233rd Experiments & Extension Forum Keynote Address

I Sarath B Abeysinghe
Director, Tea Research Institute

Tea Research Institute of Sri Lanka

Tea Production –Mn Kg (2015 & 2016)

Elevation	2016	2015	Change	% Change
High	64.40	75.53	-11.13	-14.73
Medium	43.10	49.23	-6.13	-12.46
Low	184.86	204.01	-19.15	-9.39
TOTAL	292.36	328.77	-36.41	-11.07

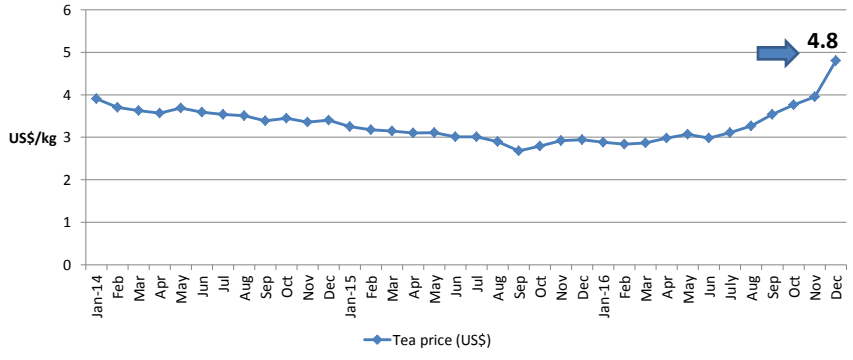
Source, Statistical Bulletin, SLTB

World Crop Statistics – Tea Production (Mn kg)

Country	2016	2015	Change	% Change
North India (up to Nov)	979.8	938.4	41.4	4.41
South India (up to Nov)	196.6	213	-16.4	-7.70
Kenya (up to Nov)	427.9	352.8	75.1	21.29
Sri Lanka (up to Dec)	**292.3**	**328.7**	**-36.4**	**-11.07**
Bangladesh (up to Nov)	77.6	61.7	15.9	25.77
Malawi (up to Nov)	37.5	35.6	1.9	5.34

Source, Statistical Bulletin, SLTB

Fluctuation of Tea Prices at Colombo Auction (2014-2016)



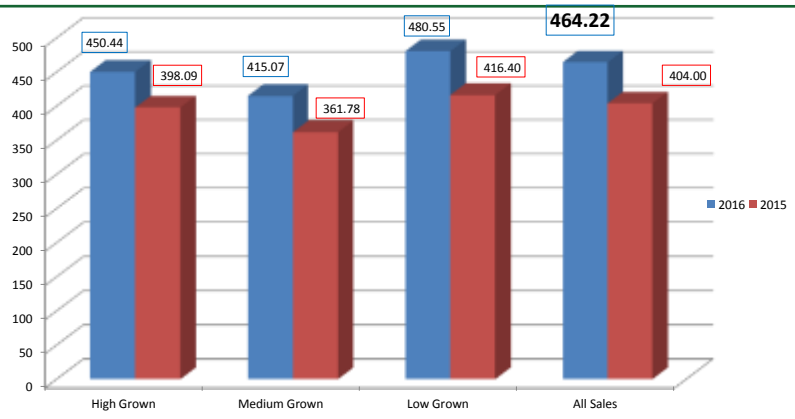
Source, Statistical Bulletin, SLTB

Comparison of Colombo Auction Tea Prices (US$/kg)

Month	Price Difference (2014 & 2013)	Price Difference (2015 & 2014)	Price Difference (2016 & 2015)
Jan	0.58	(0.66)	(0.37)
Feb	0.36	(0.52)	(0.34)
Mar	0.16	(0.47)	(0.28)
Apr	0.17	(0.47)	(0.12)
May	0.39	(0.58)	(0.04)
Jun	0.39	(0.58)	(0.03)
Jul	0.36	(0.53)	0.10
Aug	0.13	(0.61)	0.37
Sep	(0.20)	(0.71)	0.86
Oct	(0.34)	(0.66)	0.97
Nov	(0.36)	(0.44)	1.03
Dec	(0.41)	(0.46)	

Source, Statistical Bulletin, SLTB

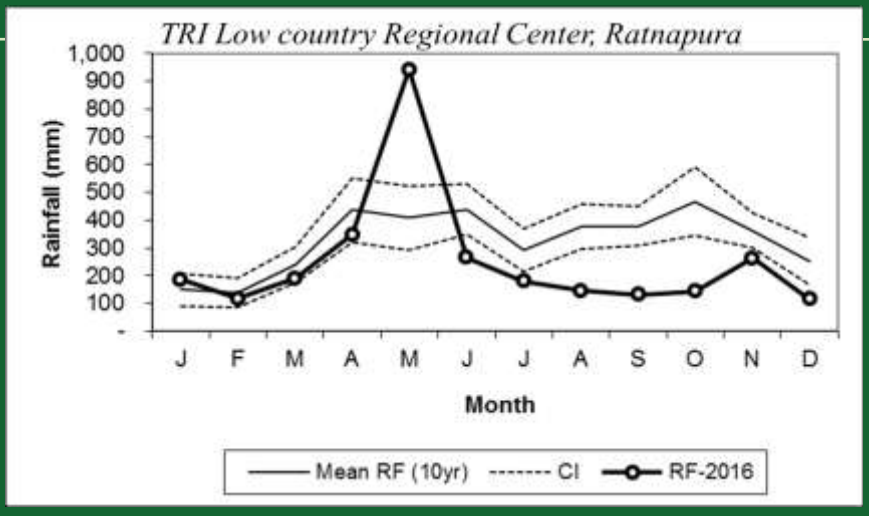
Changes in Elevational Tea Prices (LKR/kg) - (2015 & 2016 up to November)



Auction averages for the period January – December 2016 totaled Rs.464.22 thus realizing the highest ever average for a year with the previous best being Rs.461.86 achieved in 2014

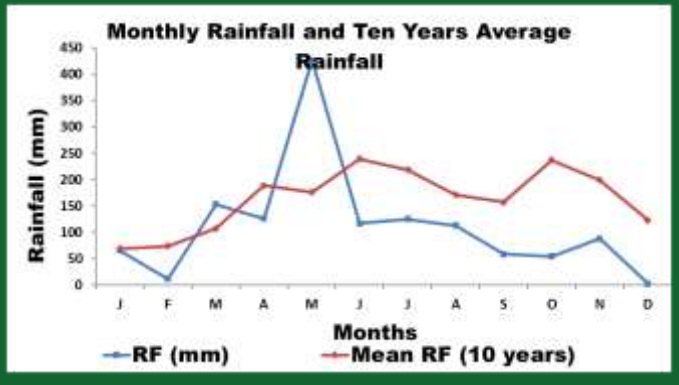
Source, Statistical Bulletin, SLTB

Rainfall at Low elevation -2016



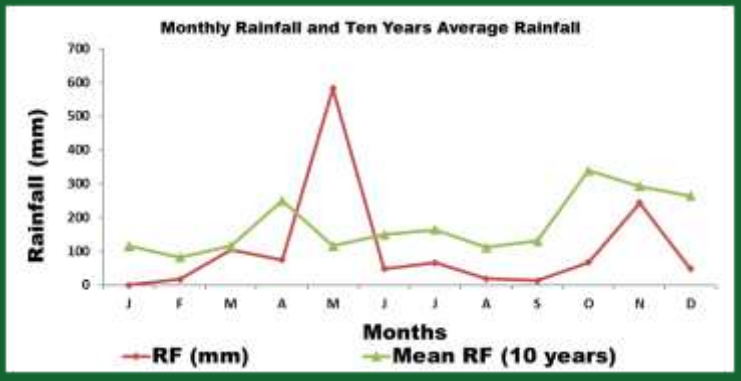
Significantly low rainfall during the last 6 months

Rainfall at High elevation -2016



Low rainfall during the last 6 months

Rainfall at Mid elevation -2016



Low rainfall during the 4 months from June

Seasonal Forecast for January-March

District	Average rainfall (mm) –JFM	Probability %		
		Below	Normal	Above
Colombo	336.4	35	35	30
Kalutara	461.6	30	35	35
Galle	456.3	35	35	30
Matara	396.0	35	30	35
Hambantota	220.5	35	35	30
Ampara	456.7	30	35	35
Batticaloa	399.2	35	30	35
Trincomalee	264.6	30	35	35
Mullaitivu	177.6	35	30	35
Jaffna	125.3	35	30	35
Kilinochchi	157.1	30	35	35
Mannar	148.4	30	30	40
Puttalam	156.1	30	30	40
Gampaha	276.3	35	35	30
Kegalle	373.7	35	35	30
Ratnapura	454.0	35	30	35
Monaragala	356.8	35	30	35
Badulla	530.7	35	30	35
Polonnaruwa	355.6	40	20	40
Vavuniya	176.8	40	20	40
Anuradapura	201.9	40	20	40
Kurunegala	221.2	40	20	40
Matale	427.8	35	30	35
Kandy	397.3	35	30	35
Nuwaraeliya	376.2	30	35	35

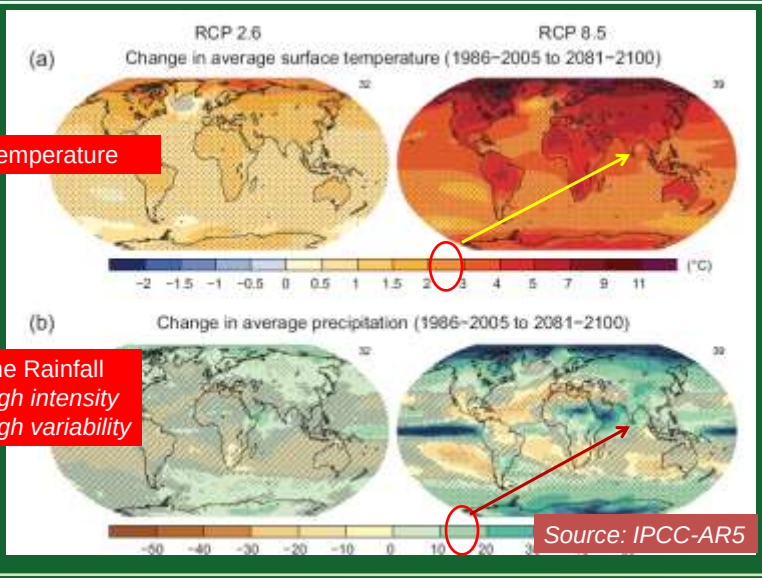
Dry weather prevails in all Districts

Impacts on tea:

- *Low yield*
- *Drought casualties*
- *Dry weather pests*

Source: Department of Meteorology, Sri Lanka

Long-term Projections (2100)



High Temperature

Extreme Rainfall
High intensity
High variability

Source: IPCC-AR5

Measures to be adopted during dry weather

- *Keep shade in tea lands (do not lop shade trees)*
- *Stop fertilizer application till dry spell ends*
- *Do not prune tea bushes during dry weather*
- *Selective weeding where necessary*
- *Mulching of young tea lands*
- *Spraying of SOP/MOP as per TRI recommendations*
- *Irrigation of tea where water sources are available*

Long-term measures to mitigate drought

- *Selection & use of most suitable lands for tea*
- *Use of drought/ P/D tolerant cultivars/Improved seedlings/Grafted plants*
- *Planting and proper management of shade trees*
- *Soil conservation and improvement*
- *Irrigation*

TRI 5000 series cultivars

Trends in tea cultivar development (Breeding objectives)

Before 1980's
- High yield only

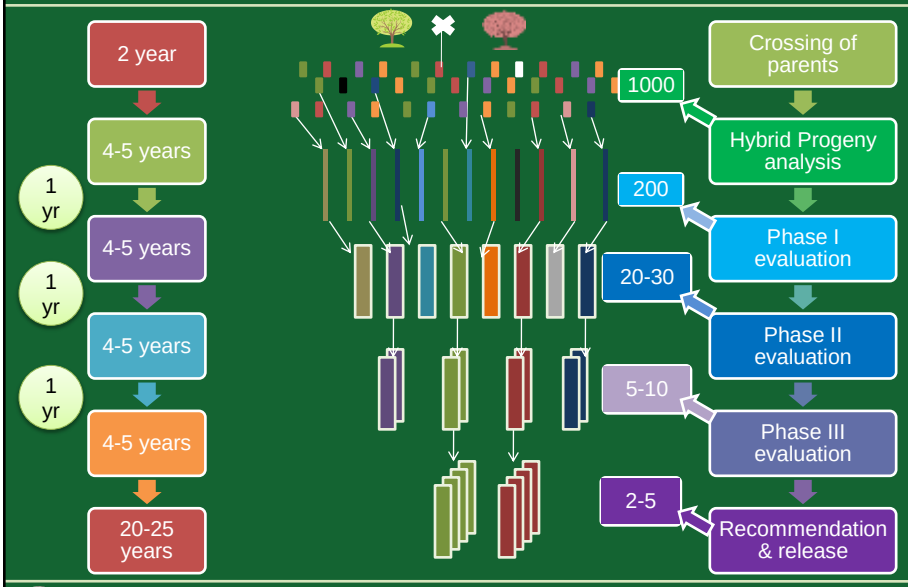
1980 -90's
- High yield
- High made tea quality
- Pest & disease resistance````

Today
- High yield
- High made tea quality
- Multiple Pest & Diseases resistance
- Drought & heat tolerance (Adaptation to climate change)

Tea breeding objectives- "Region Specific":

Trait	Up	Mid	Uva	Low
Yield	+	+	+	+
Quality	+		+	
Blister Blight	+		+	
Canker		+	+	+
Shot Hole borer		+	+	+
Nematodes	+	+	+	+
Live wood termite				+
Drought		+	+	+

Tea Breeding Program



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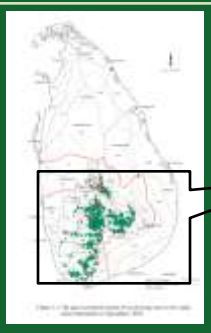
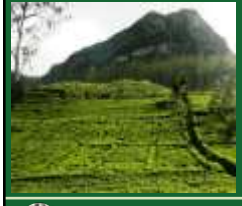
TRI 5000 series adaptive trials - locations





35 adaptive trials
Both RPCs & SH
All Agro-ecological regions

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18

Multiplication of TRI 5000 series cultivars

Project: Establishment of a mechanism to multiply and disseminate quality planting materials for newly developed cultivars and improved seed materials.

Total cost: 86 Million

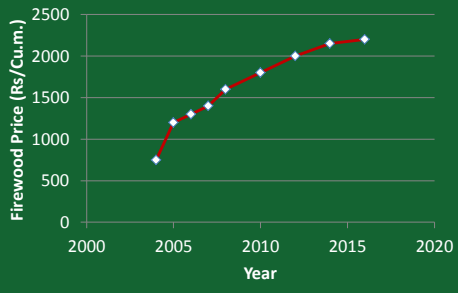
Project period: 2017-2021

Locations: Talawakelle, Hantana, Ratnapura, Kottawa, Deniyaya, Passara

Electrical energy consumption – tea industry

Electrical energy consumption – tea industry

- Tea industry consumes 250 GWh / yr (250 million units) in 2015 considering production volume 329 Mn kg and 0.75 unit/kg MT
- Cost on units – 3,700 million rupees (source : SLSEA 2014)



Increase electricity charges

Increase firewood price

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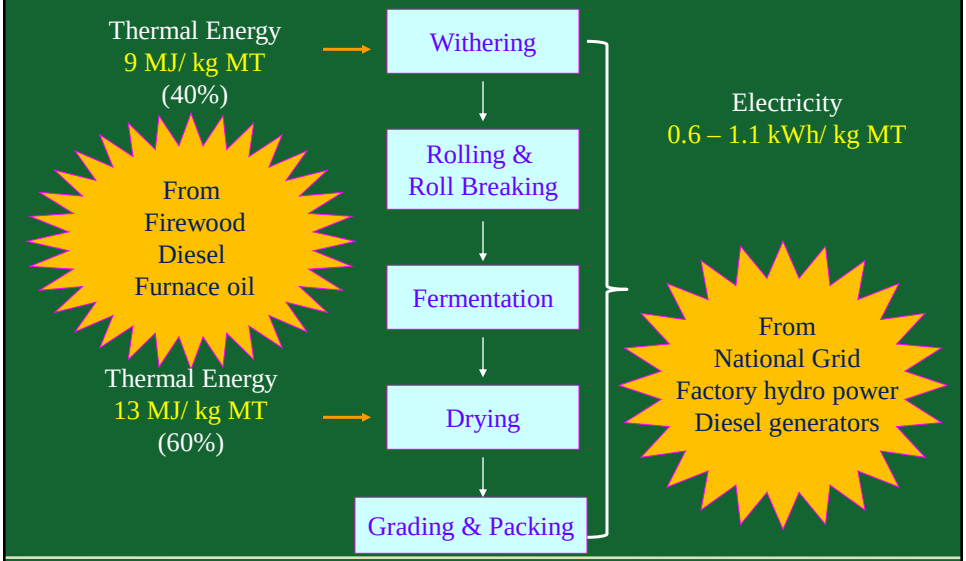
Energy consumption – different manufacturing stages



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Withering - trough

- Large size (5.5 – 15 horse power) motors are used
- Operating time can be varied 12 – 20 hours
- Power consumption for withering can be varied 0.35 – 0.46 kWh/kg MT
- Power consumption increases when more & more rewound motors are used

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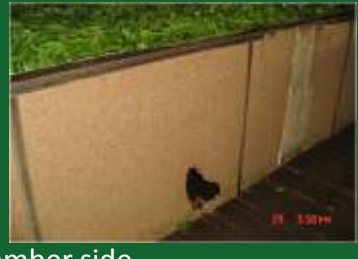
Poor Operational & Maintenance Practices

Blowholes are formed on the trough



Air leaks - chamber side

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Rolling operation – Orthodox & Rotorvane mix type manufacture

- RV is the most common continuous rolling machine which is used in up country rolling process.
- These machines use very large motors varying capacity of 15HP, 20HP etc.

- Continuous feeding of leaves to RV using a conveyor is essential.
- Manual feeding is a bad practice & it will increase the power consumption due to variation of pressure.
- Ammeter is needed to assemble to monitor the pressure variation in the RV barrel.

Drying operation – Dryers & operational conditions

- Fluidized Bed Dryers are used 15 – 25 HP large capacity motors
- ECP Dryers are also used 15 – 30 HP capacity motors.
- Rewound motors should not be connected with any kind of dryer

HEM – to carbon mitigation

- At different operational stages where large capacity motors are used in tea processing, there is an advantage of replacing with High Efficient Motors if existing motors are burnt.
- This may have an impact on C - mitigation measures and leads to environmental friendly operation.

Solar Energy for tea industry

- Solar is another key source of energy that can be used in tea industry
- TRI was tested solar energy in 1997 for pre-heat air for drying operation.
- Results revealed that solar energy to pre-heat air was not economically viable.

- Government has taken steps to popularize solar PV (Photo voltaic) to generate electrical energy and used in tea industry through SLSEA.

Sri Lankan Standards (SLS)- Microbiological parameters

Microbiological parameter	SLS test method	Requirement (Maximum Permissible Level)
Total Aerobic Plate Count	Sri Lankan Standard 516: part 1(1991)	10000 CFU/g
Yeast and Mould Count	Sri Lankan Standard 516: part 2(1991)	1000 CFU/g
Total Coliform Content	Sri Lankan Standard 516: part 3(1982)	10 MPN
Total *E. coli* Content	Sri Lankan Standard 516: part 3(1982)	NIL

**CFU = Colony Forming Units
MPN = Most Probable Number

Thank you