

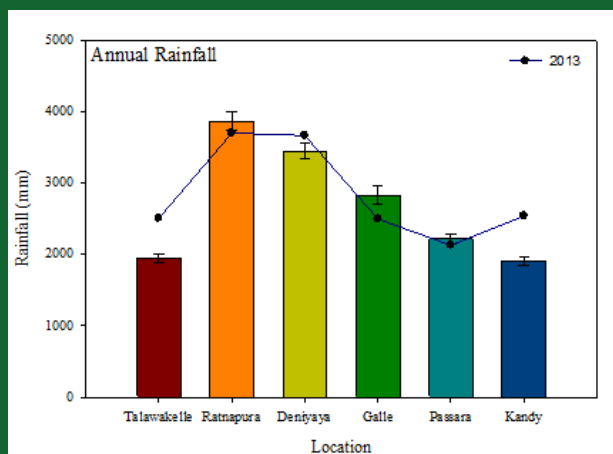
228th Experiments & Extension Forum Keynote Address

I Sarath B Abeysinghe
Director, Tea Research Institute

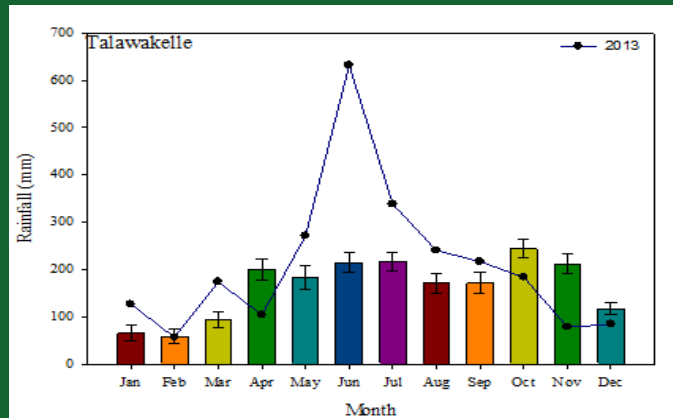


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Annual Rainfall 2013



Monthly Rainfall



Climate Change Scenarios in Tea growing Countries

Kenya:

TRFK: Studied data over last 52 years
 Temp ↑, RF ↓ (4.82mm/Yr), large soil water deficit (Jan-Mar), ↑ in propensity of hail, drought and frost

Predictions: temp ↑ by 2.5C, ↓ in Ground water table, Optimal tea growing zone ↑2000-2300masl



Climate Change Scenarios in Tea growing Countries

India: Assam/Darjeeling

TRA: Studied data over last 100 years
Temp ↑ 2C, RF uneven, Flash floods/water logging, soil erosion, yield drop, pest and diseases



Climate Change Scenarios in Tea growing Countries

Japan:

Very hot summers and drought

Drought from mid summer to Autumn + very high temp. → drop in yield in the first harvest

Buds are not dormant during winter due to warm air – Therefore more tender and easily **damaged by frost** in late autumn and early spring

Also there is an increase in pest and disease attacks



Climate Change Scenarios in Tea growing Countries

Taiwan:

Macrophoma theicola that attacks bushes during very dry and hot conditions has become a regular issue



Climate Change Scenarios in Tea growing Countries

China:

South East: Typhoons and Extreme fluctuations in Temp and Humidity

South West: Drought , Sudden rainstorms with landslides – Yunnan province



FAO – Intergovernmental Group on Tea

WORKING GROUP ON CLIMATE CHANGE

At the inter sessional meeting of the Intergovernmental Group on Tea (2011), Group recommended setting up of a Working Group on Climate Change.

Chair: India

Co –Chairs: Kenya, Sri Lanka

Members:

1. China
2. Japan
3. Tanzania
4. Malawi
5. Bangladesh
6. Rwanda



FAO – Intergovernmental Group on Tea

WORKING GROUP ON CLIMATE CHANGE

Terms of Reference:

- 1.To collect and collate all available research data on climate change in member states.
- 2.To determine the impact of climate change on the tea economy.
- 3.To identify /suggest mitigation and adaptation strategies.
- 4.To develop appropriate long term technologies for mitigation/adaptation.



R & D Work on Climate Change at TRI



Climate Change Studies (2002-2004)

**Assessment of the impact and adaptation to Climate
Change in the Tea and Coconut Plantations in Sri
Lanka**

**TRI in collaboration with SLAAS, DOM, CRI &
NRMS (2002-2004)**

**Dr. Janaka Ratnasiri (PI)
Dr. Senaka Basnayake (DOM)
Dr. M A Wijeratne, Dr. A Anandacumaraswamy,
Mrs. Asoka Jayakody & Mr. S.L.D.Amarathunga (TRI)**



Findings of the Study

- Optimum rainfall required for tea varied from 223 - 417mm/month in different regions
- Reduction of monthly rainfall by 100mm could reduce productivity by 29-81kg/ha/month
- Higher yields recorded at temperatures around 22°C
- **A crop model was developed to predict tea yield under future climatic scenarios**
- **Tea yields are likely to increase at high elevations (WU) while yields at mid and low elevations are likely to reduce**
- **WL, WM & IU regions are highly vulnerable**



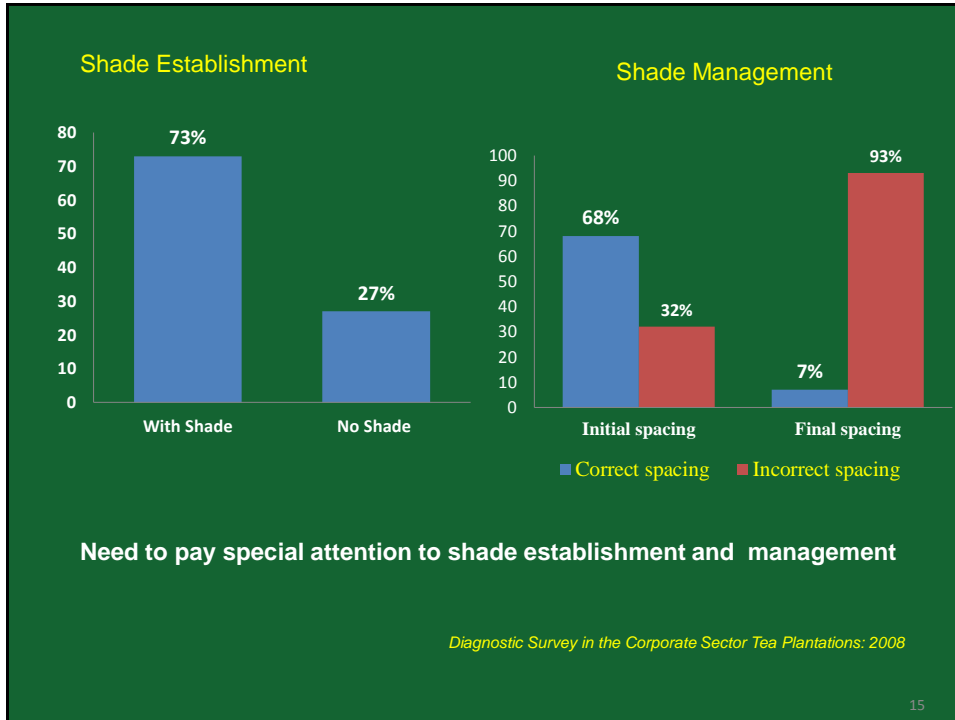
Recommendations/adaptation measures

Adaptation measures aim at:

- *Crop Improvement*
- *Soil Improvement*
- *Improvement of aerial environment (shade)*

TRI has communicated the findings to tea growers through seminars/workshops





Carbon Balance in Tea Plantations

Preliminary study on the determination of carbon balance in the tea industry

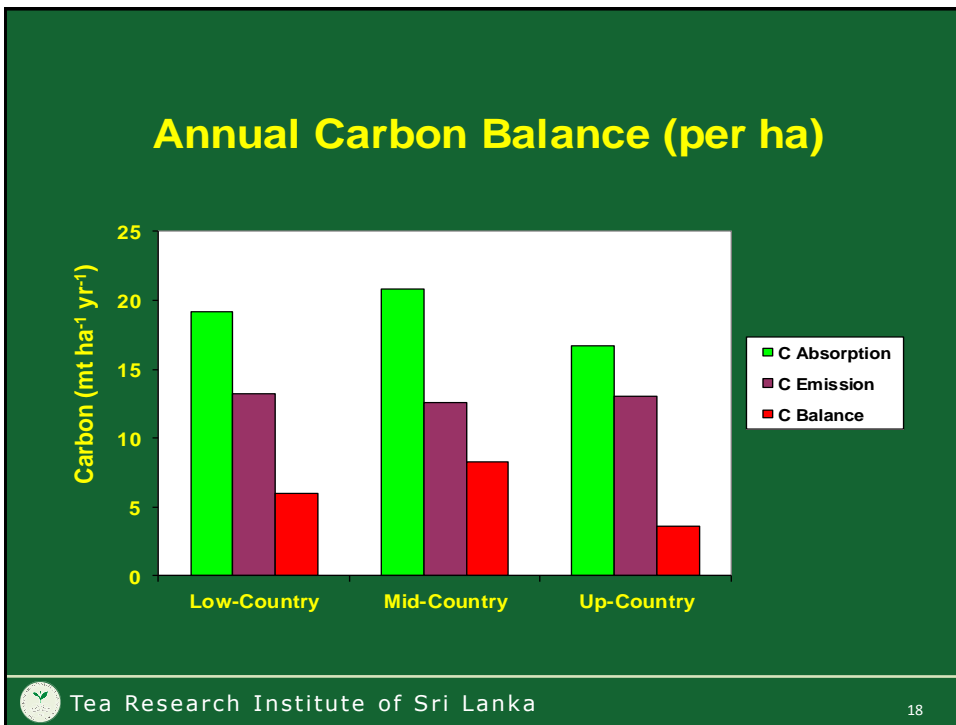
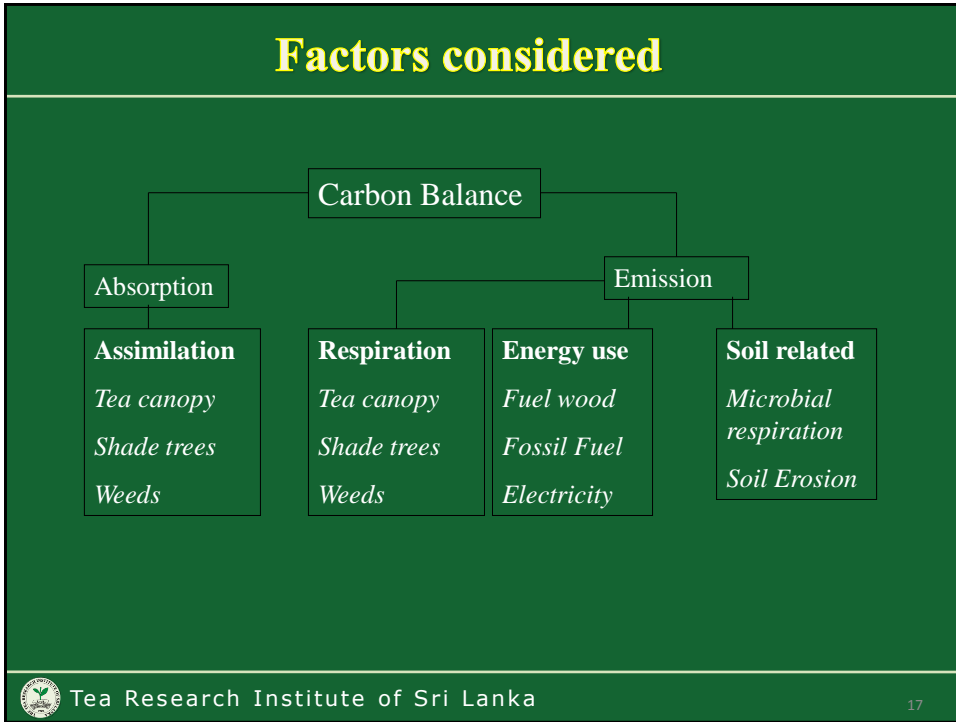
Collaborative project with University of Peradeniya

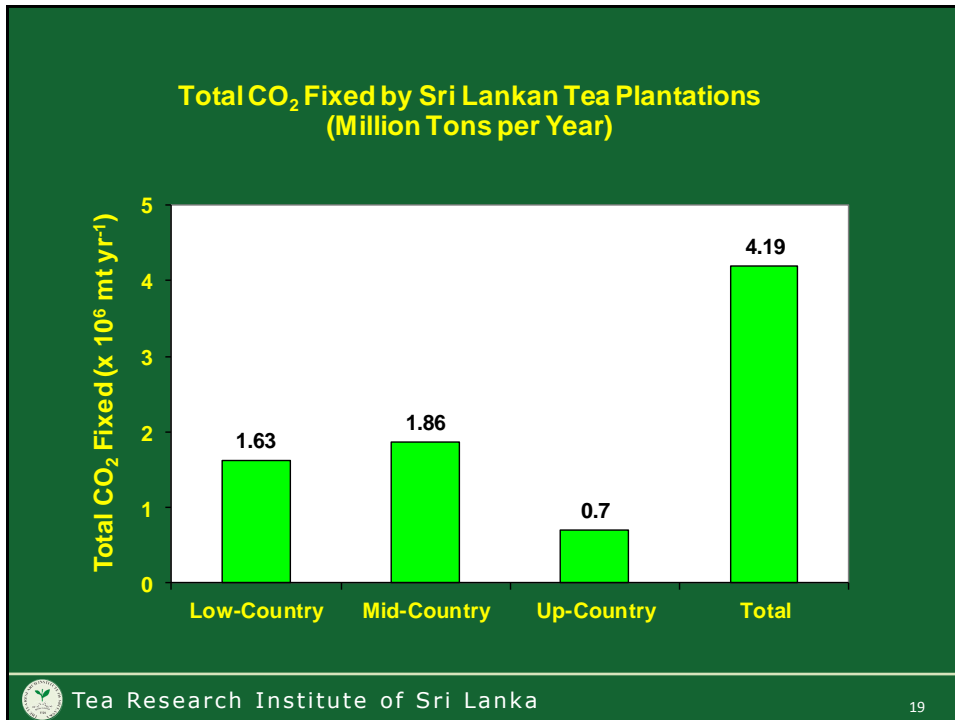
Prof. J M de Costa

Dr. M. A. Wijeratne

B K Herath







Carbon Balance in Tea Plantations

Sri Lankan tea industry is a net carbon absorber and thereby contributes to mitigation of long term climate change

Study on carbon sequestration potential and modeling

Carbon sequestration potential of seedling /VP tea plants and shade trees in different elevations are quantified

A model (Sheffield Dynamic Global Vegetation Model) is fine tuned & relationships were developed to predict future tea yield variation in response to global climatic change



Adaptation for climate change

Development of drought tolerance/resistance cultivars

- TRI has recommended 64 cultivars for commercial planting and out of that 45 cultivars are found to be drought tolerance
eg: DG 39, DG 7, DN, S 106, CY 9, KP 204, CH 13
TRI 2025, 2027, 4042, 4052

- TRI 5000 series new tea cultivars

Selection of cultivars with high yield incorporated with high quality and P&D resistance and specialty drought tolerance

Identification of drought tolerant accessions using recently developed **Drought Susceptibility Index (DSI)**

This facilitate precise screening of large amount of plant materials with in a short time

Screening in LC, Uva and MC regions in progress



Development of drought tolerance/resistance seed stocks

“improved seeds” as alternative planting materials to withstand drought conditions while maintain appreciable productivity levels.

Bi and Poly Clonal Seeds



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Evaluation of potential of improved seeds in marginal areas



1. Medamahanuwara (IM)
2. Galaha (IU)
3. Passara (IU)
4. Craig (IU)
5. Endane (WL)
6. Warapitiya (WL / IL)



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Increasing the availability of seeds

- Maintenance of the existing gardens

Bi- clonal (2) – Reucastle & Rambukkanda
 Poly- clonal (5) – Salawa, Halpe, Kiriporuwa,
 Sapumalkanda & Rambukkanda

- Rejuvenation of old gardens
 Peenkanda , Welimada and El- Tab

- Establishment of new seed gardens
 TRI Kottawa and Hanatana TRI

- Initiated steps to establish new gardens
 3 Estates from 3 RPCs selected
 (Waltrim, Ury & Dessford)



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Development of graft combinations

- Successful graft combinations for drought (Cultivar/cultivar)

TRI 2023 on CY 9

TRI 2026 on DN

TRI 4046 on DN

TRI 4052 on DN



- Evaluation of cultivar/seedling combinations (Cultivar/Seed)

TRI 4053 on Sapumalkanda seedlings



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Identification of metabolites for facilitating screening /identification of drought tolerant cultivars

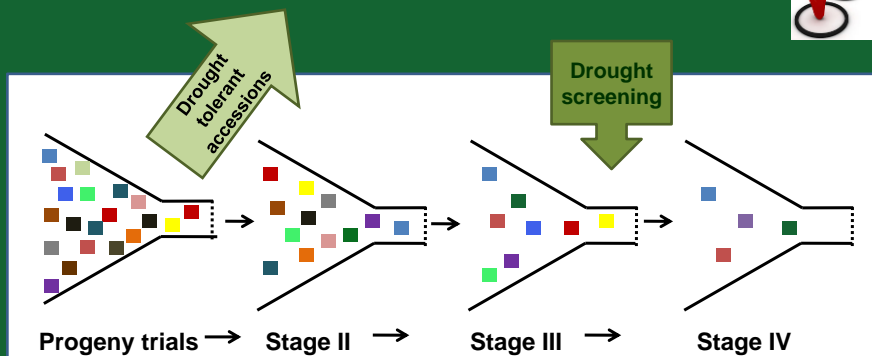
- Analysis of metabolites related to drought tolerance (eg amino acids – Prolin) of cultivars (NRC funded project) – in progress



- To facilitate precise and early screening of large amount of plant materials with in a short time



Potential application of screening for drought



- Rapid evaluation of large number of accessions
- Alternative & early selection criterion for drought tolerance



Studies Related to Climate Change

Analysis of climatic changes over the past 50 years in all tea growing AERs (In collaboration with the Department of Meteorology)

Forecasting of weather (monthly/seasonal):

Test forecasting is done by Department of Meteorology



Studies Related to Climate Change

Mapping of tea lands - (in collaboration with LUPPD & Survey Department)

A project Proposal was submitted to the treasury to obtain Rs. 45Mn

Mapping of Galle District is completed under a Pilot Study

Mapping of vulnerable regions to CC



Update on MRL Issue



Tea MRLs

a.i.	EU	Japan	USA	China
Bitertanol	0.10	0.10		
Copper Hydroxide	40	Exempted		
Copper oxide	40	Exempted		
Copper Oxychloride	40	Exempted		
Hexaconazole	0.05	0.05		
Propiconazole	0.10	0.10		
Tebuconazole	0.05	50		
2,4-D	0.10	0.01		
Diuron	0.10	1.0		
Glufosinate Ammonium	0.10	0.30		0.5
Glyphosate	2	1.0	1.0	1.0
MCPA	0.10	-		
Oxyfluorfen	0.05	0.01		
Paraquat	0.05	0.30		
Carbofuran	0.05	0.20		
Chlorfluazuron	0.01	10		
Diazinon	0.02	0.10		
Dazomet	0.02	0.10		
Imidachloprid	0.05	10		0.5
Fipronil	0.005	0.002		
Metam Sodium	0.02	0.10		
Sulphur	Exempted	Exempted		



Use of Fipronil in Tea - Concerns

- At present TRI recommended Fipronil only for nursery and immature tea
- FAO guided residue trials completed and the recommendations for mature tea is pending
- TRI prepared an application to be submitted to EU and Japan to revise MRL
- MRLs (default LOD set): EU 0.005 ppm
Japan 0.002 ppm
- Due to frequent detections of Fipronil in Chinese and Vietnamese teas, JTA incorporated Fipronil in the monitoring programme
- JTA Cautioned Sri Lanka not to use Fipronil as they did for 2-4 D and MCPA in 2005



Use of Fipronil in Tea - Concerns

- Use **Fipronil** only for nursery and **immature tea** fields as per **PM 4 Circular**
- **Do not use** for mature tea fields until recommendations given
- Recommendation on Alternate PPP pending: Lime : Sulphur 1:1
- Record keeping



Thank you



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