



Mapping Cocoa Productivity: Mapping Cocoa Productivity Project

World Cocoa Conference, Bavaro, The Dominican republic
22-25th May 2016

Paul Hadley
School of Agriculture, Policy and Development,
University of Reading

Mapping Cocoa Productivity Project

Aims

- To carry out a thorough characterisation of approximately 300 contrasting cocoa farms in Ghana, Indonesia and Cote d'Ivoire (age, size, variety of cocoa used, shade species present) as well as the socio-economic background of the farmers.
- To assess the agricultural practices carried out on these farms by means of farmer interviews.
- To assess yields, cropping patterns and losses to disease across the farms in the study.
- To carry out controlled interventions on a sub-set of farms.
- To ascertain what factors underlie farm-to-farm variations in yield.
- Funded by Mondelez International.

Ghana Component



- Has been running for over three years
- Interviews and regular yield assessments are carried out by CRIG staff

Key Data

- Profile of Farmers & challenges faced by farmers
- Farmer practices: What are farmers doing compared with recommended practices?
- Training
- Farm to farm variation in yield
- Seasonal variation in yield
- Factors underlying farm to farm variation
- Factors underlying seasonal variation
- Losses to blackpod
- Intervention trials

Challenges faced by farmers

Problem	% of farmers
Pest and diseases	78.0
Mistletoes	36.3
Lack of credit access	16.5

2012

Problem faced	% of farmers
Insect pests	62.4
Blackpod	43.5
Lack of credit	40.0

2014

Problem faced	% of farmers
Pests	67.4
Blackpod	55.8
Lack of credit	46.5

2015

- Pests and diseases consistently cited as major problem
- Lack of credit has increased in importance

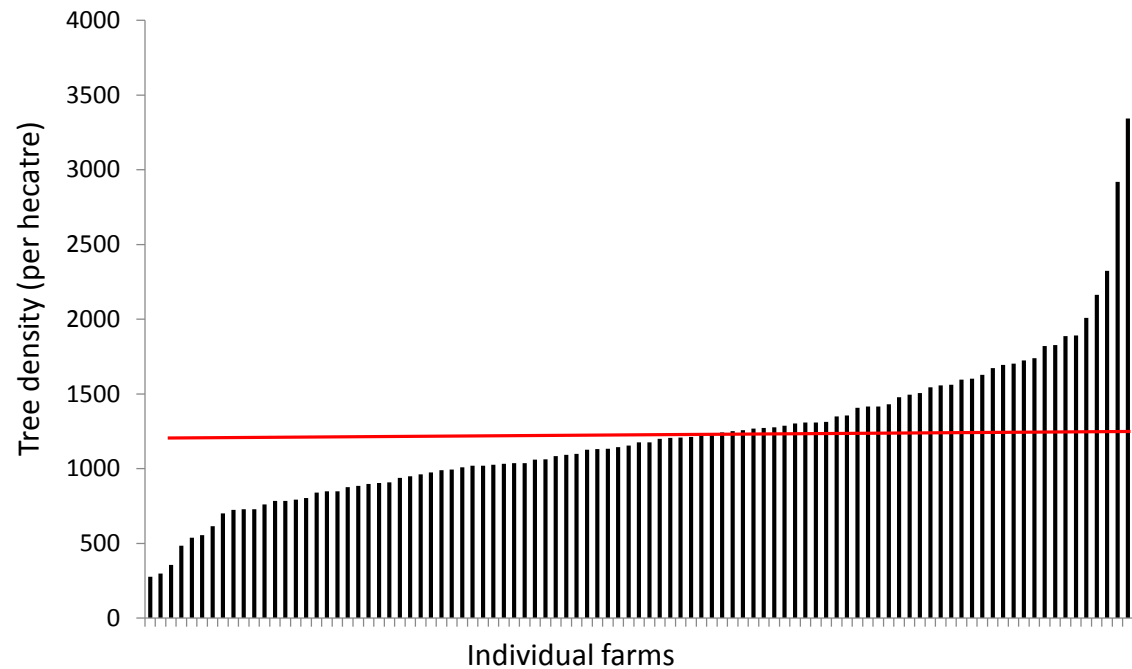
Cocoa Tree Density

Recommendation

Plant in rows at 3*3 (1111 plants ha⁻¹)

Actual

Considerable deviation from recommended density, few farmers plant in rows



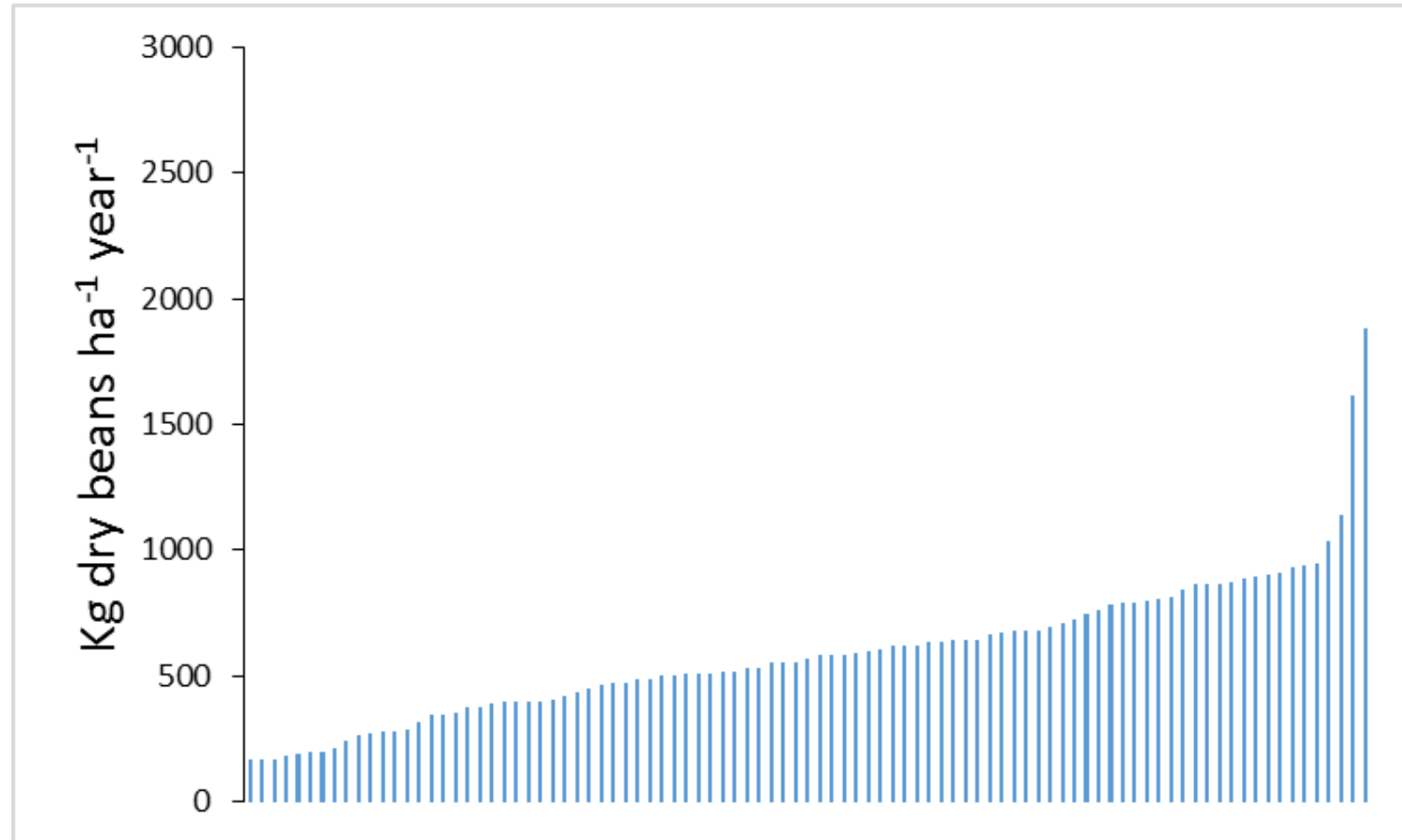
Yield Variation

Variation in yield 2012/13 based on
pod count data

Range approx. 63- 1887 kg ha⁻¹

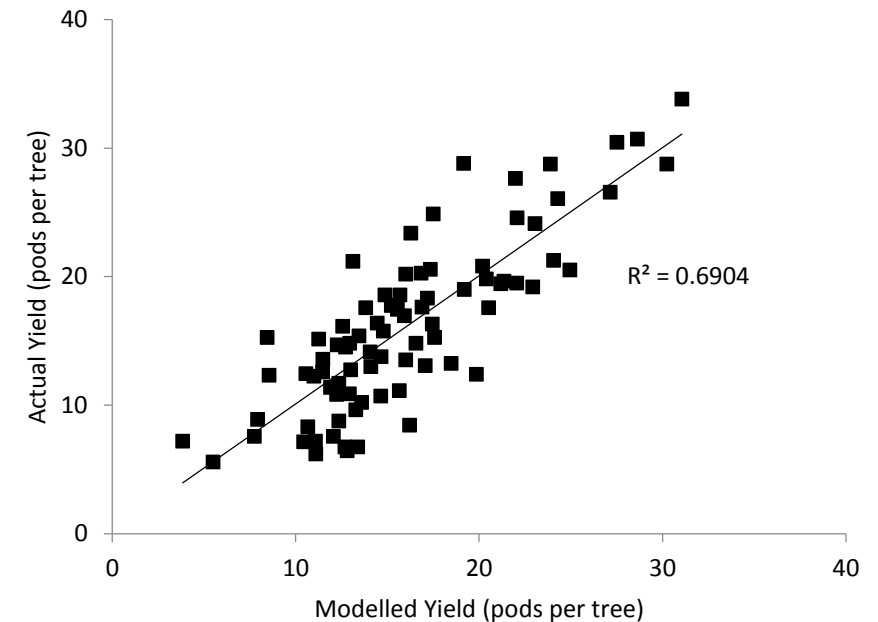
Average ~580 kg ha⁻¹

Based on pod value of 30

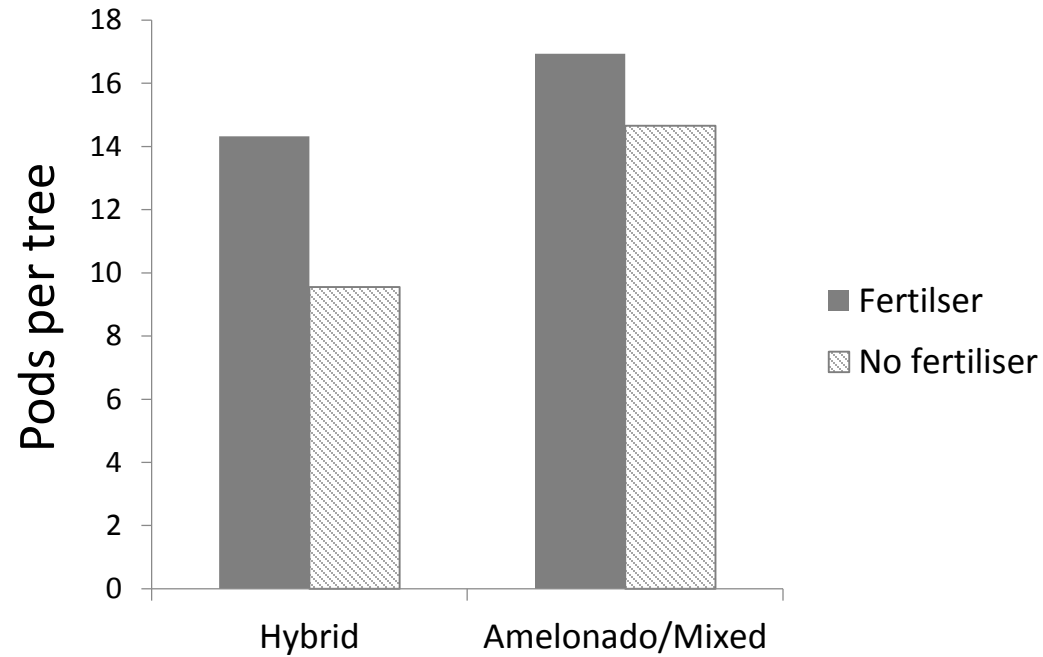


Year-2 Regression model

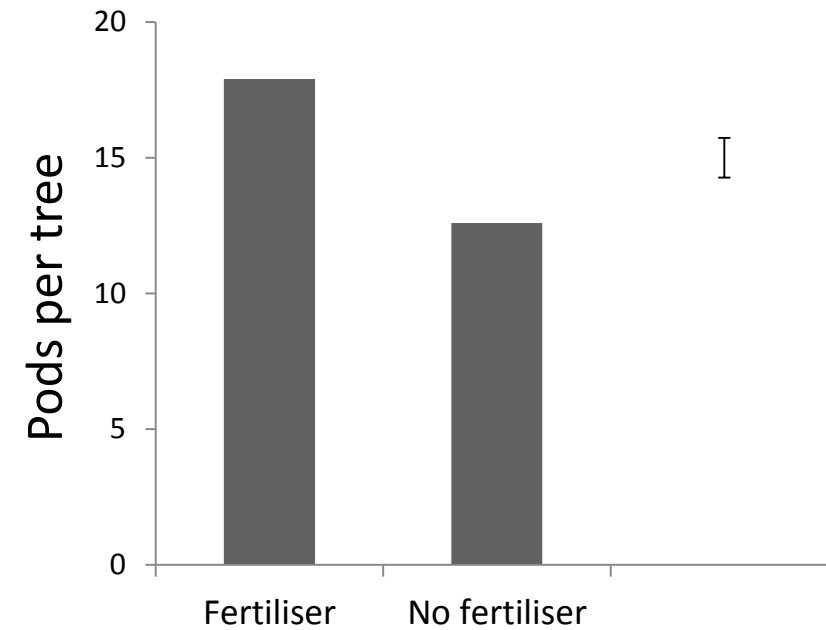
Parameter	Estimate
Constant	-22.2
Tree Age (years)	0.1005
Density (trees per hectare)	-0.00286
Fertilizer = Yes	9.60
Ln (Nitrogen)	-12.67
Ln (Phosphorus)	2.850
Sqrt (Rainfall) mm	-0.455
Sqrt (Shade) % light interception	0.16
Variety: Hybrid	56.5
Variety: Mixed	-11.6
Weeding	-4.27
pH	0.94
Age * Variety: Hybrid	-0.137
Age * Variety: Mixed	0.390
Fertilizer = YES * Variety: Hybrid	-9.96
Fertilizer = YES * Variety: Mixed	-1.20
Ln (Nitrogen) * Variety: Hybrid	18.13
Ln (*Nitrogen) * Variety: Mixed	13.35
Sqrt (Rainfall) * Variety: Hybrid	0.642
Sqrt (Rainfall) * Variety: Mixed	-0.315
Sqrt (Shade) * Variety: Hybrid	19.4
Sqrt (Shade) * Variety: Mixed	20.78
Weeding * Variety: Hybrid	4.95
Weeding * Variety: Mixed	5.79
pH * Variety: Hybrid	-3.93
pH * Variety: Mixed	4.73



Effects of fertiliser pods per tree

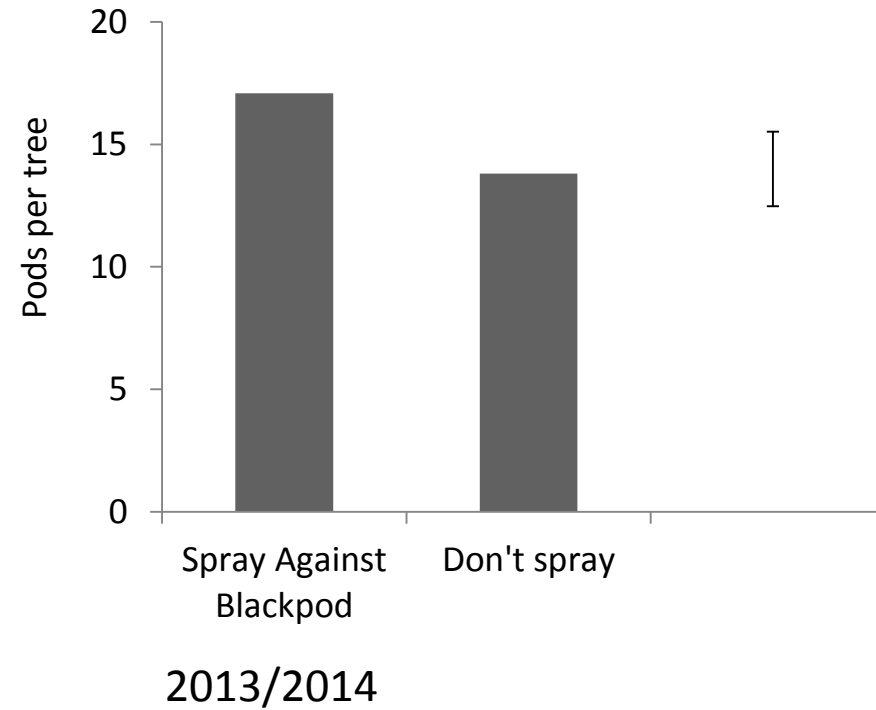
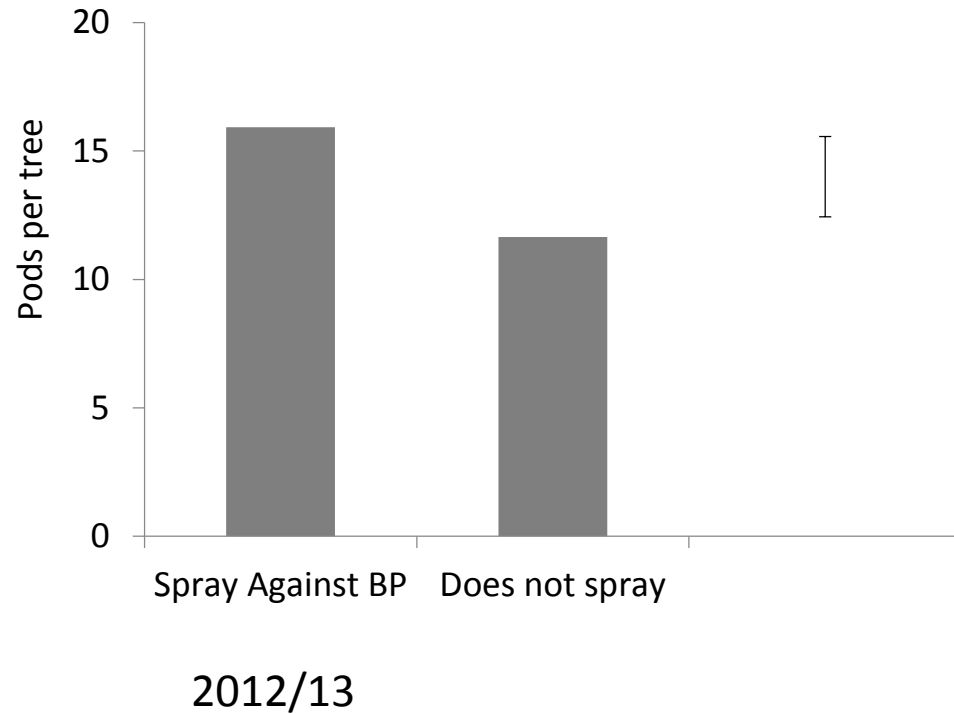


2012/13



2013/2014

Effects of spraying against blackpod on pods per hectare



Consistent features of the models

Impact of tree density

Simulated density (trees per hectare)	Pods per Tree	Pods per Hectare
Year 1 Model		
500	17.6	8,831
1111	15.6	17,350
	% Increase:	96%
Year 2 Model		
500	18.1	9,061
1111	16.4	18,192
	% Increase:	100%

- Small negative impact of increased density on pods per tree
- However large positive effect on pods per hectare
- Increasing tree density on under-planted farms a route to increased yields

Association between Intervention Programme Followed and Yield

- When the data from the two years were combined, no significant differences in yields in terms of pods per hectare were found between the different agricultural intervention programmes followed by the farmers.
- There was a trend of lower yields on those farms that follow Organic and UTZ interventions.

Relationship between socio-economic factors and yield

Relationship between level of education and cumulative yield over two years.

Level of Education	Yield (pods per hectare over two years)	Approx. Beans ha ⁻¹ equivalent over two years
No formal	32350	1078
Primary/middle	35118	1171
Secondary	44696	1490
University/ College	51777	1726

Thank you for your attention