PLANTATION INTELLIGENCE

IPNI INTERNATIONAL PLANT NUTRITION INSTITUTE

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Analysis of Commercial Data for Yield and Fertilizer Management in Oil Palm

Oberthür, Chua, Cook, Donough, Cock, Lim, Mohanaraj, Rachel & Kam

XVIII Conferencia Internacional Sobre Palma de Aceite

18th International Oil Palm Conference

cenipalma

22 al 25 de Septiembre de 2015

Cartagena de las Indias, Colombia

fedepalma

1 Conceptual Background

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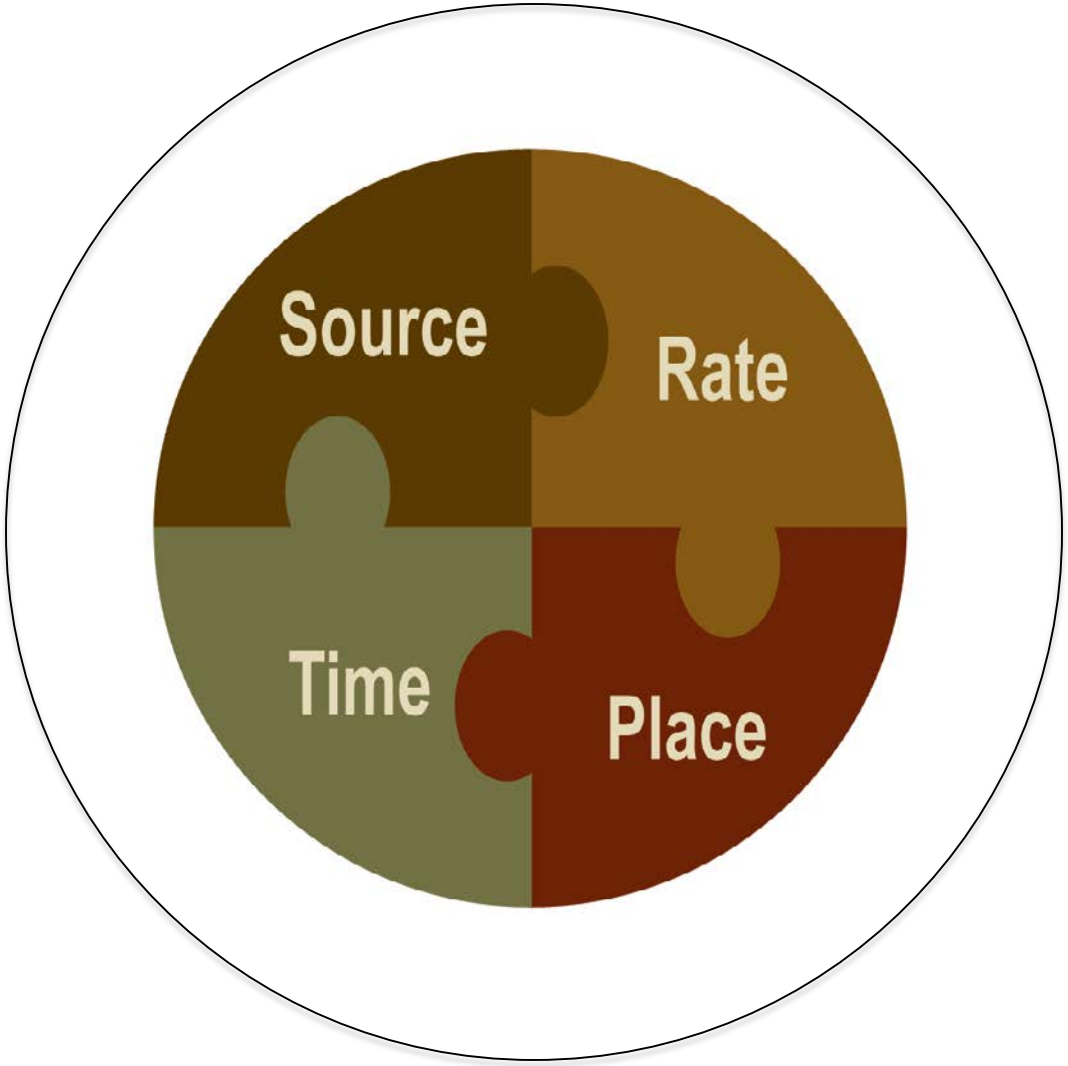
IPNI 4R Nutrient Stewardship



Decision Making Uncertainty

Complex interactions in an agronomic system render outcomes of any management decision

Uncertain

Decision Making Uncertainty

METRIC
Uncertainty about rate & placement of fertilizer to support a yield target

TRANSLATIONAL
Uncertainty from external factors that reduce fertilizer performance, e.g. harvest, mill and transport efficiency

Example:

ROI in Fertilizer

TEMPORAL
Uncertainty about timing of fertilizer applications, e.g. drought interference

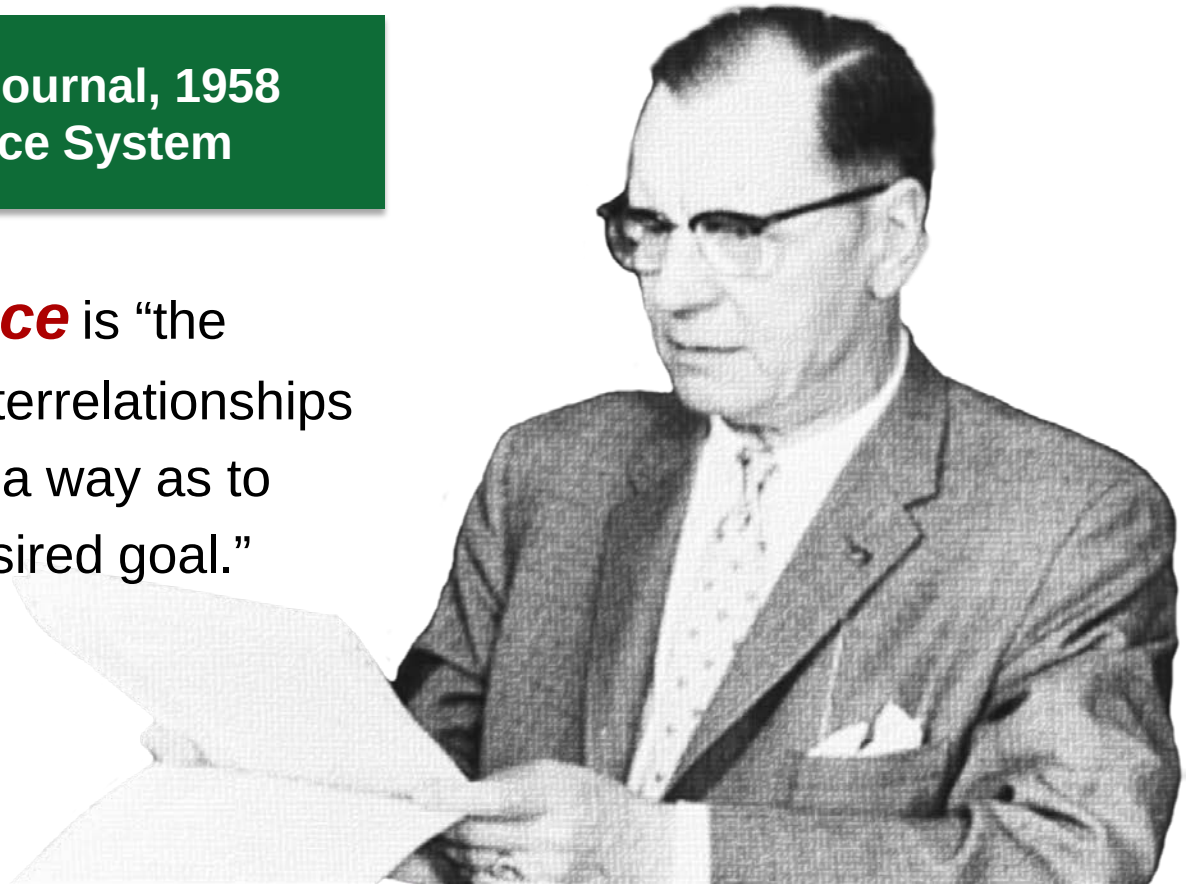
STRUCTURAL
Uncertainty from internal factors that influence fertilizer efficiency, e.g. EFB applications

*Cook et al. Better Crops **97,** 17 - 20 (2013)*

Business Intelligence

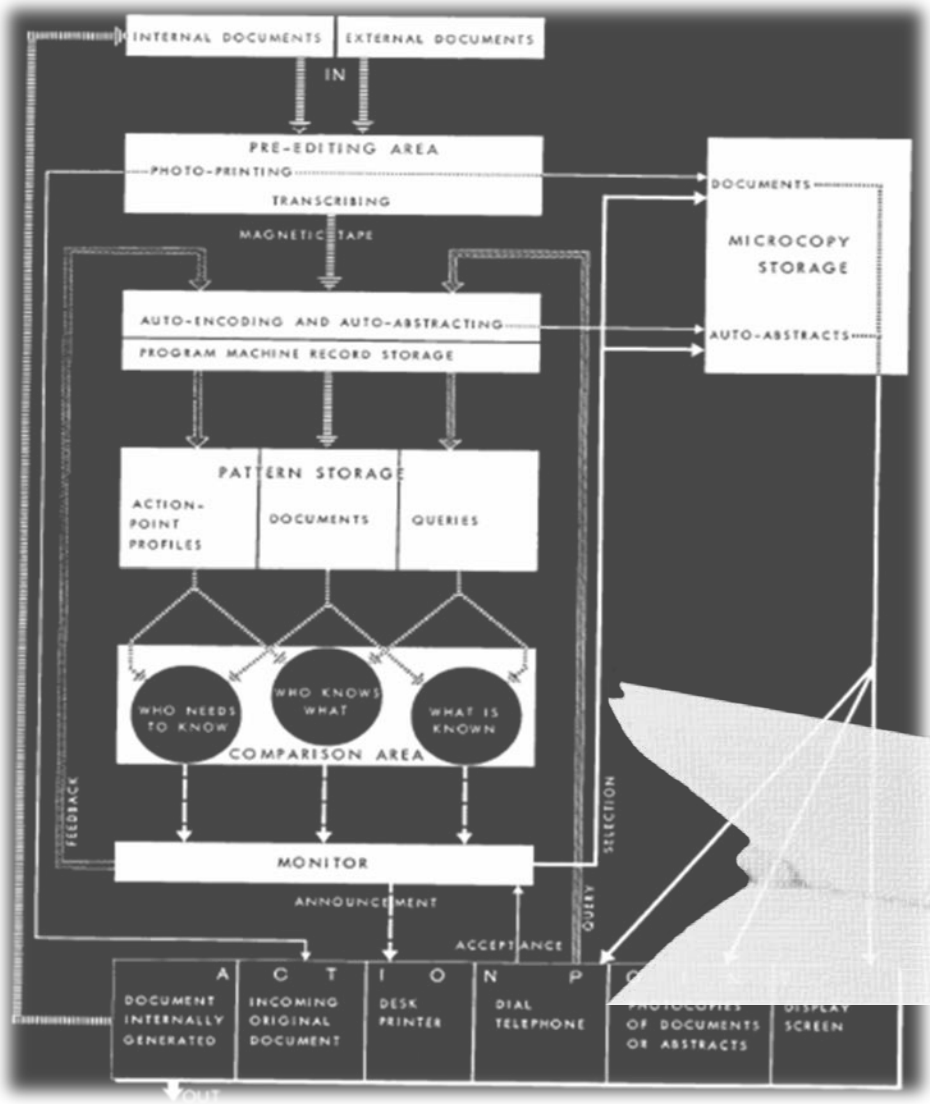
Hans Peter Luhn, IBM Journal, 1958
A Business Intelligence System

(business) intelligence is "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal."



http://www.bireports.co.uk/blog/tag/hans-peter-luhn/

Business Intelligence



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System is Monitored
in Extraordinary Detail

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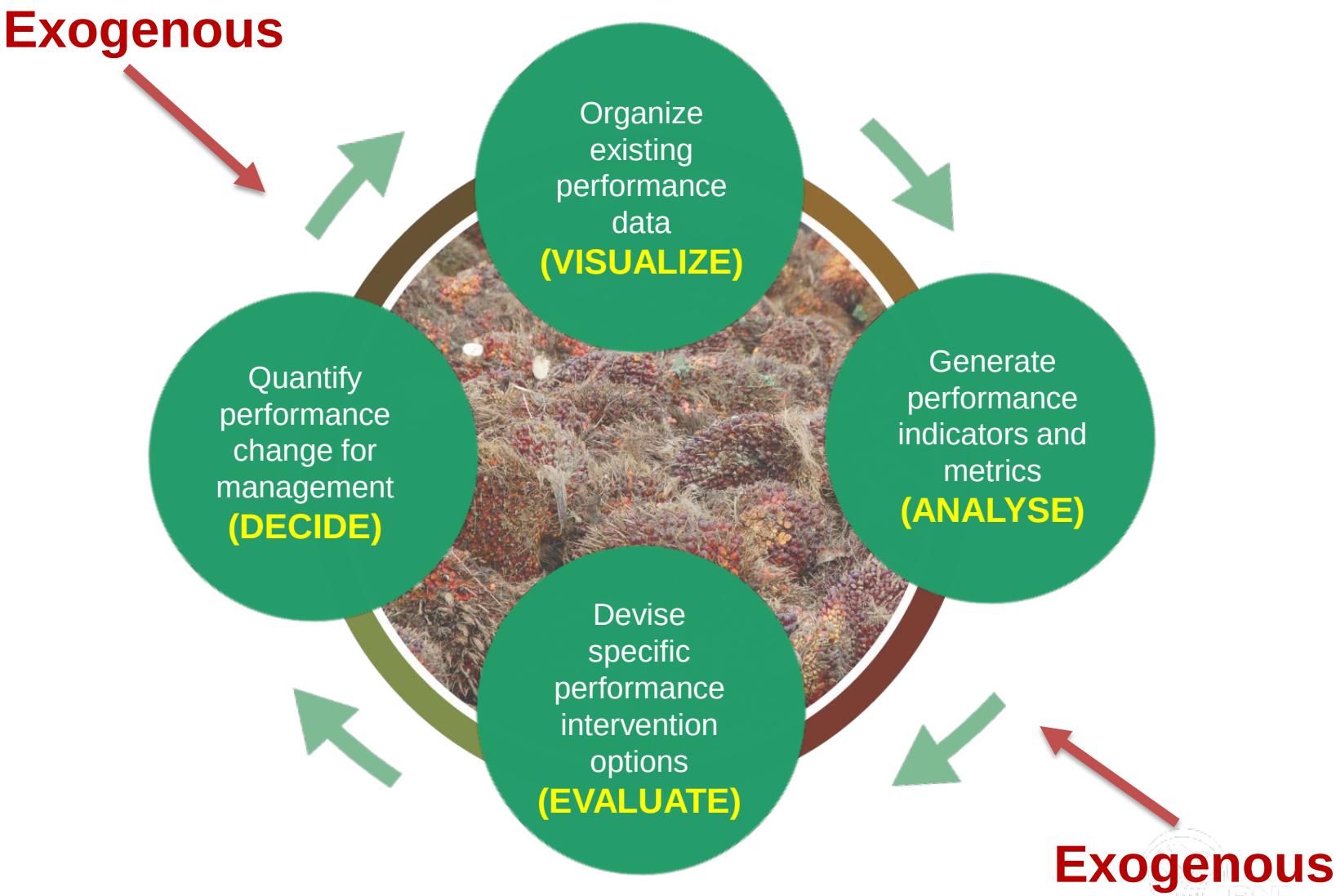

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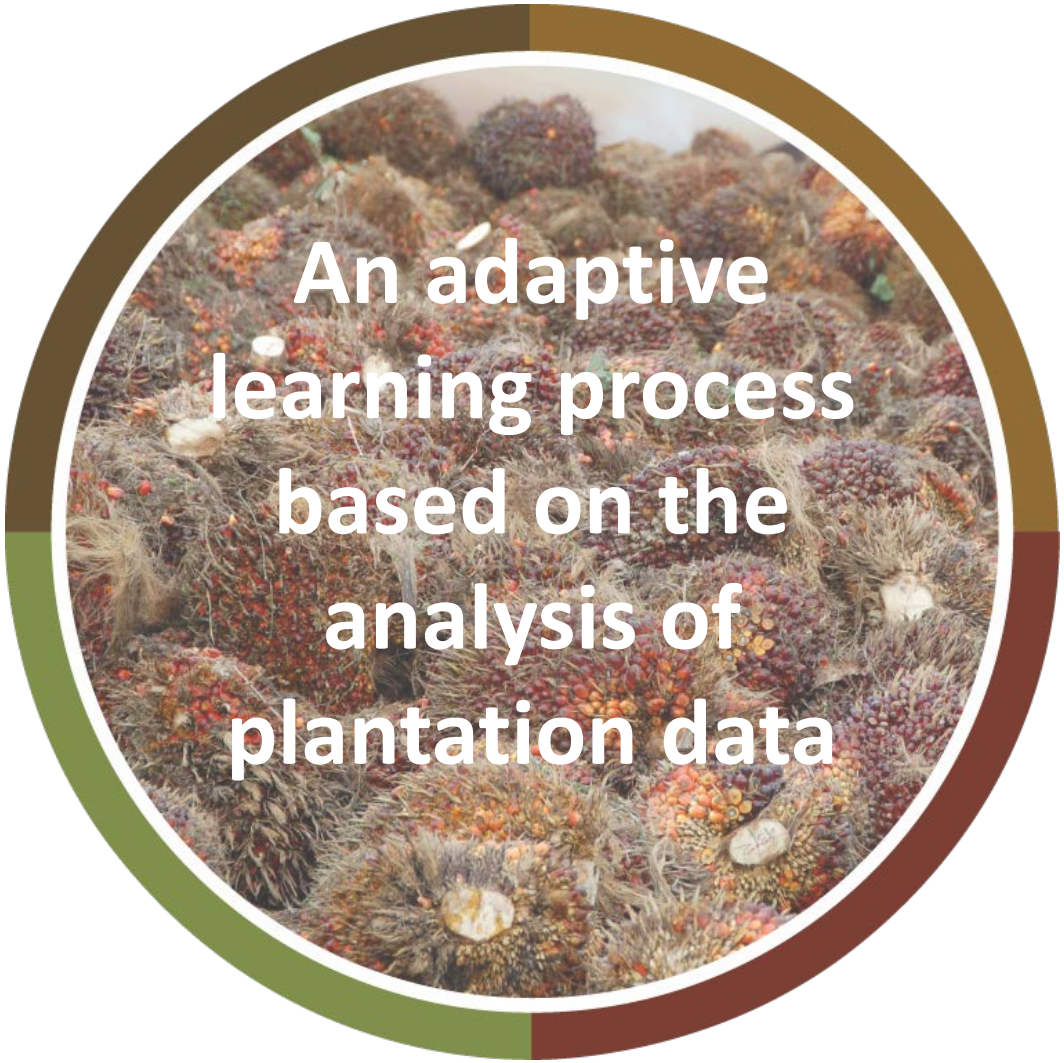

2 Application Examples

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Current Protocols

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7

Yield Age Profiling

Yield Trends

Naïve Gross Margins

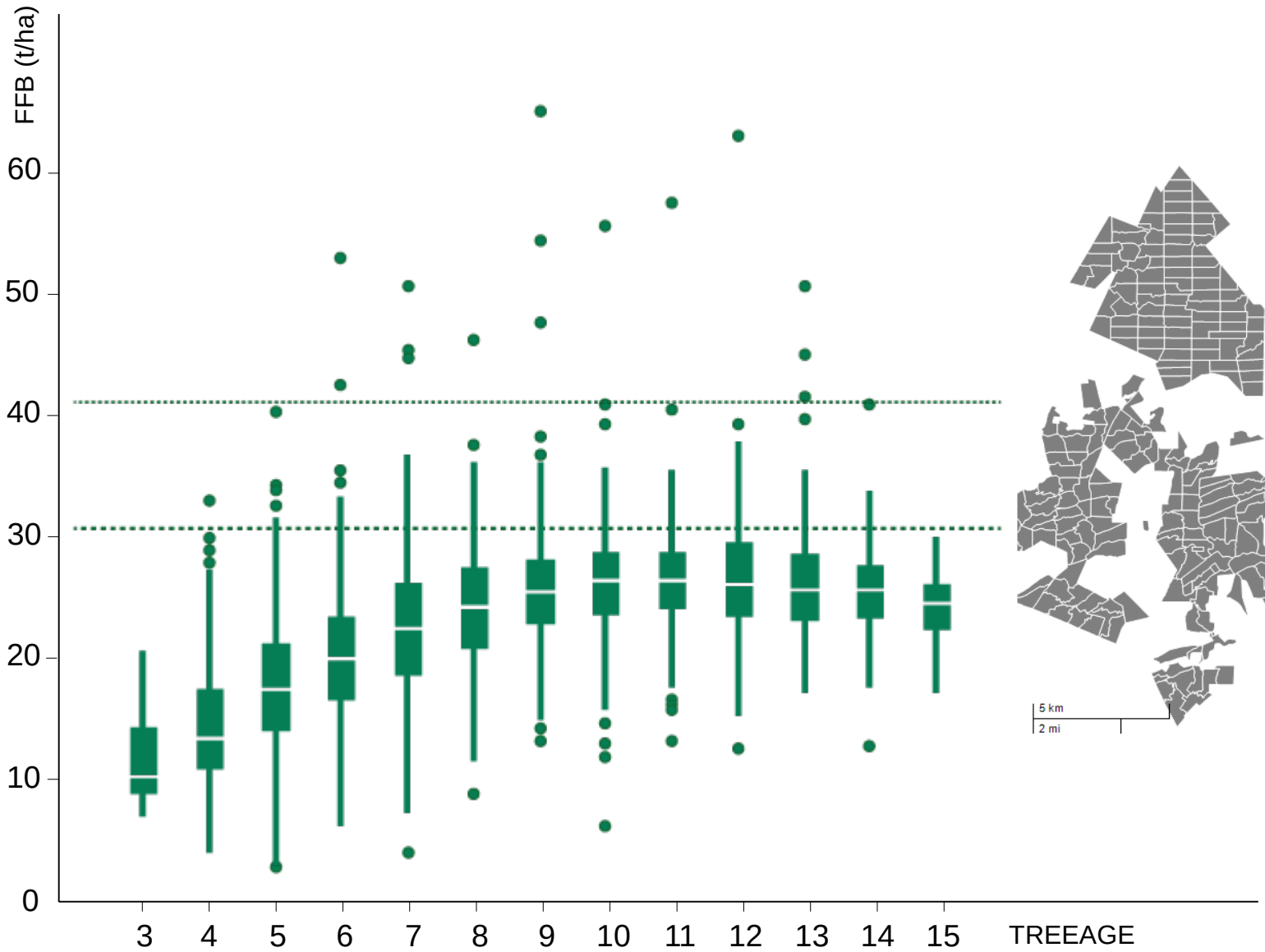
Yield Soil Interactions

Yield Soil Climate Interactions

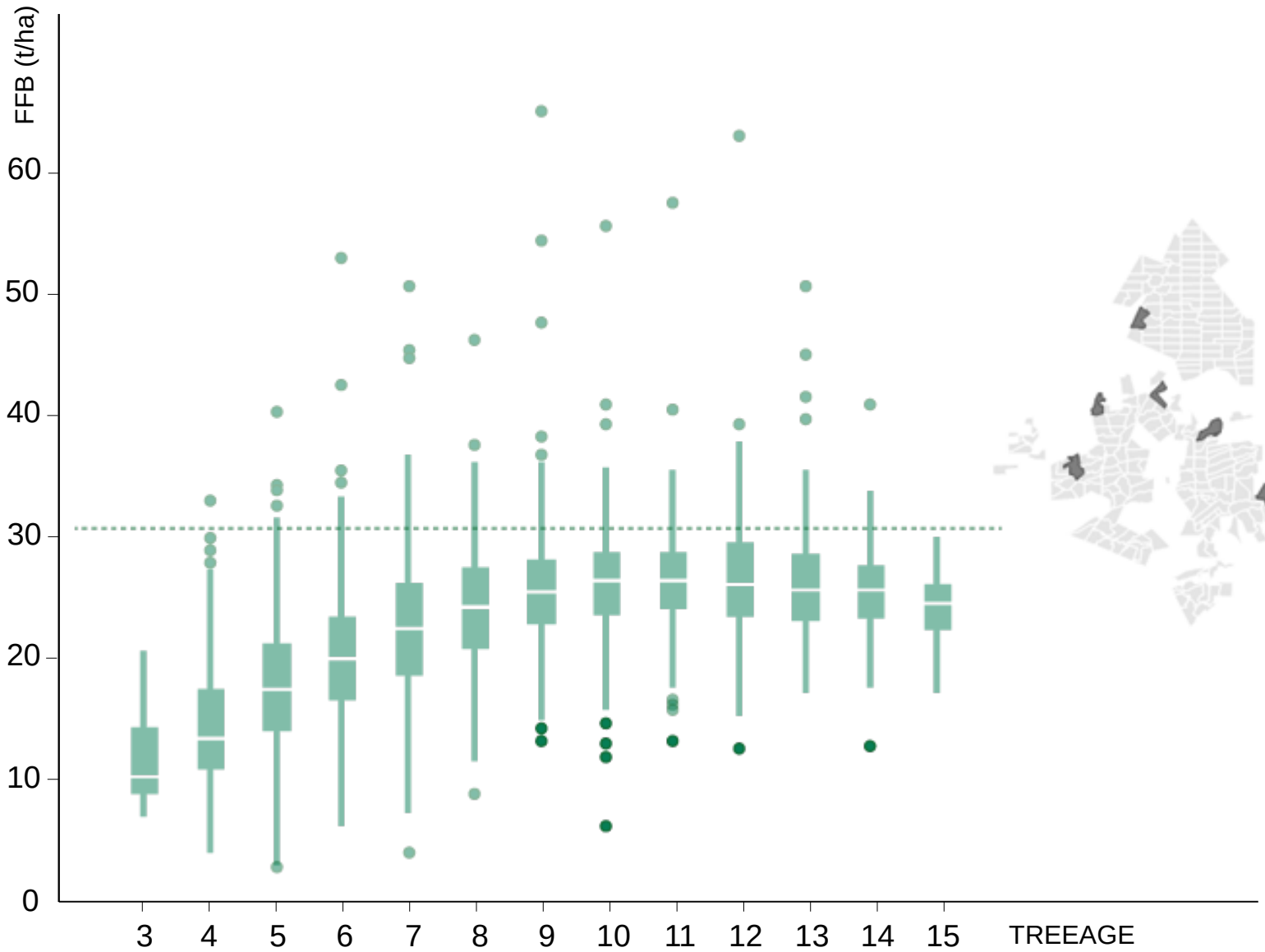
Yield Labor Interactions

Fertilizer Response Analyses

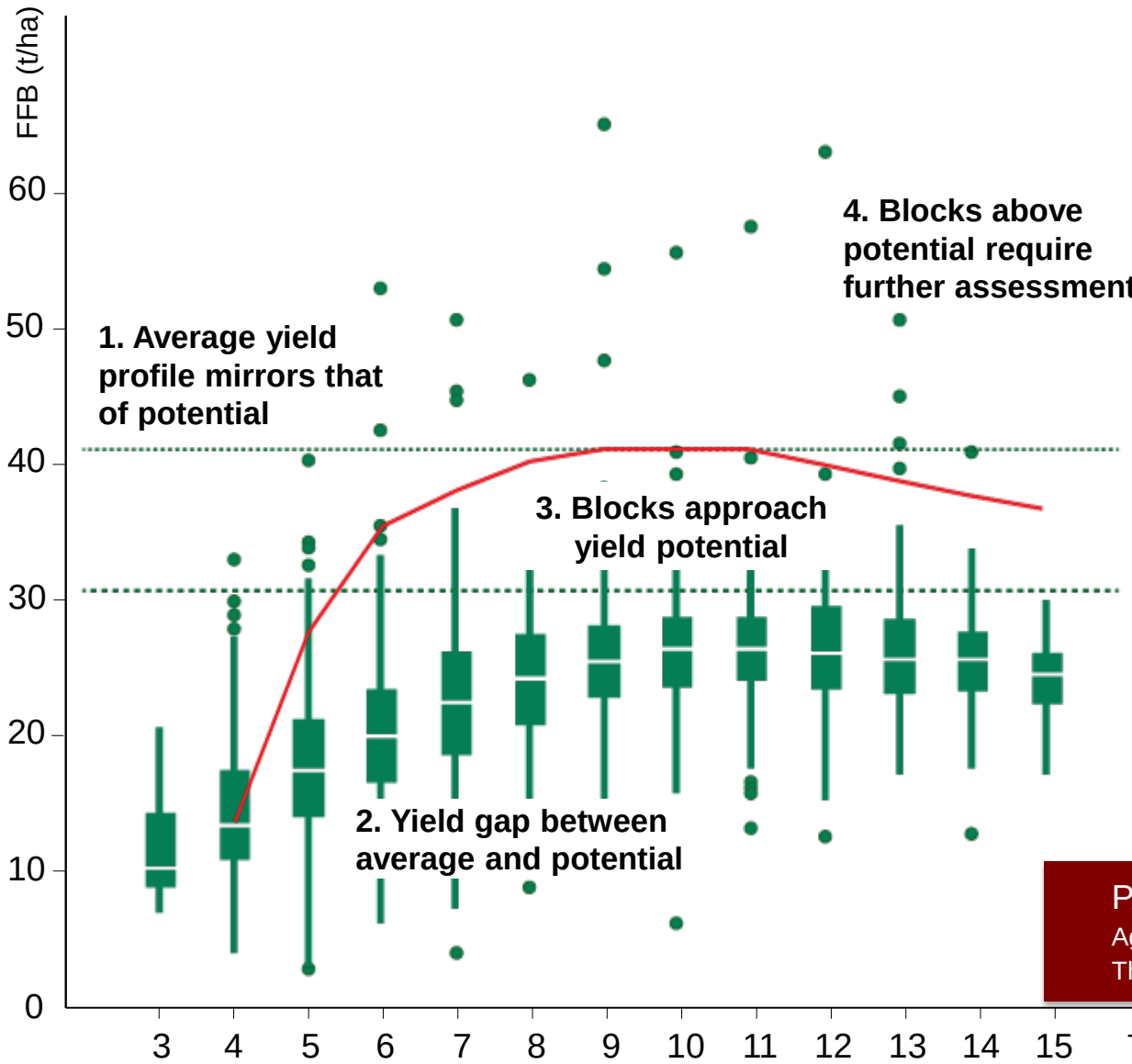
Yield Age Profiling

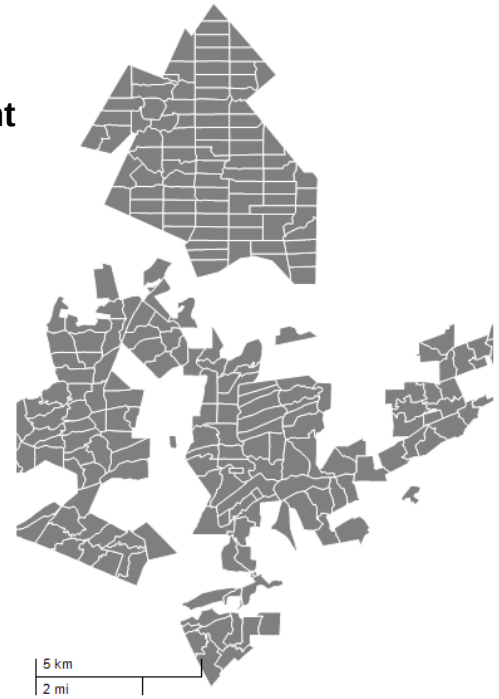


Yield Age Profiling



Yield Benchmarking





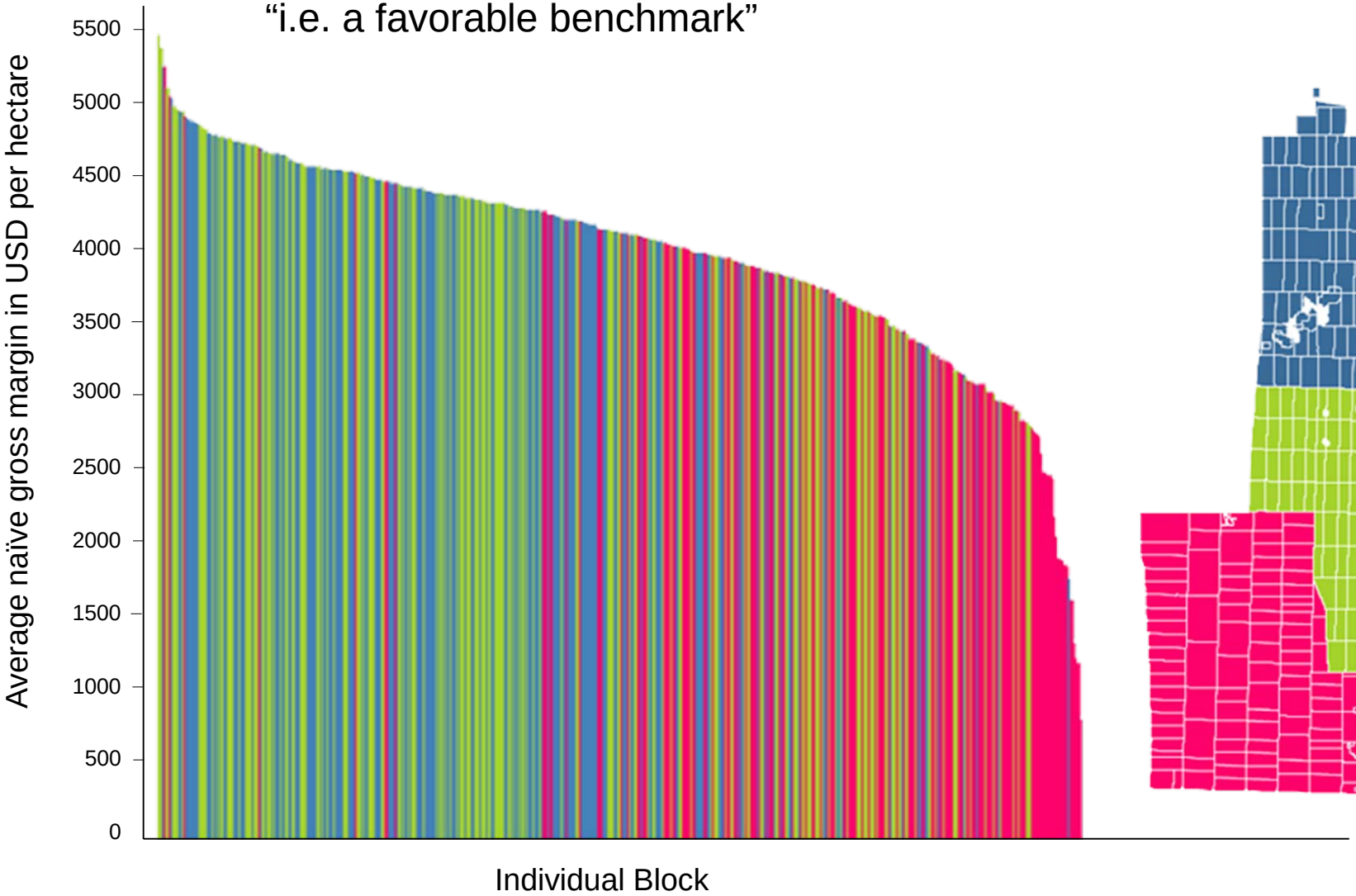
PALMSIM Model

Agricultural Systems, 131:1-10 (2014)

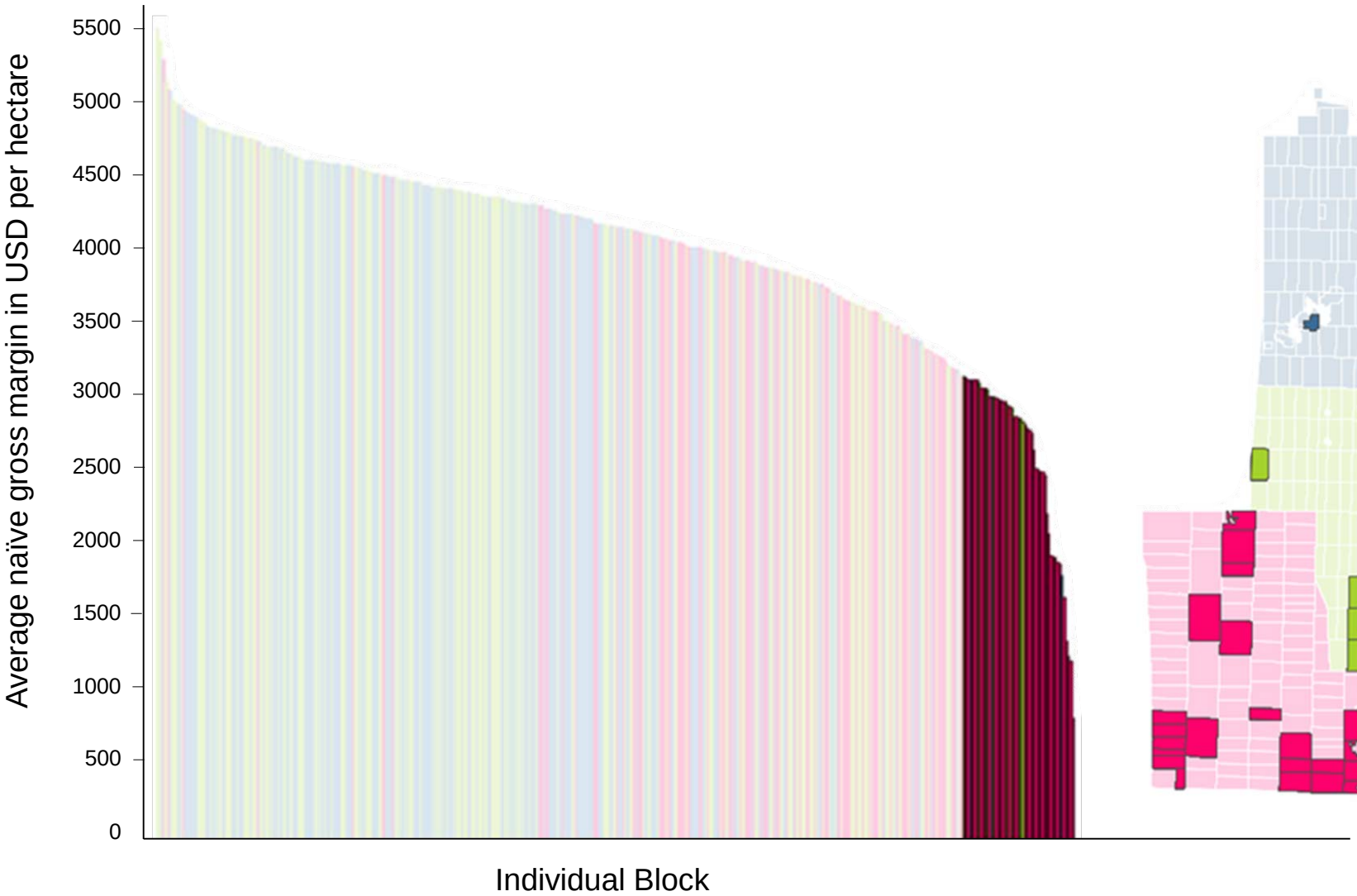
The Planter, 91: 81-96 (2015)

Naïve Gross Margins

Cost = 500 $US per ha per year
“i.e. a favorable benchmark”



Naïve Gross Margins



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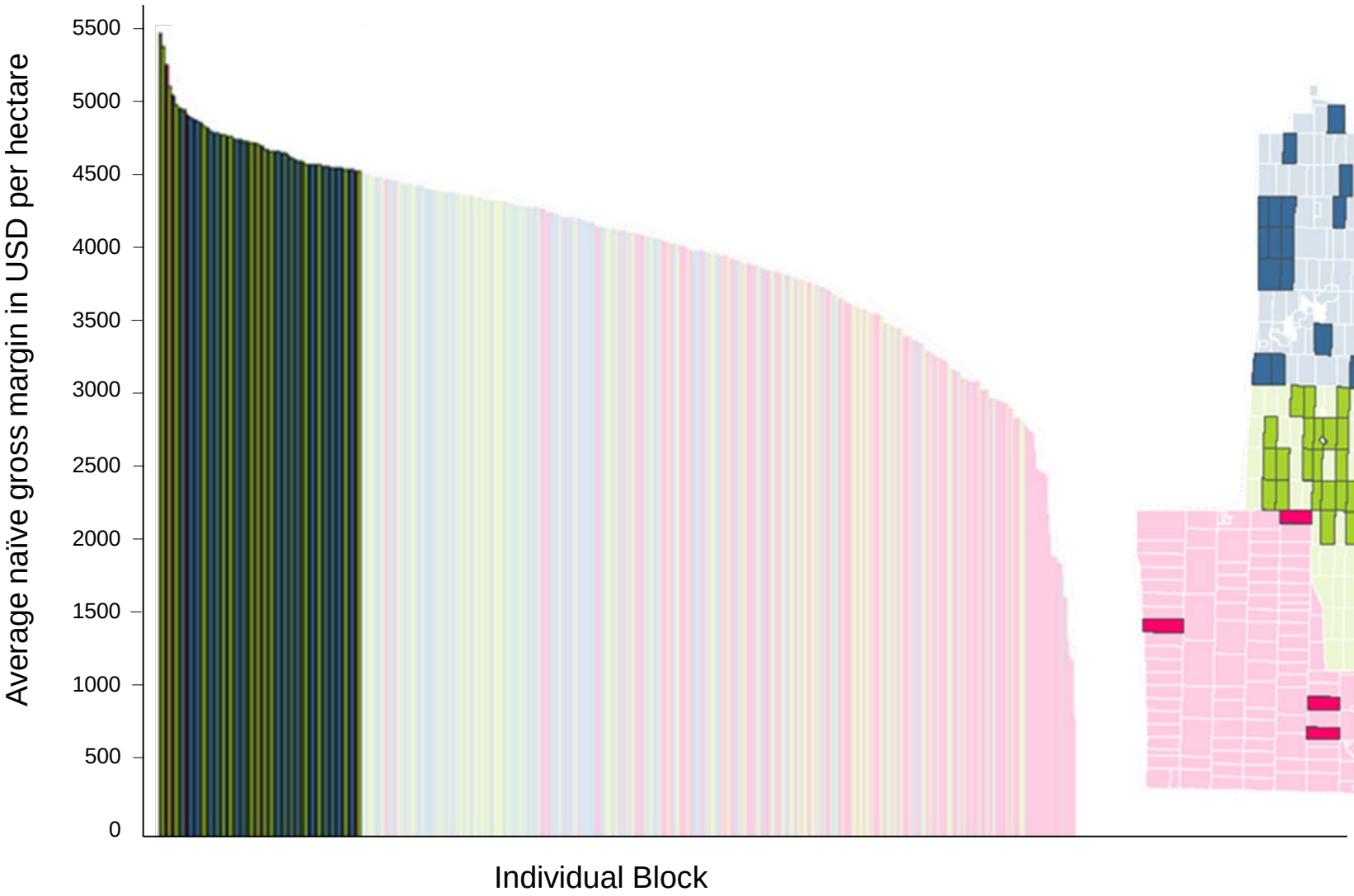

3 Response to Fertilizer

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Return on Investment

BREAK–EVEN

point

8 kg ~ 10 kg fresh fruit

bunches per kg nutrients

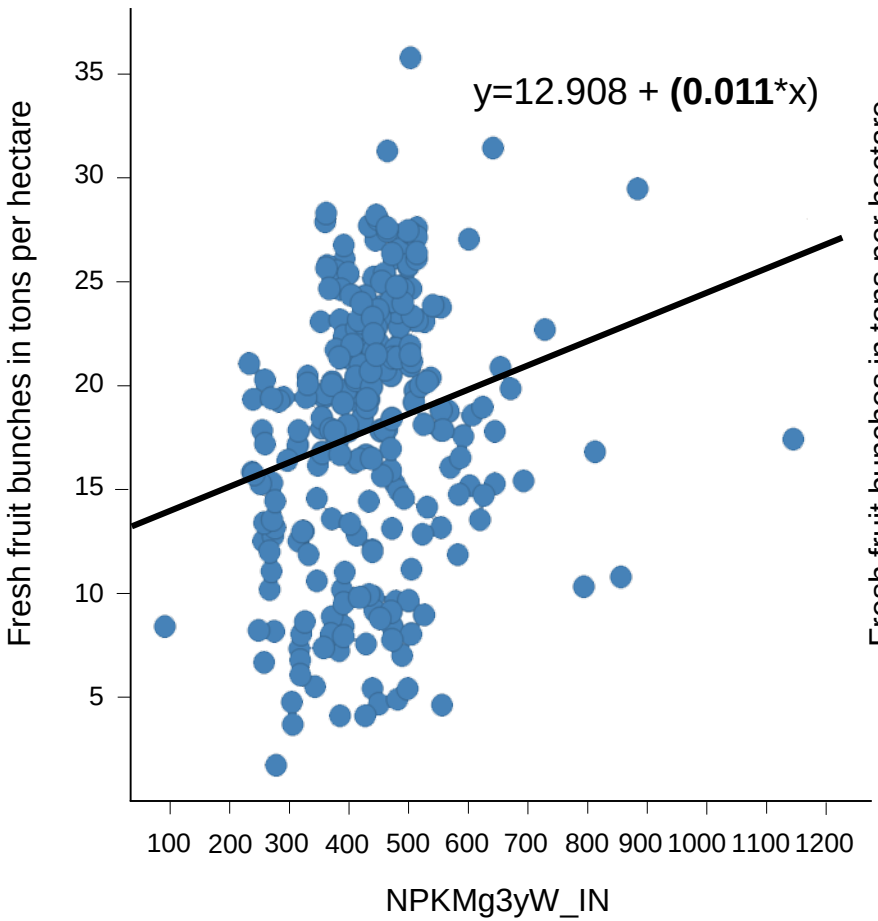
Return on Investment

Sum of NPKMg

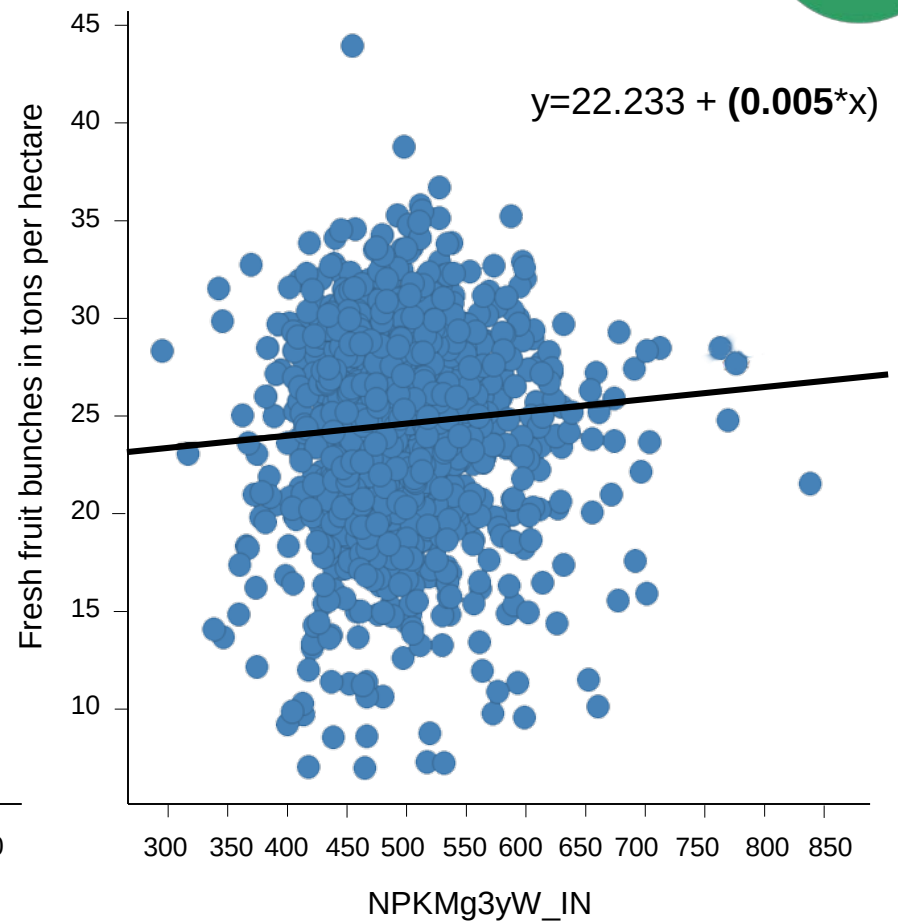
2.5 years to 0.5 year before harvest

Tree Age Effects

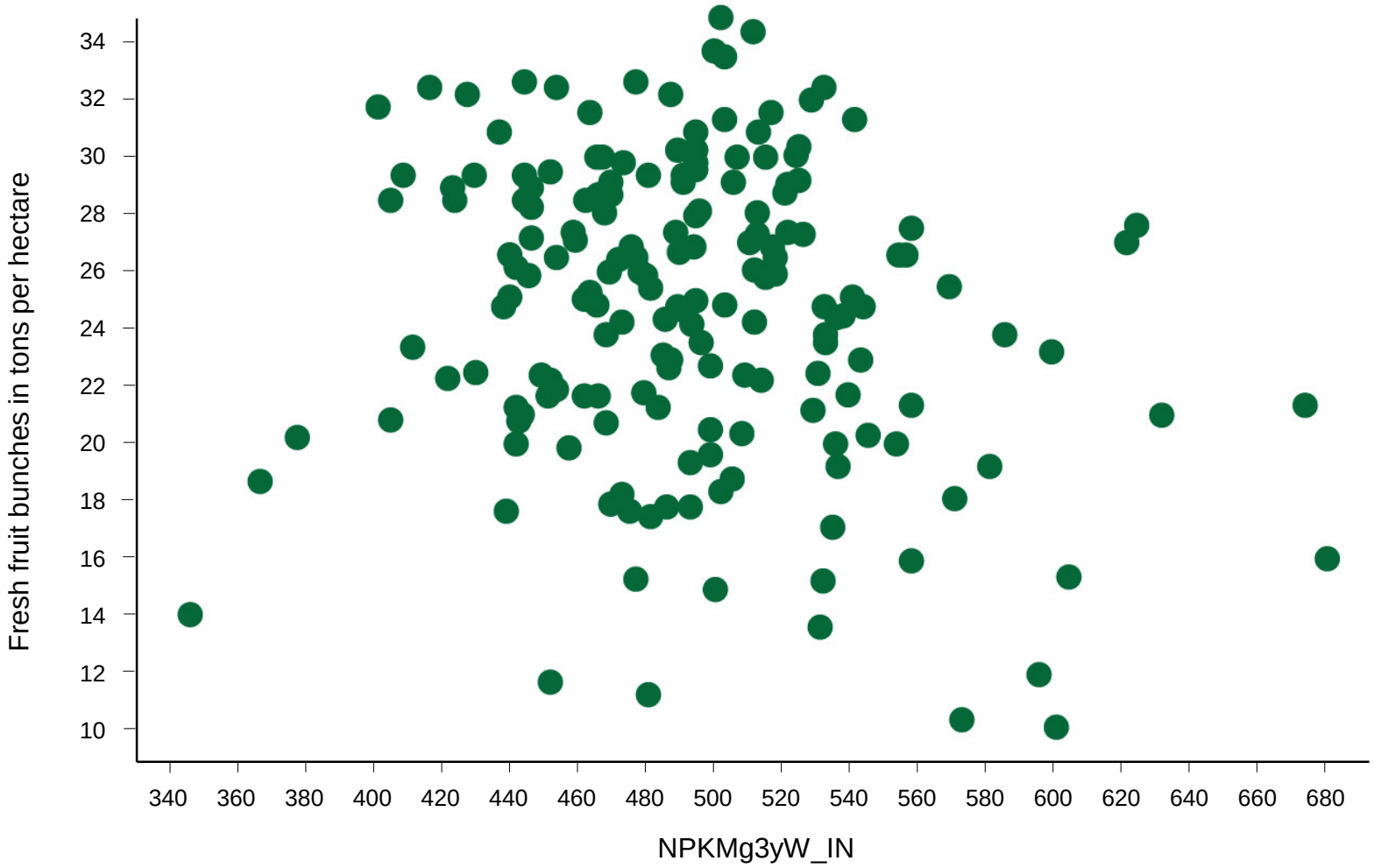
Steep Ascent : Palm age from 3-5



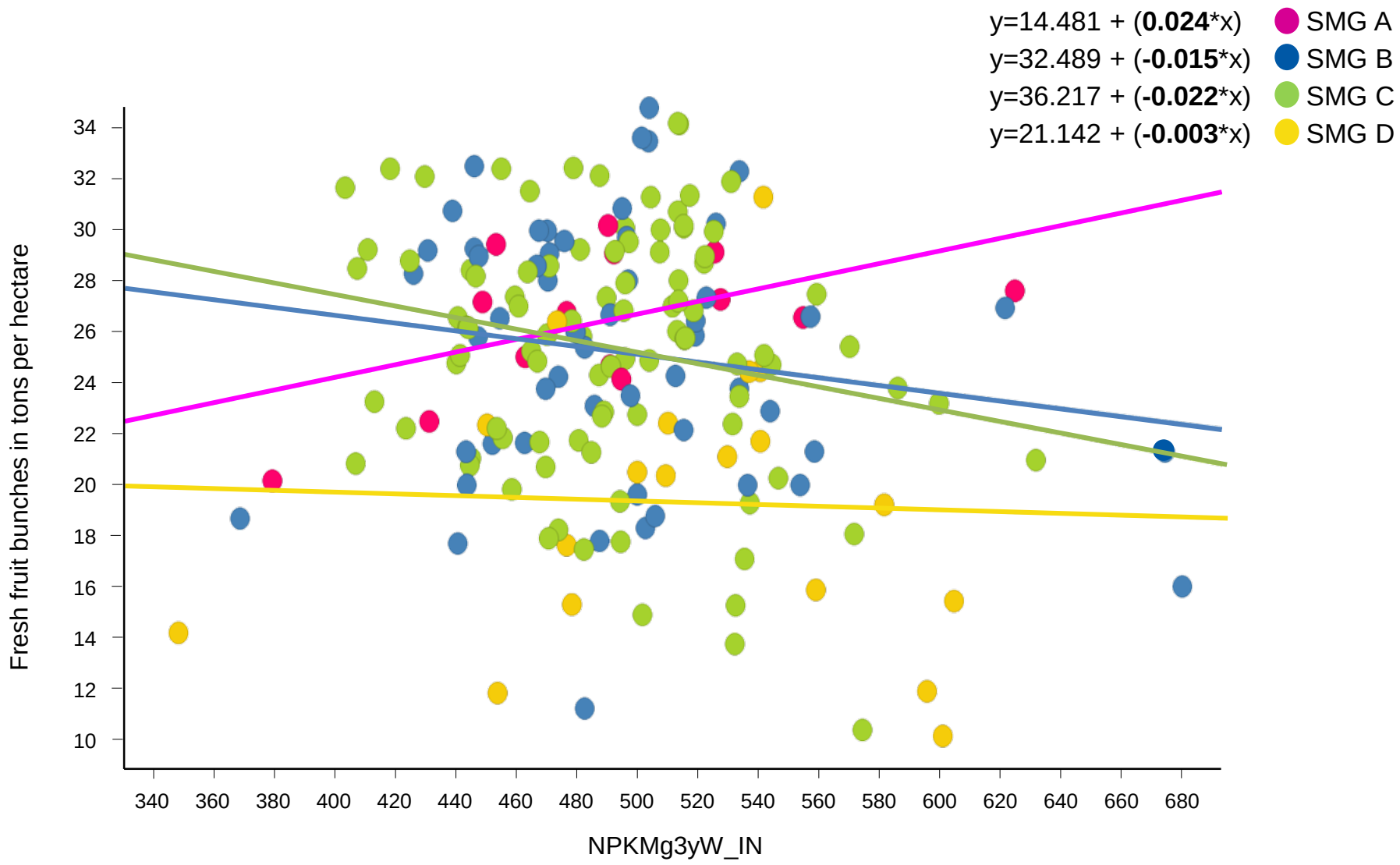
Plateau : Palm age from 6-13



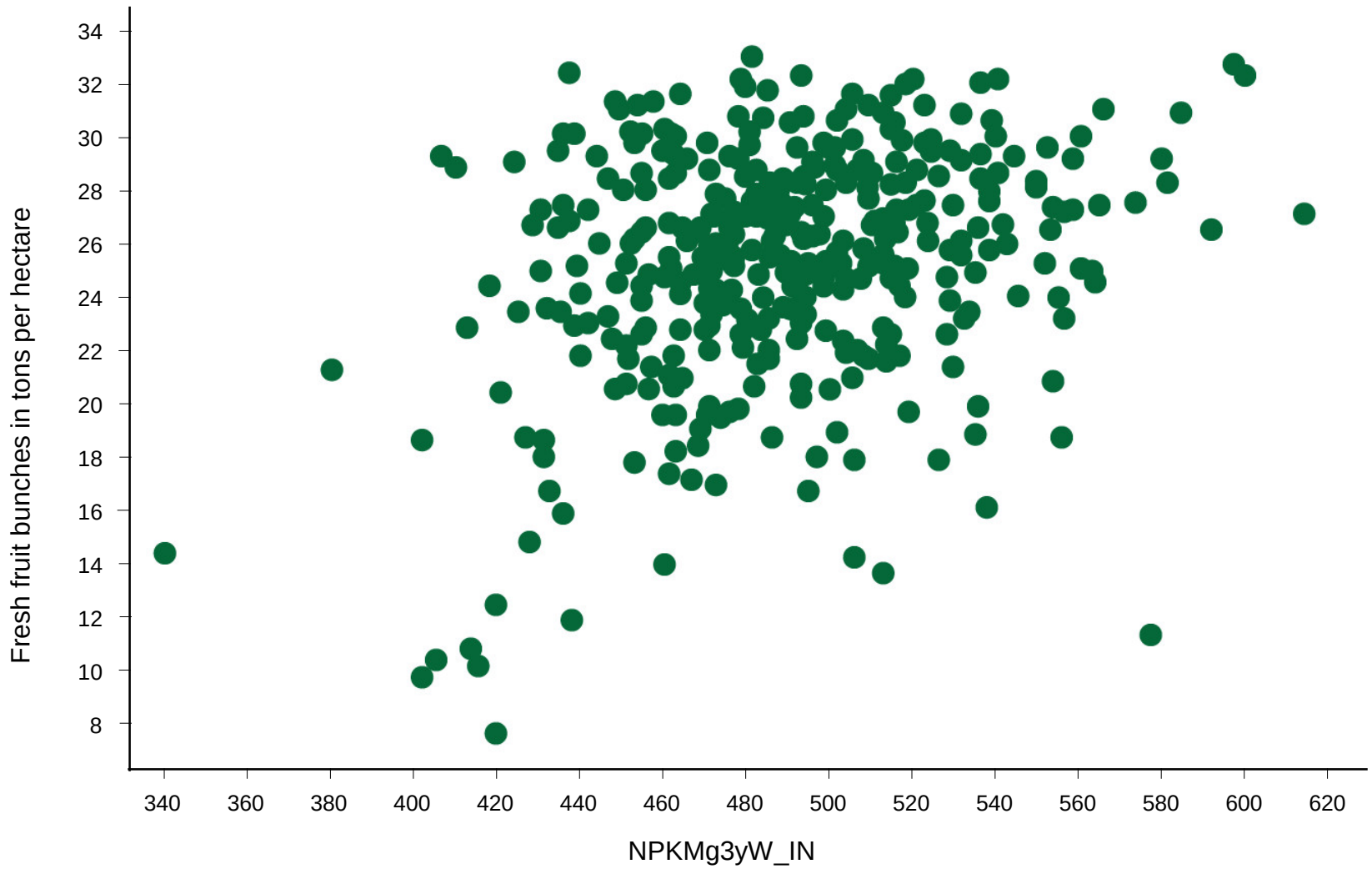
Annual Response 2012



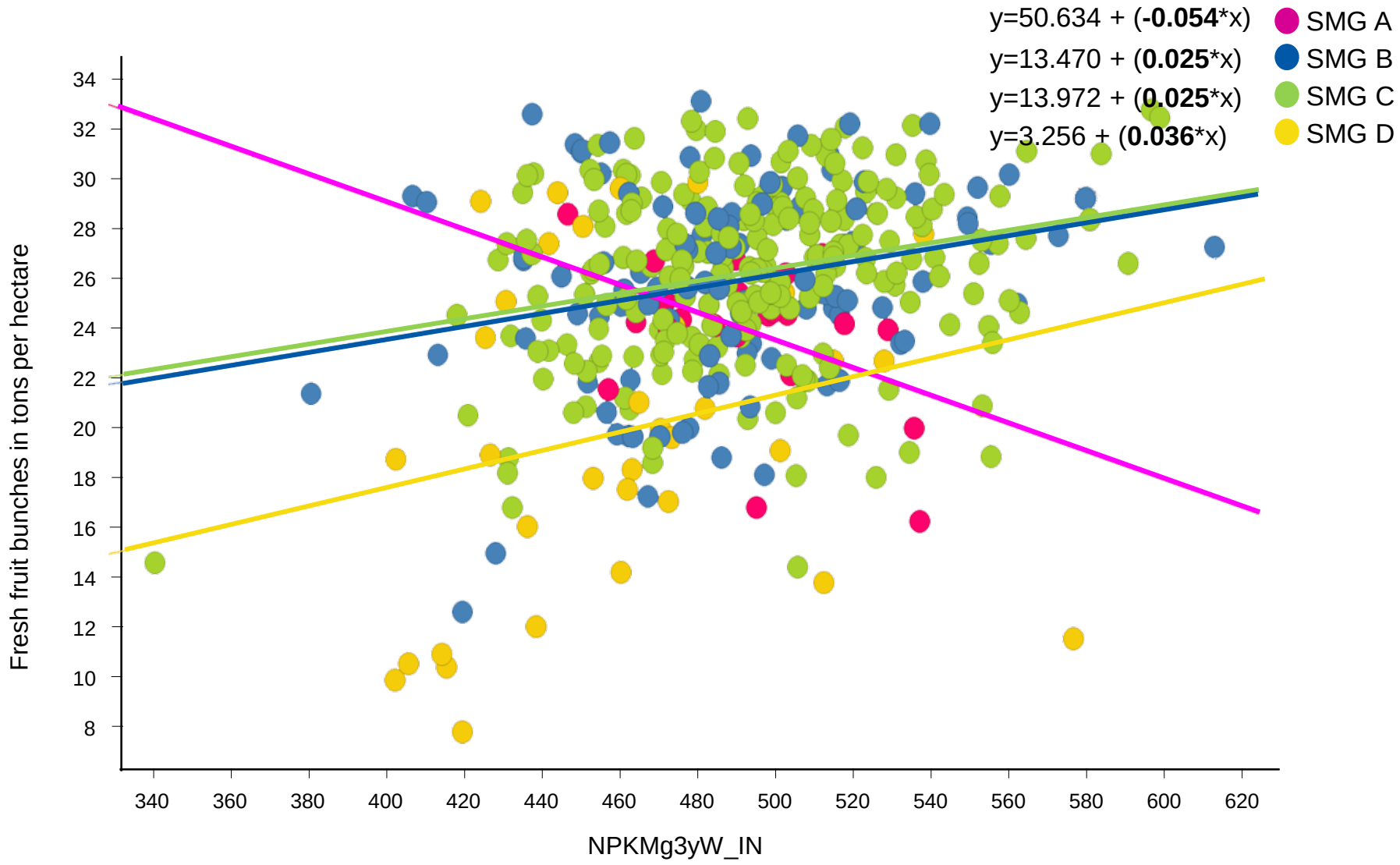
Annual Response 2012



Annual Response 2014



Annual Response 2014



Visualizing Local Response

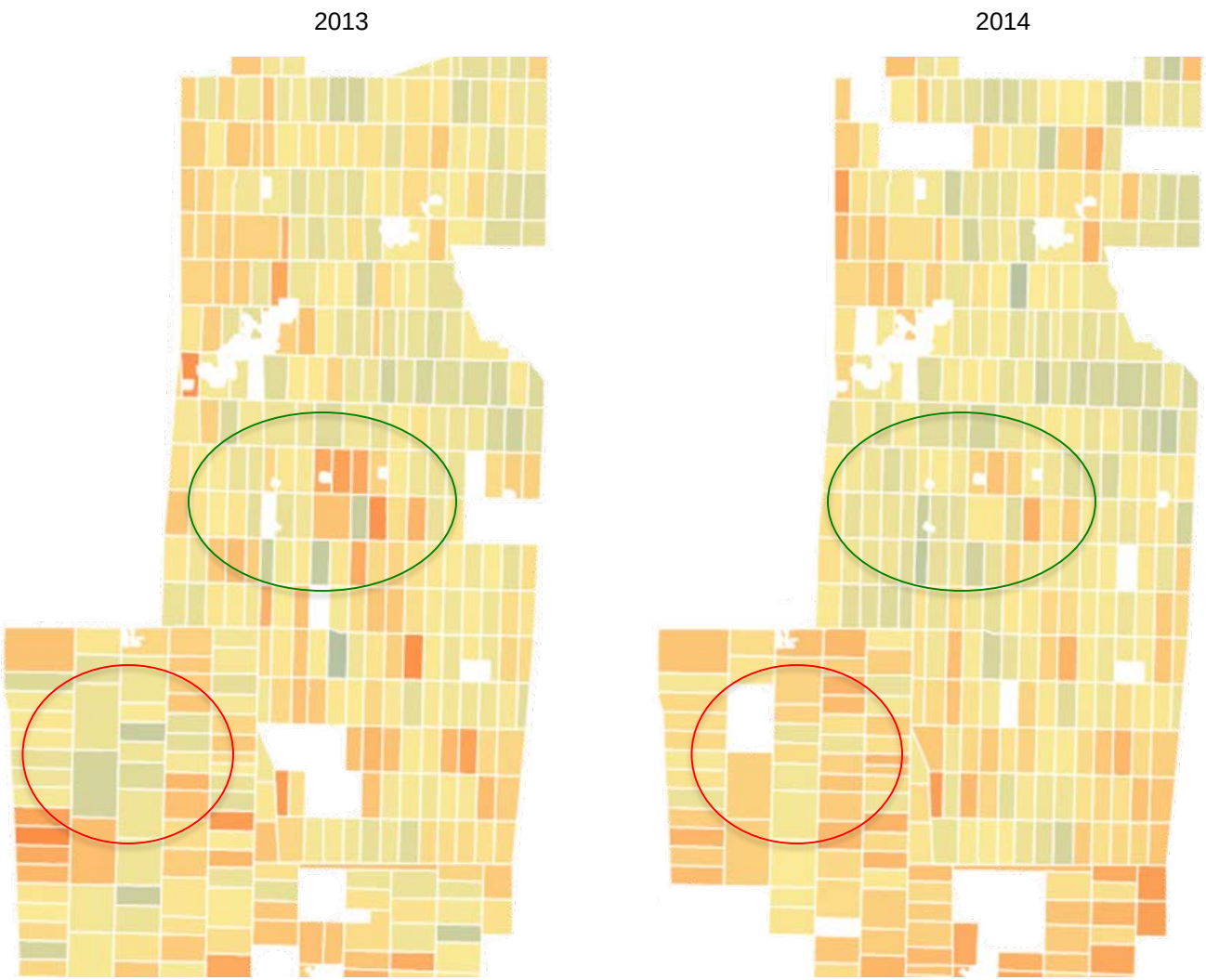
‘Contrast Method’

Yield Response (t FFB ha y) = F_1 (PV_1, PV_2, … PV_N, PV_{NPKMg})

Yield Response (t FFB ha y) = F_2 (PV_1, PV_2, … PV_N)

Response Contrast (t FFB ha y) = $F_2 - F_1$

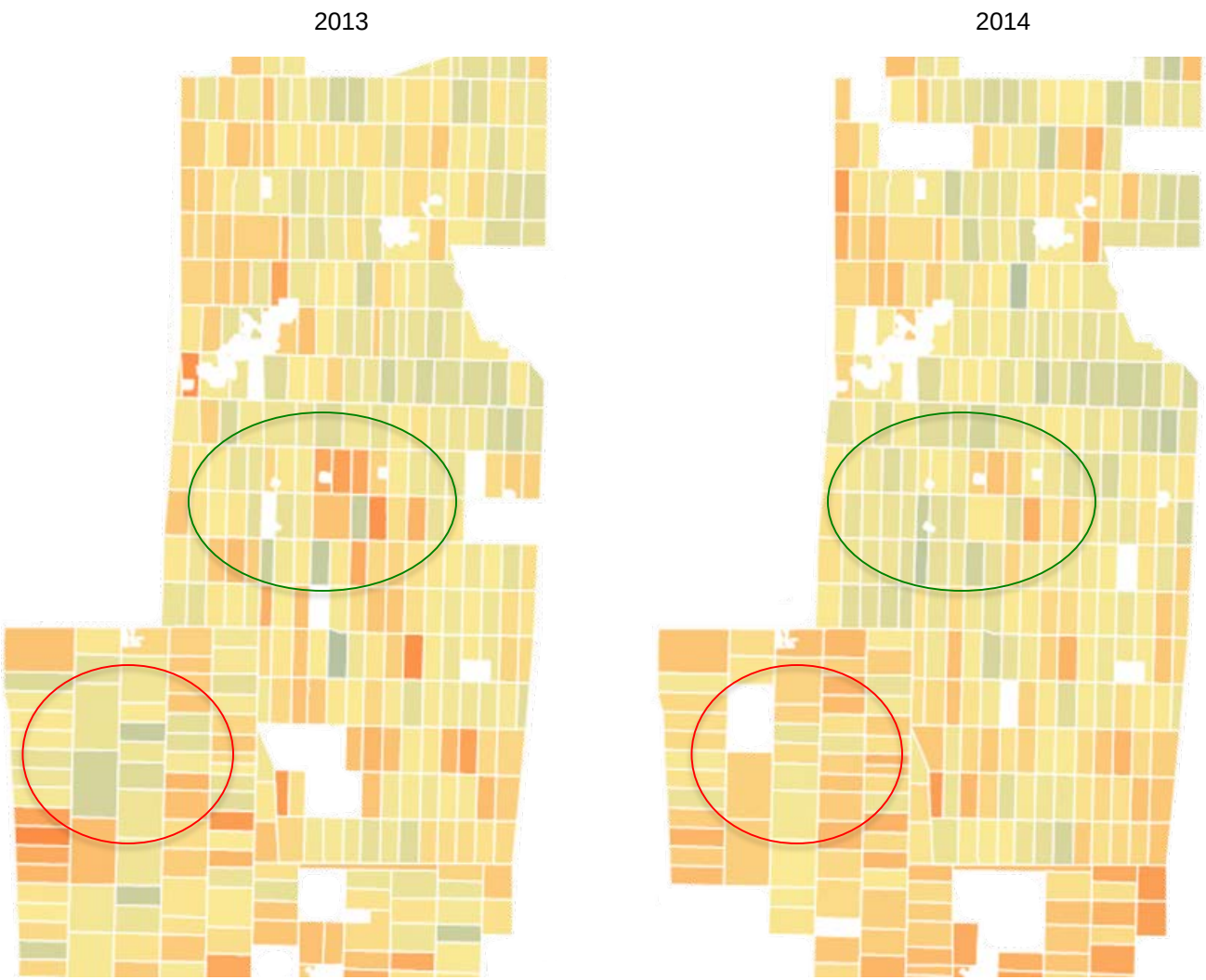
Visualizing Local Response



Contrast in t FFB per ha per year relative to yield without fertilizer

- 1.40
- 0.00
- -0.75

Visualizing Local Response



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4 Final Remarks

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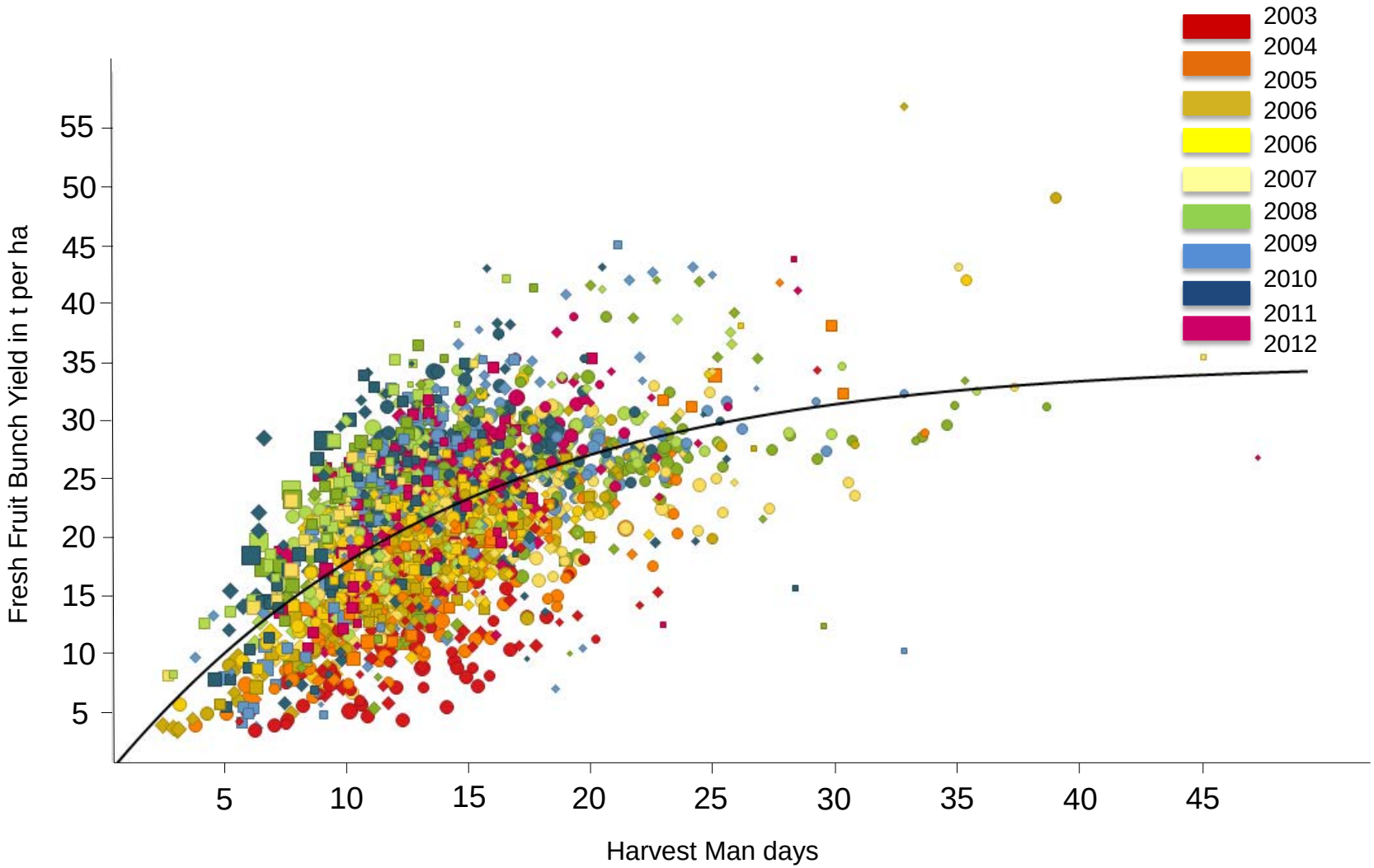

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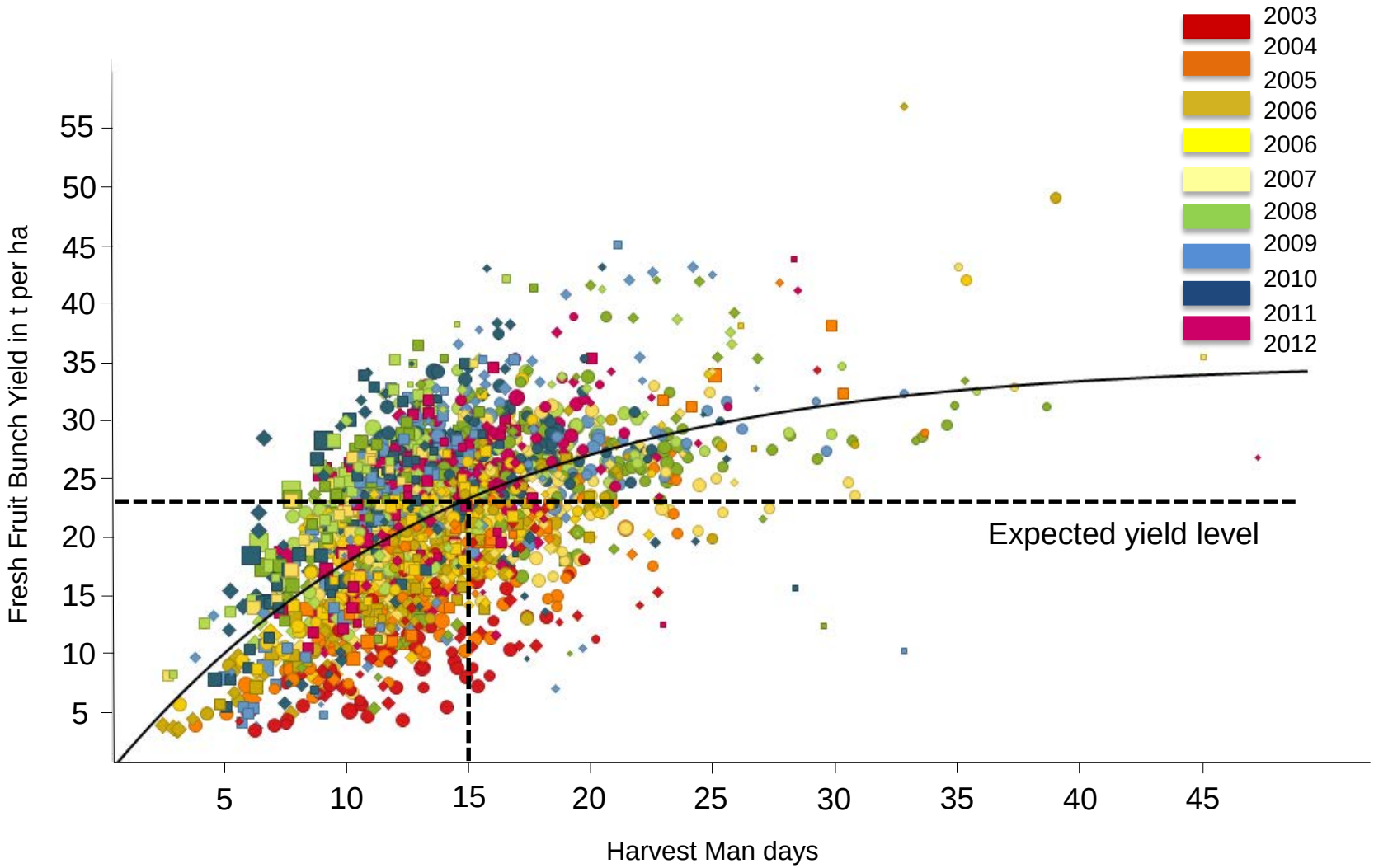
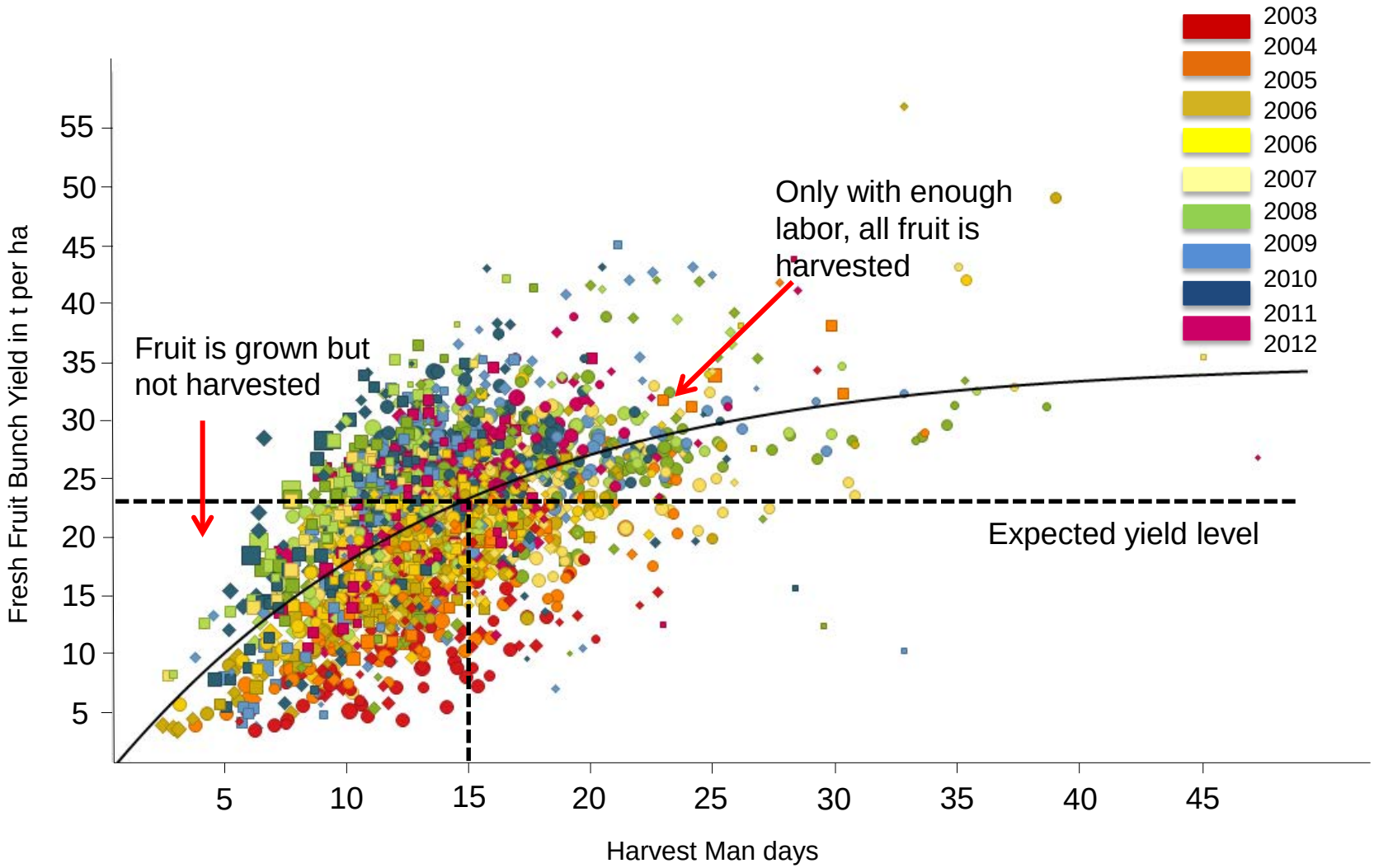


Decision Making Uncertainty



Decision Making Uncertainty

Yield Made

VS.

Yield Taken

Systems Solutions

PLANTATION ® INTELLIGENCE

Business Opportunity
PALMSIM Model

Measure Performance
Plantation Intelligence®

Estate Networking
The Benchmark Club

Continuous Improvement
Best Management Practices

IPNI Southeast Asia Program

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