

231st Experiments & Extension Forum

Keynote Address

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Tea Research Institute of Sri Lanka

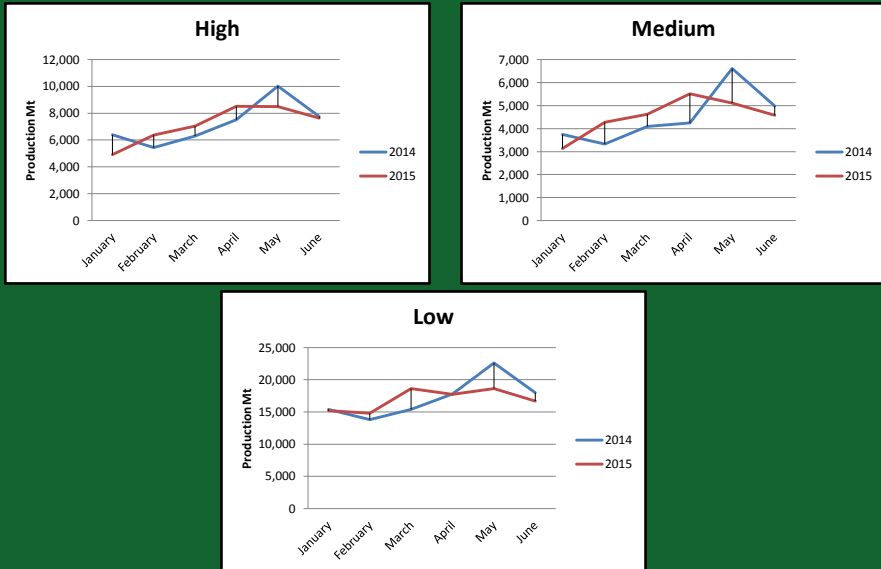
Tea Production in Sri Lanka

January - June

Elevation	Jan - June 2014 (Mn kg)	Jan - June 2015 (Mn kg)	% Change
High	43,393	42,943	-1.04
Medium	26,994	27,229	0.87
Low	102,965	101,749	-1.18
Total Production	173,352	171,921	-0.83



Tea Production in Sri Lanka (January – June)



World Tea Production (Mn kg) January - May

Country	Up to May (cumulative)		Change %
	2015	2014	
N E India	176,090	154,250	14.16
South India	98,840	90,820	8.83
India Total	274,930	245,070	12.18
Bangladesh	8,735	8,155	7.11
Sri Lanka	143,104	141,554	1.09
Kenya	142,977	193,241	-26.01
Malawi	28,964	32,733	-11.51

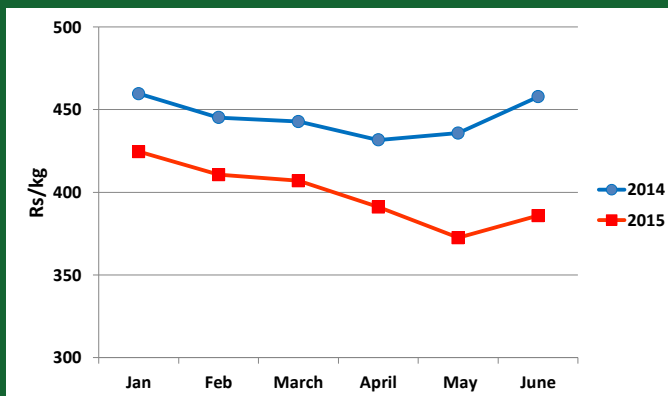


Sub District Price Averages (Jan - May)

	Average Prices 2014 (Rs/Kg)	Average Prices 2015 (Rs/Kg)	% of Average Price Change
Nuwara Eliya	462	445	-3.60
Westerns	438	399	-8.89
Mediums	424	422	-0.53
Uda Pussellawa	391	345	-11.82
Uva	439	372	-15.21
Low grown	504	424	-15.90



Comparison of Tea Prices 2014 & 2015

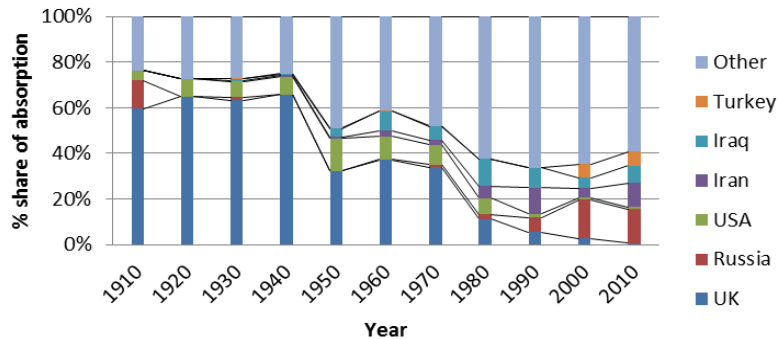


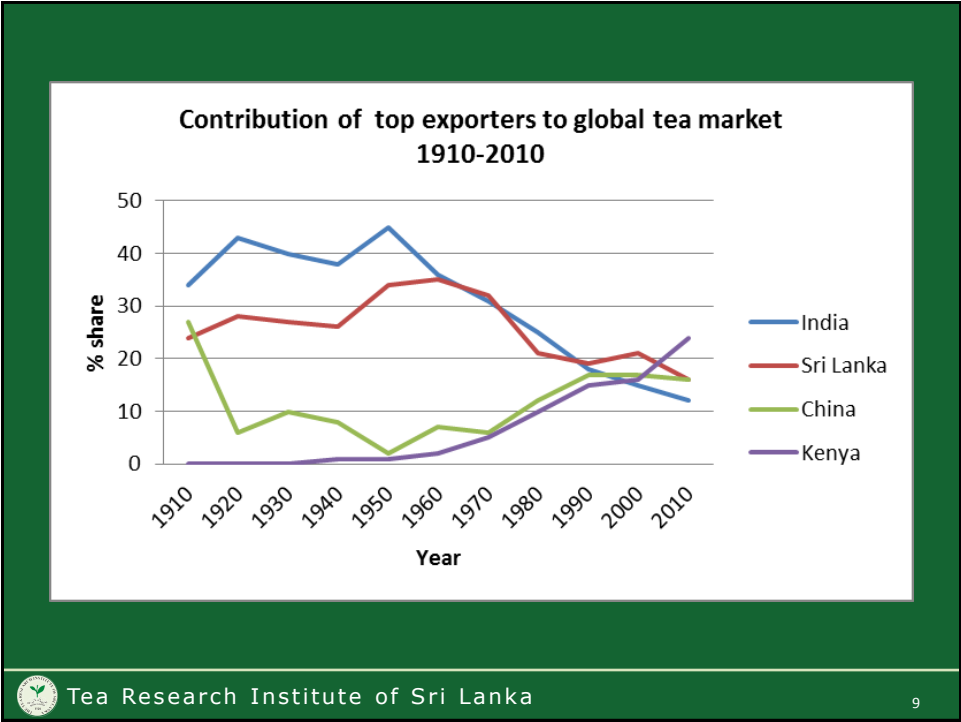
Prices at Different Auction Centers January - May

Auction Centers	2014 Average Price \$/Kg	2015 Average Price \$/Kg	% Change of Average Price
Kolkata	2.30	2.07	-10.02
Cochin	1.79	1.59	-11.06
Mombasa	2.18	2.46	12.92
Colombo	3.70	3.16	-14.69
World	2.60	2.51	-3.54



**% Share of tea export for different destinations
1910-2010**





International Standards Organization (ISO)
Technical Committee 34
Sub Committee 8
FOOD PRODUCTS - TEA

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10

ISO Standards

Parameter	Black Tea ISO 3720 (1986)	Green Tea ISO 11287 (2011)
Water extract	32%min	32%min
Total Ash(TA)	8%max 4%min	8%max 4%min
Water Soluble Ash (%TA)	45%min	45%min
Alkalinity of water soluble ash	1%min 3%max	1%min 3%max
Acid insoluble ash	1%max	1%max
Crude Fibre	16.5%max	16.5%max
Total Catechins(TC)	N/A	7%min
Total Polyphenols(TP)	9%min	11%min
Ratio of TC to TP	N/A	0.5
Theanine – Work in Progress		
Theaflavin - Work in Progress		
Theogallin - Work in Progress		



ISO/TC34/SC8 FOOD PRODUCTS – TEA Work Programme

White Tea

White Tea Definition:

“Tea derived solely and exclusively and produced by acceptable processes, by harvesting and a single withering/drying stage from the bud or bud and tender shoots (one to three leaves) of varieties of the species *Camellia sinensis* known to be suitable for making tea for consumption as a beverage”

With the approval of the definition - Proceed to gather samples that adhere to this basic 'definition' and analyse to create a dataset.

- **Proposed chemical parameters for white tea to be circulated for comments**
- **Call for White Tea data - samples should be accompanied by sample information**



ISO/TC34/SC8 FOOD PRODUCTS – TEA Work Programme

Oolong Tea

Chemical database developed by China includes Catechins, Caffeine, Theanine, Total Amino Acids, Soluble Sugar

- Oolong database **developed by China** will include oolong teas from all origins.
- Conduct an initial ring trial with a limited number of samples to evaluate the method and the performance of the participating international laboratories.
- Invite from other countries to participate in the data collection.
- Oolong samples be sourced with the description of the processing method.



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Theaflavins

Method for the determination of Theaflavins by HPLC

- A new work item proposal will be prepared
- Continue the work on a method for the determination of theaflavins by HPLC;
- International Ting Test



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Theanine

Theanine is a unique non protein amino acid found in *Camellia* 0.1-0.2% w/w dry basis in tea leaves.

Beneficial effects: Enhancement of relaxation, improvement in concentration

ISO 19563 Determination of theanine in tea using high-performance liquid chromatography

- ISO method should be completed and circulated to the WG.
- The draft method should proceed straight to DIS (public enquiry).



ISO/TC34/SC8 FOOD PRODUCTS – TEA Work Programme

Theogallin, GC/GCG/CG

ISO 14502 -1:2005-Determination of Total Polyphenols in Tea

ISO 14502 -2:2005-Determination of Catechins in Tea

- Extension of the range of measurement of tea components by ISO 14502-2
- Theogallin - Characteristic for tea/ biological effects
- GC/GCG/CG - Characterization of powders and RTD beverages



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Tea Chemical Classification

(Discrimination of different types of teas using chemical composition)

- Types of Tea - Green/Black/Oolong/Dark/Yellow Teas
- Chemicals – Total Polyphenols/ Total Catechins/ Catechins/ Amino acids
- More than 600 samples from China/India, Sri Lanka, Kenya, Indonesia and & Burma were analysed (Green – 260, black-189, Oolong-142, White-51)
- Oolong and White and Green and White can be discriminated.
- But Oolong and Green overlap
- **Include special teas from all producing countries**
- **Develop a classification of the different types of teas**



ISO/TC34/SC8 FOOD PRODUCTS – TEA Work Programme

Good Tea Agricultural and Manufacturing Practices

- Sri Lankan Standard: SLS 1315 Part1: GAP, Part 2: GMP & Part 3: GHP
- Kenya, India, China, and Japan also submitted their GAP/GMP documents.
- Harmonization of different country standards



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Cold and hot water soluble instant teas

- Current ISO 6079 Standard - Ash level 20%max. for both cold (CWS) and hot (HWS) water soluble instant tea.
- CWS Instant tea generally has higher ash content due to the use of processing aids.
- 1672 CWS and 344 HWS Instant tea samples were analyzed (samples from Sri Lanka, Kenya, China, Paraguay, Chile, India and Germany)
- Ash content – HWS → 7.51-17.21% CWS 11.31 → 40.50%
- Continuation of the work on cold and hot water soluble teas



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Items for future work

Matcha tea

- **Develop the methods for characterising matcha tea;**

Total polyphenols in bottled tea

- **Determination of total polyphenols in bottled tea drinks**



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Contaminants found in Tea

- **Pyrrolizadine Alkaloids** - Has been found in some **Argentinian teas**. Associated with weeds (Crotalaria). Contamination may be due to machine plucking/Bio pesticides.
- **Perchlorate ClO₄** - May be Chlorine detergent use in tea processing factories
- **Polycyclic Aromatic Hydrocarbons (PAH)** - Has been found in many teas, mainly smoky teas
- **Anthraquinone** -Has been found in many teas, mainly in Chinese teas - EU MRL is 0.02mg/kg
- **Rare Earth Elements** - Issue in China



Pesticide Residue Detections in 2015

Chemical	Type	Country of Detection	Estate	Detection Level (ppm)
Diuron	Herbicide	Germany	Uva	
			Uva	
			Uva	
			Uva	
			Uva	
Chlorfluazuron	Insecticide	EU	Up Country	0.03 (0.01)
Anthraquinone	Unknown	EU	Up Country	0.023 (0.02)
			Uva	
		France	Low Country	0.023 (0.02)
			Uva	0.018 (0.02)
			Up Country	
	Low Country			
Pentachlorophenol	Biocide	EU	Uva	0.014 (0.01)



Glufosinate Ammonium

MRLs					
EU	Japan	USA	China	Canada	Australia
0.10	0.30		0.5		20 (T)

- At FAO IGG on Tea meetings, Glufosinate Ammonium has been listed as priority chemical to generate residue data
- TRISL is in the process of conducting declining and regional trials as per FAO guided trial protocol



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Iron & Sodium Levels in Made Tea



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24

Iron (Fe) and Sodium (Na) Levels in Made Tea

Background:

SLTB standard: Circular No. AL/MQS – Rev/2010 -02

1. Basic requirements for black tea
 2. Heavy Metals (Fe, Cu, Pb, Zn, Cd) Fe Level - 500ppm was set based on available data
 3. Microbial Parameters
 4. Pesticide Residues
- **Need for a revision and therefore establishment of baseline data of Fe levels in Sri Lankan tea.**
 - **Joint project with Tea Commissioner's Division of Sri Lanka Tea Board**



Methodology

Sampling plan – To cover all tea growing regions/grades

Total number of factories selected = 111

Total samples collected = 614

- Samples were collected by Tea Commissioner's Division
- Samples were analyzed by Soils and Plant Nutrition Division, TRI.



Sodium levels of teas from different regions

Location	No of Samples	Mean	Median	Minimum	Maximum
		Na (ppm)			
Gampola	104	0.32	0.30	0.12	0.60
Galle	91	0.26	0.21	0.09	0.56
Matara	84	0.34	0.32	0.11	0.76
Rathnapura	92	0.22	0.18	0.09	0.57
Hatton	98	0.39	0.41	0.21	0.57
Bandarawela	104	0.13	0.12	0.08	0.31
Mathugama	41	0.16	0.15	0.09	0.26

- The level of Sodium in 99% of sample population is below 0.68%



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Fe Levels of Teas from different Regions

Region	No of Samples	Mean	Median	Minimum	Maximum
		Fe (ppm)			
Gampola	104	91	91	21	255
Galle	91	94	86	52	278
Matara	84	92	83	29	250
Rathnapura	92	106	99	51	233
Hatton	98	129	127	47	295
Bandarawela	104	103	81	50	128
Mathugama	41	76	67	34	211

- The level of Fe in 99% of sample population is below 272 ppm.
- Therefore new proposed level of Fe for SLTB standard is 300ppm.



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Thank you

