaluation test

- Obtained fired tea from St. Joachim Tea Factory
- Divided the fired tea into two identical feed samples
- Fired tea samples were graded separately using MTSCS and Conventional Michie sifters
- Recorded final weights of tea grades
- Graded tea samples were evaluated by 03 different professional tea taster panels
- Average of 03 valuations were taken for comparison

Results

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Grade Percentages & Tea Taster Valuations



	Grade (Packing weight –kg)	MTSCS			Existing Michie Sifters		
		Average Percentage Qty (%)	Average Valuation (Rs/kg)	Amount (Rs)	Average Percentage Qty (%)	Average Valuation (Rs/kg)	Amount (Rs)
Main Grades	OP A (26)	35.27	1,010	35,623.32	18.76	1,038	19,462.65
	OP A (20)	6.28	895	5,624.23	3.74	899	3,366.92
	OP (28)	12.06	1,104	13,315.78	9.80	1,180	11,566.08
	OP (24)	3.63	908	3,299.43	2.46	933	2,293.59
	OP 1 (33)	17.94	1,329	23,850.65	27.94	1,092	30,497.74
	OP 1 (30)	2.58	834	2,151.32	5.29	998	5,277.53
	PEKOE (32)	1.78	1,048	1,864.42	0.70	1,114	777.14
	PEKOE (35)	7.05	1,137	8,009.93	4.77	1,176	5,611.54
	PEKOE (28)	1.20	893	1,069.83	0.55	892	491.01
	FBOP (42)	2.72	1,240	3,378.13	5.21	1,196	6,233.79
	FBOP (36)	0.51	779	396.23	2.09	815	1,705.40
	FF 1 (46)	1.89	1,184	2,236.71	4.66	1,125	5,245.04
	FF 1 (40)	1.16	768	893.09	3.38	797	2,690.65
Off Grades	BT (28)	2.07	686	1,420.00	4.52	711	3,209.71
	BM (30)	1.42	728	1,031.78	1.32	717	947.14
	BOP 1A (25)	1.05	742	781.27	1.65	743	1,227.97
	Fngs (42)	0.36	715	259.72	1.06	753	802.01
	Dust (55)	1.02	738	750.09	2.09	786	1,644.36
Average Selling Price (Rs/kg)				1,059.56			1,030.50

Grade Percentages & Tea Taster Valuations -Summery

Sifter	No. of Workers	Throughput (kg / hr)	Main Grades (%)	Valuation (Rs/kg)	Off Grades (%)	Valuation (Rs/kg)
MTSCS	01	142.50	94.08	1,081.14	5.92	716.60
Existing 03 Michie Sifters	05	46.15	89.35	1,065.64	10.65	735.59

MTSCS

- Higher main grade percentage (%) & higher average valuation

Existing 03 Michie Sifters

- Higher off grade percentage (%) and higher average valuation (due to accumulation of broken particles from main grades)

Grade Percentages & Tea Taster Valuations

Average Selling Price – MTSCS (Rs/kg)	= 1,059.56
Average Selling Price – Conventional (Rs/kg)	= 1,030.50
Price Difference (Rs/kg)	= 29.06
Percentage of Fired Teas Passed through the Michie sifters/MTSCS	= 57%

**Impact on NSA due to MTSCS
- Rs/kg 16.50**

Benefits of MTSCS

Estimated Unit cost	= Rs. 3.5 Mn
Typical tea factory, Ave. GL intake	= 10,000 kg/Day
Fired teas	= 2,200 kg/ Day
Fired tea available for MTSCS (57%)	= 1,254 kg/Day

Benefits of MTSCS

	MTSCS	Conventional Michie Sifters	Gain
Operational Time (Hr)	8.8	27	
Worker Cost (Rs.)	2,073.12	8,912.50	6,839.38
Average value for teas (Rs/kg)	1,081.14	1,065.64	19,437.00
Saving (Rs./ Day)			26,276.38
Saving (Rs./ Month)			788,291.40
Machine Depreciation (Rs./ Month)			29,166.00
Gross saving (Rs./ Month)			759,124.00
Simple Payback Period			05 months

Conclusions

1. Use of MTSCS reduced worker requirement by 04
2. Increased throughput of the MTSCS compared to conventional Michie sifters
3. The MTSCS Facilitated for higher main Grade percentages
4. Increased average selling price of tea grades from MTSCS leading to higher NSA
5. Conveyorizing/ automating grading operation in pure orthodox black tea manufacture become feasible with MTSCS

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Thank You !