Economic Importance of Infilling and Replanting in Tea Plantations

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Economic Importance of Tea Crop

Country's development activities & socio-economic progress closely linked with the tea industry.

- Contributes to
  - 30% of agricultural labour force
  - 700,000 direct employment
  - 1.5 million direct & indirect employment

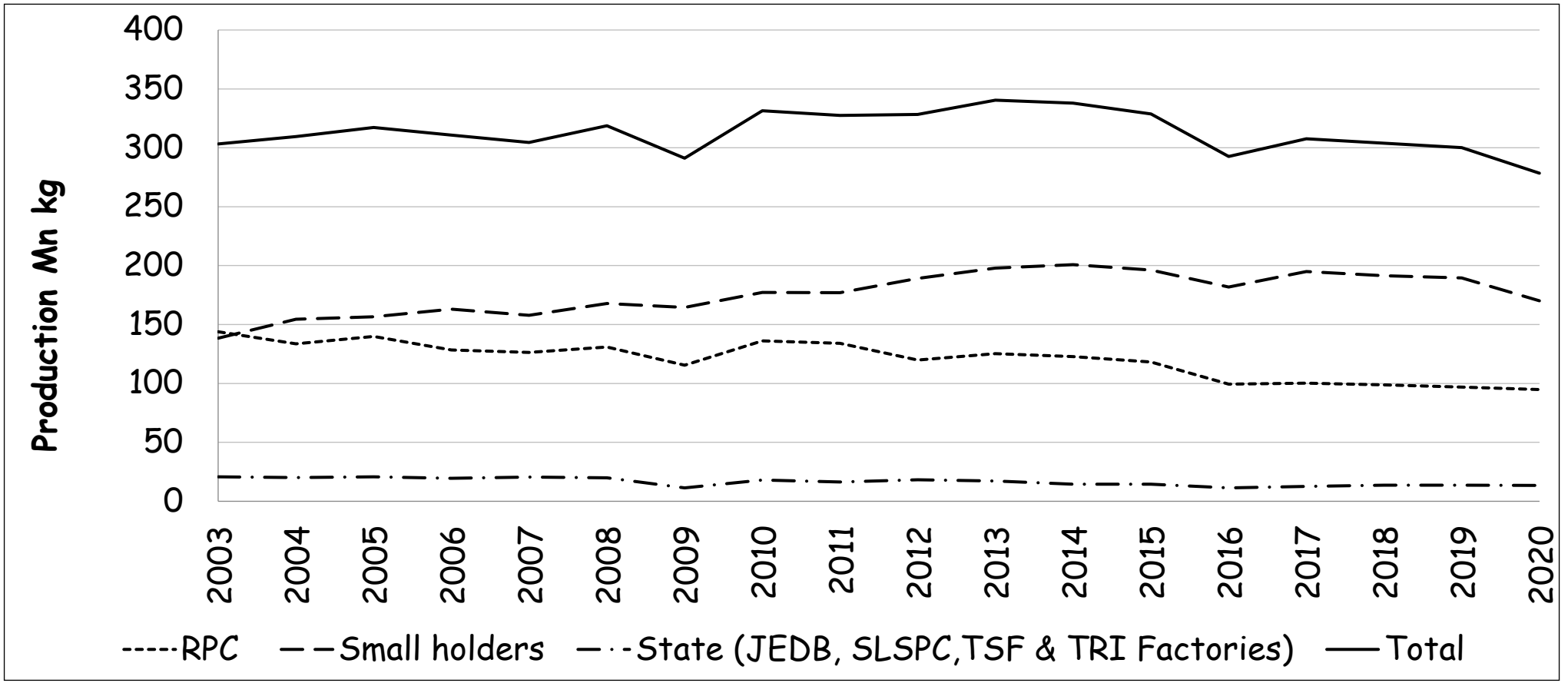
  - Second largest contributor of EE from a single production sector
  - 12.3% of export revenue & 54.6% of agric. Export revenue
  - Considerable level of GDP

  Tea cultivation in S.L contributes significantly for the economic stability of the country.

  The long term national objective is to ensure the sustainability of existing tea lands.

Challenges in Tea Sector

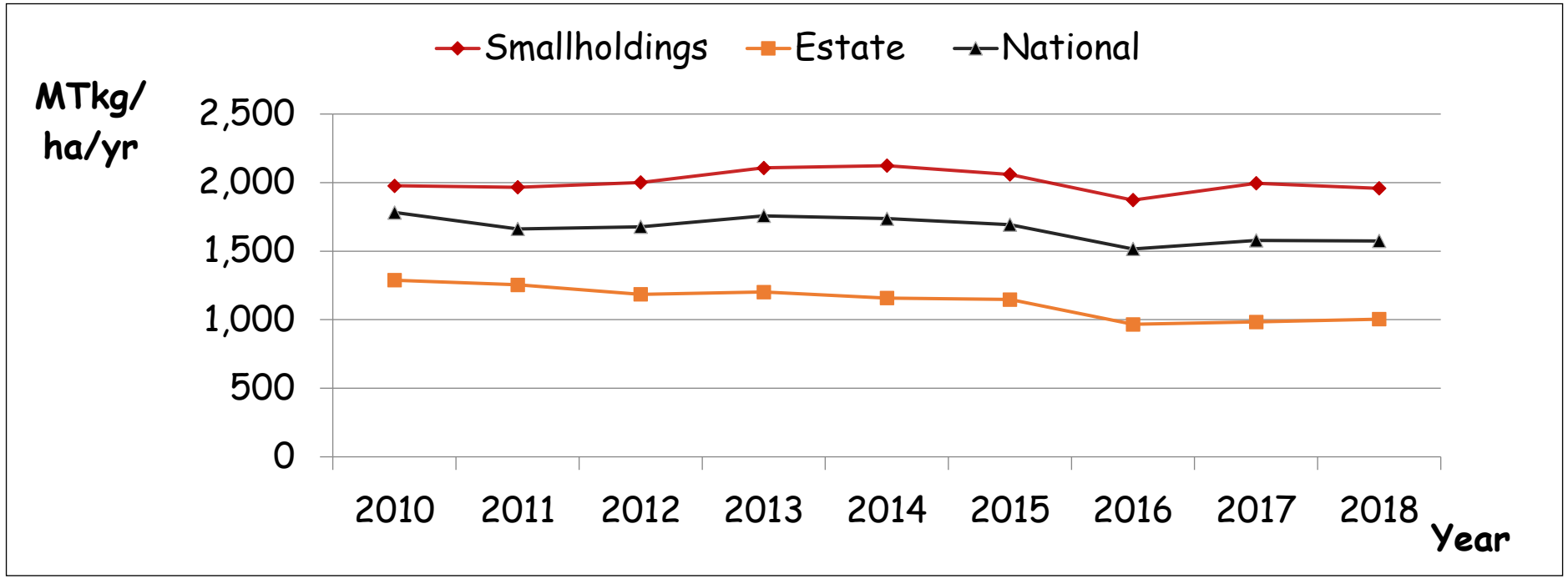
Declining tea production



Source: Sri Lanka Tea Board

Challenges in Tea Sector

Declining tea yield



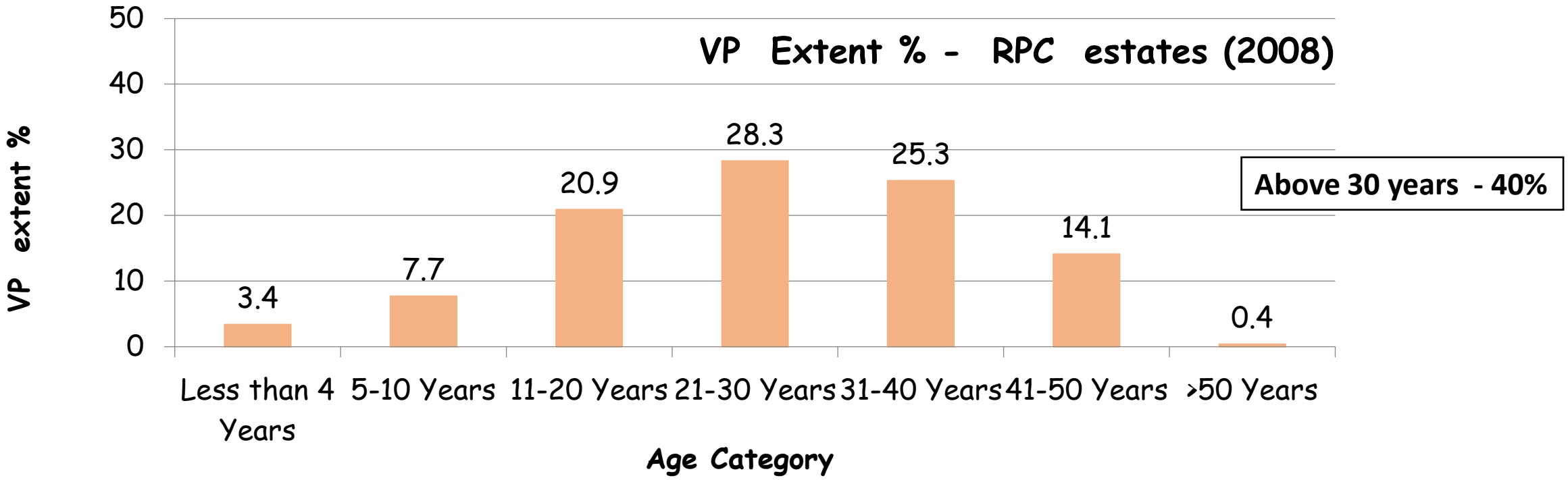
CAGR %	
Estate sector	-1.57
Smallholdings	-0.11
National	-0.64

Average yield of mid country estates in 2008 has reduced by 2.5% as compared with 2002.

Source: Statistical information on plantation crops. 2018, MPI, Diagnostic survey, TRI, 2008

Challenges in Tea Sector

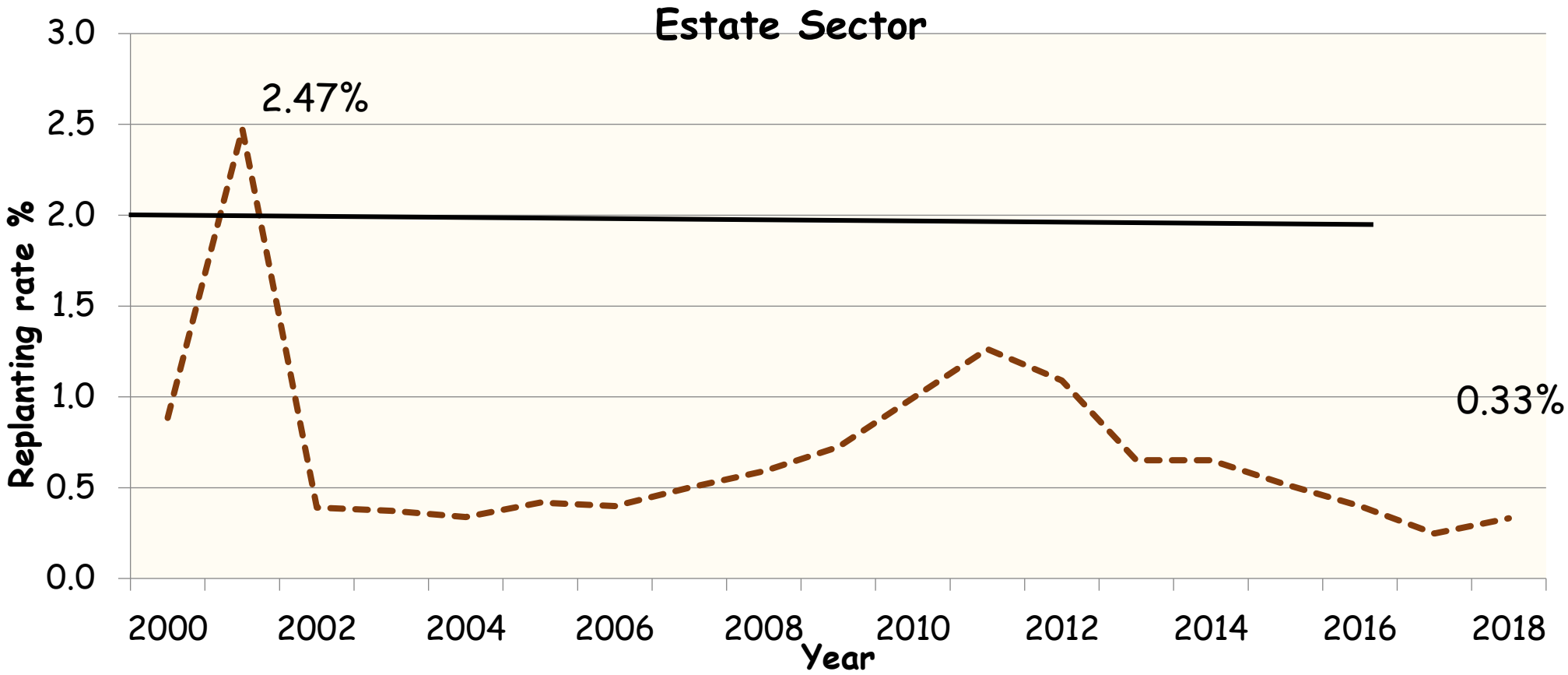
Aging of tea bushes



Source: Agronomic profile of corporate sector tea plantations in Sri Lanka,2008

Challenges in Tea Sector

Low rate of Replanting & Infilling



Source: Statistical information on plantation crops 2018, MPI

Economically Productive Lifespan

Economically productive lifespan of tea bush may vary from one region to another and vegetatively propagated (VP) tea to seedling tea.

Productive lifespan of VP tea fields

Mid, Uva and Up country = 40-45 years
Low country = 20-25 years.

(Samansiri, B. A. D., Rajasinghe, J. C. K., M A Hiromi Nishanthi.2011).

Replacement age of VP tea, which is resistant to Low Country Live-wood Termite, is around 35 years and for susceptible VP tea is about 21 years (Jayakody, J.A.AM, 2003)

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Declining Trend of Yield

The declining trend of VP tea yields started at the age of

- 20 years in the Low country
- 40 years in Mid country and Uva
- 30 years in Up country

(A Diagnostic survey in the corporate tea sector, TRI, 2008).

Infilling and Replanting

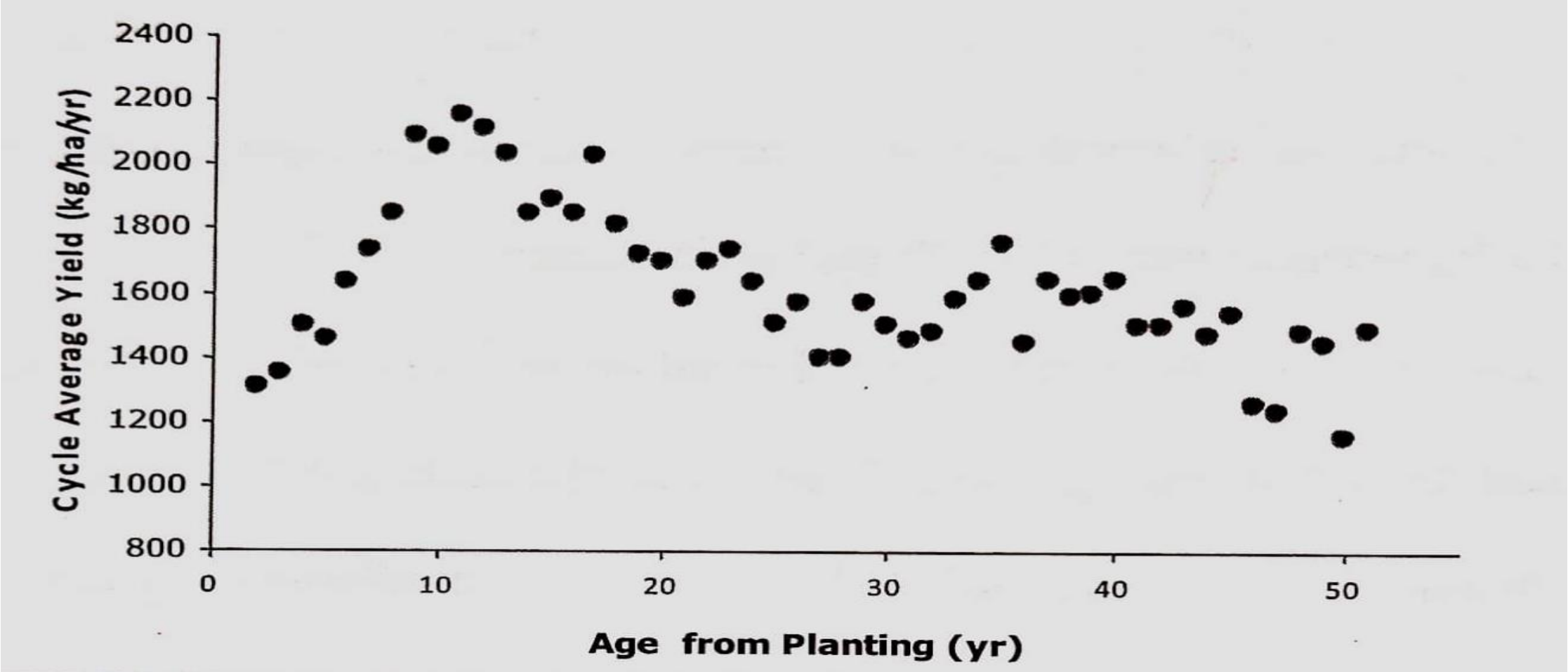
Aim of the infilling is to have an optimum bush stand per ha replacing dead or weak tea bushes that would result in optimum productivity level.

In replanting, old tea bushes replaced by improved planting materials at the end of productive lifespan in both seedling & VP teas to improve productivity of the tea lands.

Importance of Infilling and Replanting

Optimum use of land
Increase yield/production
Reduce soil erosion/nutrient loss
Reduce weed density
Reduce agro-chemical usage
Increase labour productivity/efficiency
Reduce COP

Relationship Between Casualties % and Tea Yield



Wijeratne, MA and Samansiri, BAD, 2014

Impact of Infilling on Yield & Income

Average yield of mid country VP tea = 1799 kg/ha/yr

Bush density =7500 bushes/ha

Quantity of tea produced = 0.24 kg of made tea (1.12 kg G.L)

Increasing bush density

Bush density/ha	Yield (kg/ha/yr)	Profit gain (Rs.)
7500 bushes	1799	
8000	1900 (6% increase)	Rs. 20200
9000	2160 (20%)	Rs. 72200
10000	2400 (33%)	Rs. 120200

COP =Rs.800 kg/kg
NSA = Rs. 1000/kg
Profit gain =Rs.200/kg

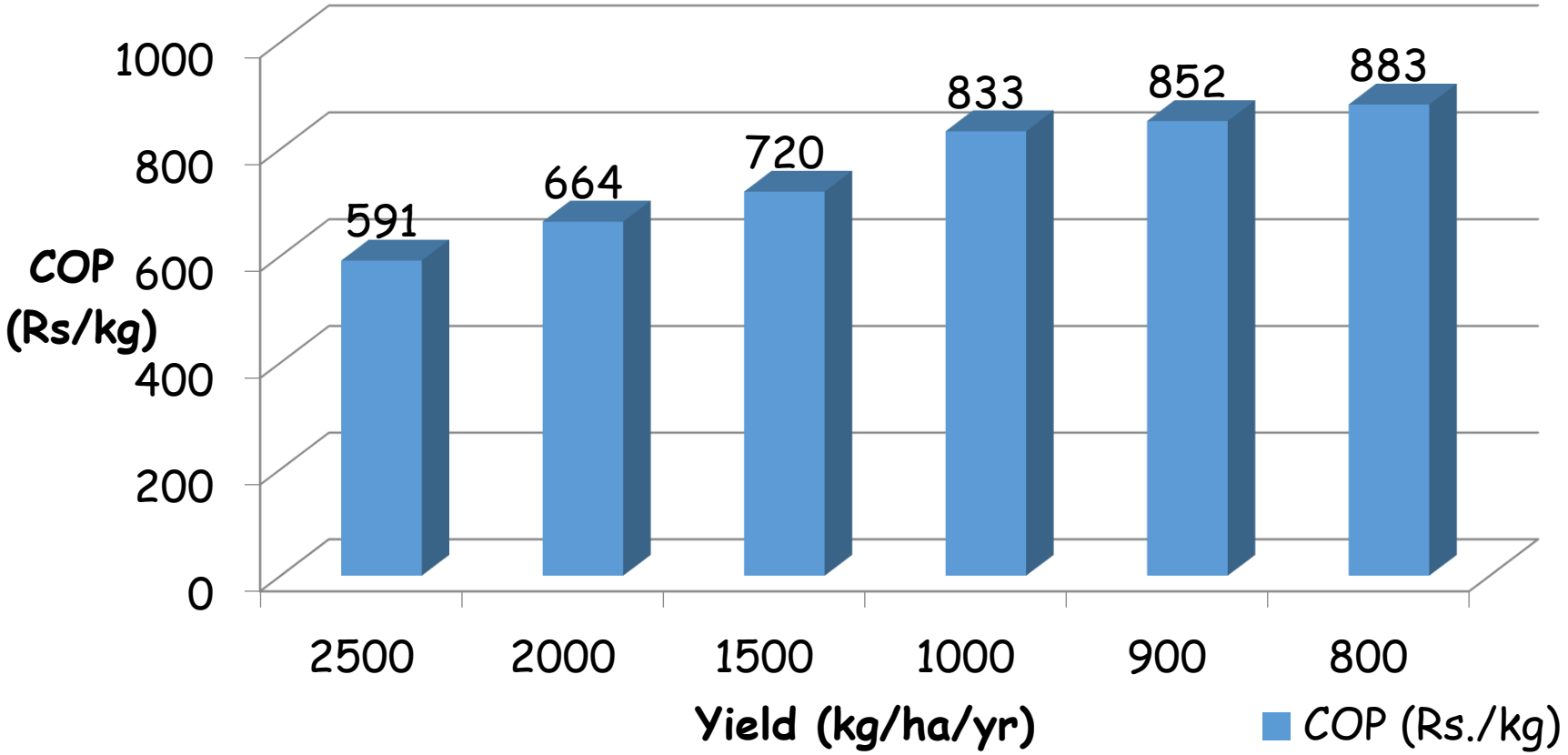
Low Labour Requirement in Tea Field with High Bush Density

Weed management in tea fields

Type of field	Manual weeding		
	LPH/ round	No. of rounds/ yr	LPH/yr
VP (100% bush cover)	10	2	20
VP (60% bush cover)	10	4	40
Poor VP/SD	14	4	56

Chemical weeding = 2 rounds/yr
Labour reqt. = 4 workers/round

Low COP in High Yielding Tea Fields



Soil Erosion in Low Bush Density Tea Lands

Agro Ecological Zone	Land Use	Soil Loss mt/ha/yr	Reference
Uva high lands Passara	VP Field	3.41	Prasad Dharmasena and M.S. Bhat (2011)
	Old seedling tea	25.52	
Tea lands in the upper catchment of Mahaweli	Well managed Tea	0.33	Manipura et.al. (1993)
	Poorly managed Tea	20 .00	

Impact of Low Rate of Replanting

Average yield of tea fields at different rate of replanting

Annual RP rate	Average yield after 10 years		Average yield after 20 years	
	Mid country	National	Mid country	National
Present yield	1758	1880	1758	1880
0.42%	1597	1811	1441	1597
2%	1666	1848	1547	1688
3%	1677	1869	1684	1838
4%	1696	1890	1773	1936

National level

Yield – declined by 3.7% (after 10 years) → 0.42% RR

Yield – improved by 3% (after 20 years) → 4% RR

Mid country

Yield – declined by -9.2% (after 10 years) → 0.42% RR

Yield – improved by 0.8% (after 20 years) → 4% RR

Capital Investment

Cost of infilling (Rs/ha)

Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
Labour (MD)	137	13	257	132	32	32	602
Labour cost	1,57,700	14.800	2,95,900	1,51,800	36,200	36,200	6,92,600
Material cost	1,72,900	18,300	2,94,700	1,32,300	1,41,100	1,41,100	9,00,400
Total cost	3,30,600	33,100	5,96,600	2,84,100	1,77,300	1,77,300	1,593,000

Assumed 30% vacancies in tea fields

Average yield = 1799 kg/ha/yr

Market rate of fetiliser price (Rs/kg)

U625 – 290
T200 – 245
T750 - 255
ZnSo4 - 400

Capital Investment

Cost of Replanting (Rs/ha)

Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
Labour (MD)	812	68	1007	471	136	131	2625
Labour cost	9,34,000	78.200	1,158,000	5,41,650	1,56,400	1,50,650	3,018,900
Material cost	5,95,700	65,900	9,64,600	4,47,200	4,76,400	4,76,400	2,549,800
Total cost	1,529,700	1,44,100	2,122,600	9,88,850	6,32,800	6,27,050	**6,045,100**

Mechanical land preparation and holing
Current wage rate = Rs. 1150/MD
Market rate of fetiliser price (Rs/kg)

U625 – 290
T200 – 245
T750 - 255
ZnSo4 - 400

Labour cost – 50%

Cost of soil rehabilitation – 8.5%

Investment Appraisal -Infilling

Average yield (kg/ha/yr)	Tea price (Rs/kg)	BCR	NPV (Rs.)	Pay back period (Yr)
	1200	1.80	11,471,200	2
	1000	1.50	7,183,100	4
2000	800	1.20	2,895,000	8

BCR = The ratio of the benefits relative to costs
Payback period = Time taken to recover the initial capital cost
NPV = The sum of present values of costs and benefit
IRR = The rate of discount at which the NPV of the investment become zero

Investment Appraisal -Replanting

Average yield (kg/ha/yr)	Tea price (Rs/kg)	BCR	NPV (Rs.)	IRR (%)	Pay back period (Yrs)
3000	1200	1.44	6,176,700	21	9
	1000	1.20	2,825,700	15	11
	800	0.96	-5,25,307	9	15
2500	1,200	1.37	4,999.900	20	9
	1000	1.14	1,928,300	14	11
	800	0.91	-1,143,300	7	16

BCR = The ratio of the benefits relative to costs
Payback period = Time taken to recover the initial capital cost
NPV = The sum of present values of costs and benefit
IRR = The rate of discount at which the NPV of the investment become zero

Replanting vs Infilling

	Replanting	Infilling
Labour (MD)/ha	2625	602
Cost/ha (6 yrs)	6,045,100	1,593,000
Payback period (Yrs)	11	4
BCR	1.2	1.5

Replanting vs Infilling

In medium term, infilling of vacancies could be considered as economically attractive investment

-Less investment
- No income loss (in replanting Loss of income for longer period (3-4 years)
- Shorter payback period
-Less labour requirement

Replanting vs Infilling

In long term, minimum 2% replanting rate is required to achieve national targets.

Thank you for your attention