Oil Palm at the Crossroads

The role of Plantation Intelligence to support Change, Profit and Sustainability

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Our main points

- Oil palm entering a phase of profound change

- Managers need information to support increasingly complex decisions.

- Plenty of data
    - Less analysis

- Plantation Intelligence:
    - A process to couple data to decisions….
    - …to help the industry cope with complexity
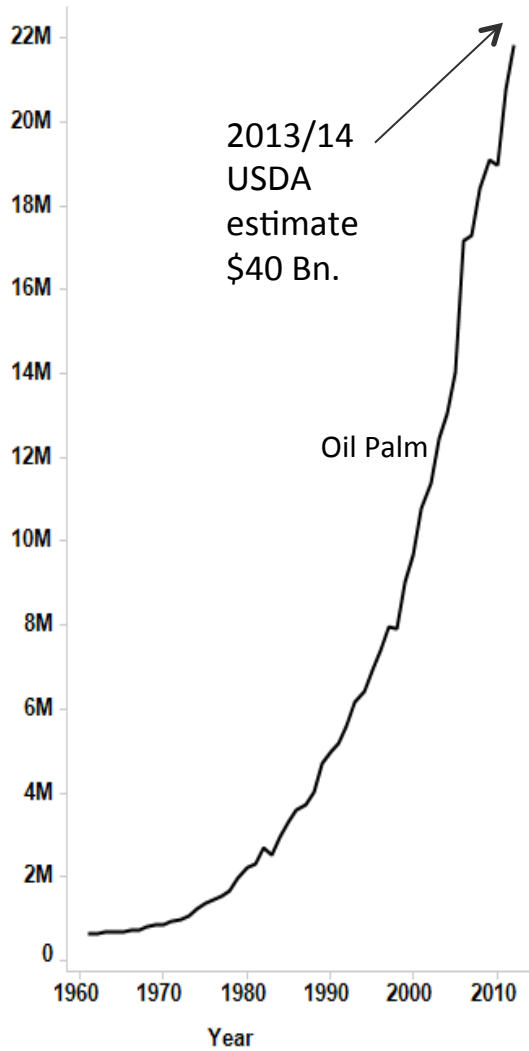
Problem or opportunity?

OIL PALM FACING A PHASE OF CHANGE

Spectacular growth

Gross value ($000)

2013/14 USDA estimate $40 Bn.

Oil Palm

22M
20M
18M
16M
14M
12M
10M
8M
6M
4M
2M
0

1960 1970 1980 1990 2000 2010

Year

Area harvested (Ha)

Oil Palm

17M
16M
15M
14M
13M
12M
11M
10M
9M
8M
7M
6M
5M
4M
3M

1960 1970 1980 1990 2000 2010

Year

Gross value per Ha ($000)

Oil Palm

1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20

1960 1970 1980 1990 2000 2010

Year

Source: FAO

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S E Asia region drives growth

Gross value ($000)

Area harvested (Ha)

Gross value per Ha ($000)

South-Eastern Asia

South America

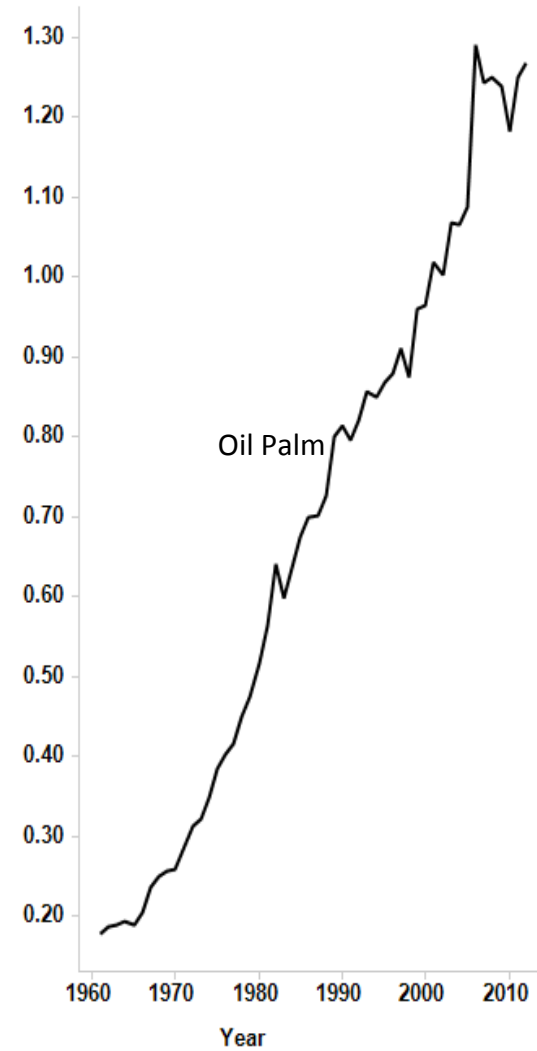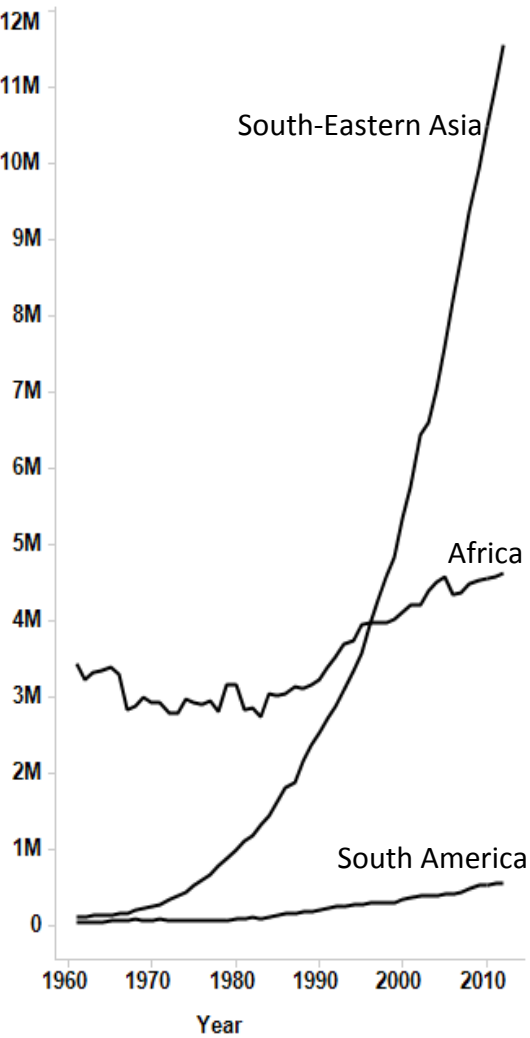Africa
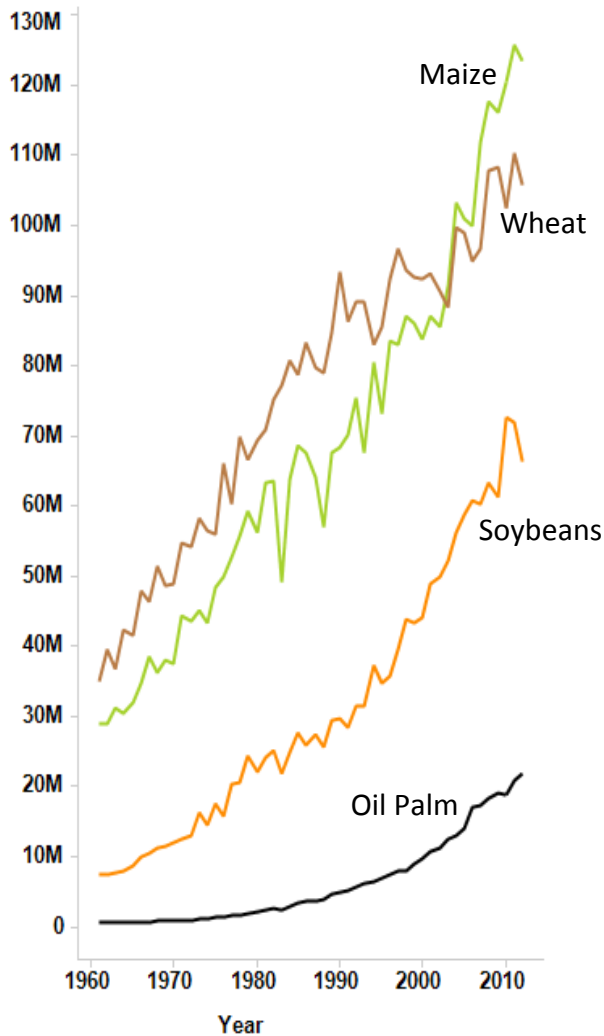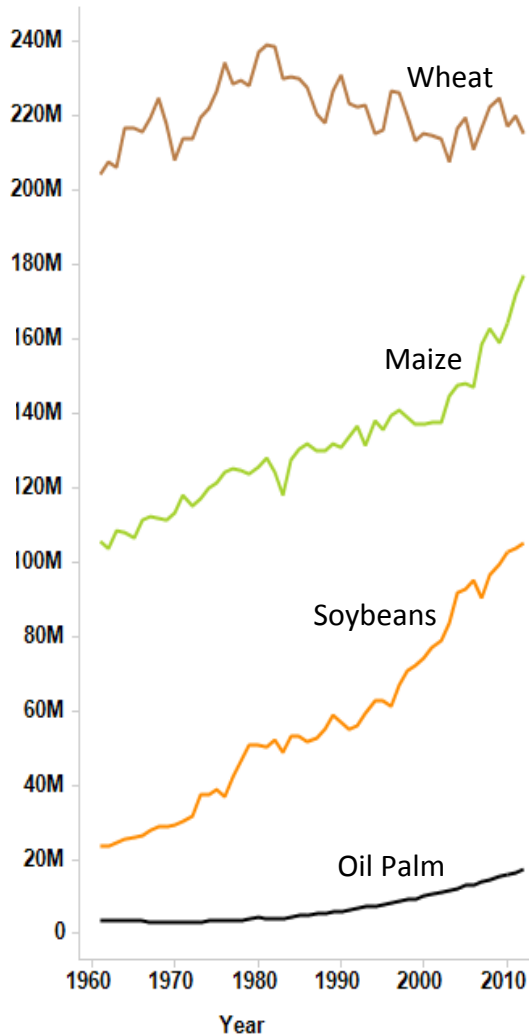
Source: FAO
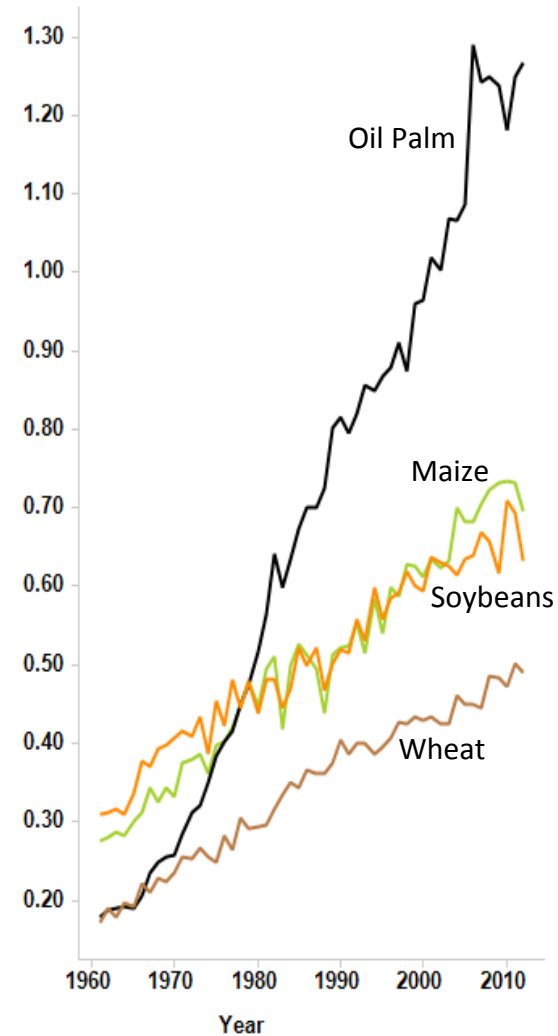
Oil palm a 'new player' in global sustainability
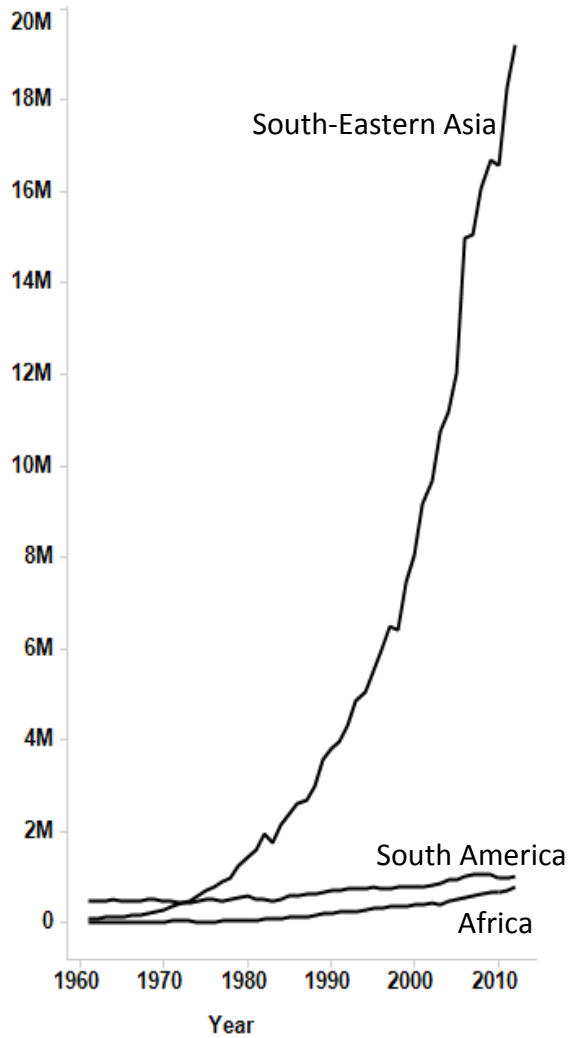
Gross value ($000)

Area harvested (Ha)

Gross value per Ha ($000)

Source: FAO

Real value of commodities always declines over time
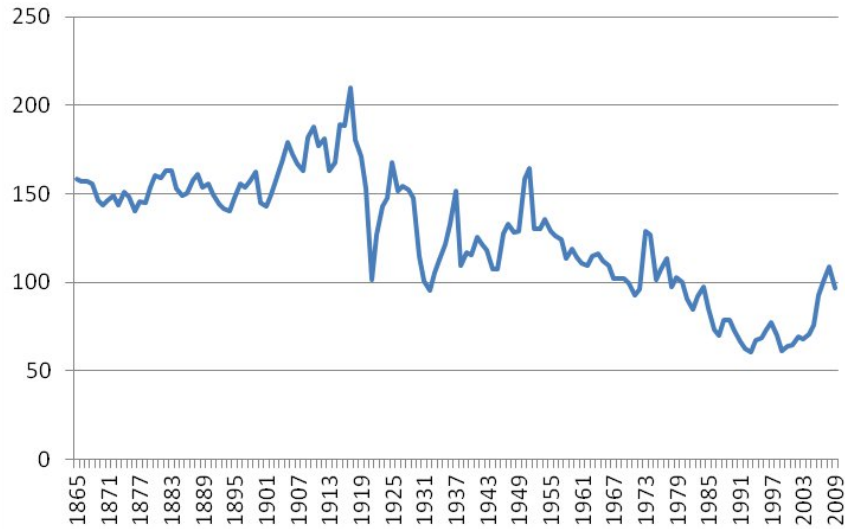
Source: Ocampo & Parra (2010)

Economic, environmental and social pressures will grow

Papua oil palm plans may benefit migrants more than local poor — report

Source: CIFOR (Center for International Forestry Research) - Wed, 30 Apr 2014 06:39 AM

Author: Julie Mollins

MORE ON FORESTS   MORE ON ADAPTING TO CLIMATE CHANGE   MORE ON CLIMATE CHANGE
MORE ON AID AND DEVELOPMENT   MORE ON FOOD & HUNGER   MORE ON HUMAN RIGHTS

WHAT COULD THE INDUSTRY LOOK LIKE IN 2020?

Two possible futures

Sunset?

- Increasing management difficulties

- Declining attractiveness to investors

- Declining attractiveness to employees

Sunrise?

- New management techniques

- New business opportunities

- New career opportunities

Two possible futures

Brown?

- Low eco-efficiency

- Oil palm seen as a global problem

- Oil palm wealth seen as 'exclusive'

Green?

- High eco-efficiency

- OP part of global solution

- "Inclusive oil palm – the basis of rural economies"

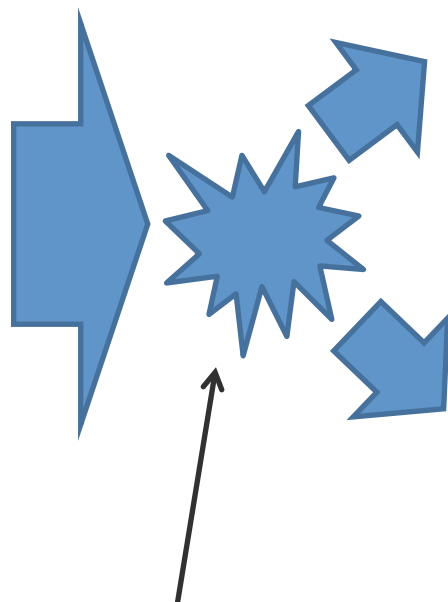INTERNATIONAL PLANT NUTRITION INSTITUTE

Oil palm at the crossroads

Drivers of change

Continued rapid growth

Competition for new resources

Increasing social and political pressures

Decisions taken now will determine future outcomes

Improved processes
Enhanced productivity
Secure return-on-investment
Improved eco-efficiency
Recognition of OP as a leading contributor to local and global food, energy and environmental security

Business-as-usual
Stagnant productivity, declining profitability
Uncertain returns-on-investment
Unimproved eco-efficiency
Grudging acceptance of OP as an unpopular necessity

'Drowning in data, starved of knowledge'

PLANTATION INTELLIGENCE:
A PROCESS TO SUPPORT DECISIONS

Why is decision support needed?

- New areas, new problems
- The human brain isn't good at solving some problems
  - Even the best managers make errors.
    Examples [seen in all types of business]:
    - **Fitting 'old' results to 'new' conditions**
      Estimates based on experience, even if conditions are clearly different
    - **Reverting to the average**
      Managers forced to ignore variation
    - Bias towards the **'number you first thought of'**
      even though data shows it is inaccurate.

- …In such cases, **evidence is essential**

Scientific evidence for decisions:
The conventional approach: Plot experimentation
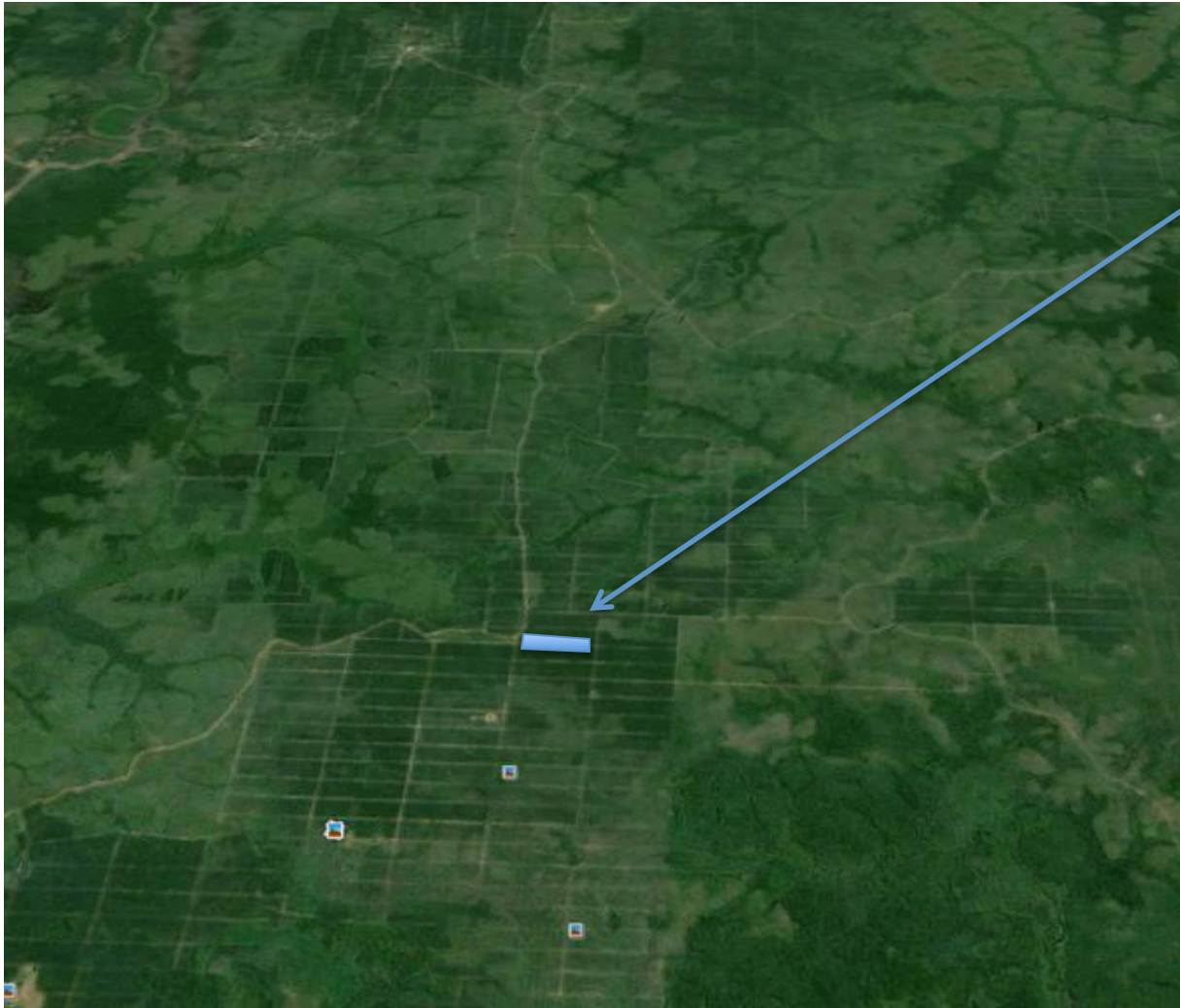
- Trial plots chosen to represent what seems important
- Trials give a clear answer for a pre-defined problem…
- ….but leave much variation unexplained
  - weather, site, soil, pests, disease, labour… …

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Scientific evidence for decisions:
Plantation intelligence approach

- Analyze data for the entire estate

- Accept variation due to weather, site, soil, pests, diseases ...

- Generate insights with managers to **complement trial results**

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Plantation intelligence

Evidence to support decisions under uncertainty

What it aims to do

- Support intuition
  - "I knew it was good, but didn't realize it was **that** good!"
- Specify variations from the norm
  - "On average, the estate performs well, but about 25% remains below expectations"
- Quantify things that are hidden
  - "How does response to fertilizer vary?"
  - How productive is labour?

...for different types of decisions

- Strategic
  - Summaries, trends & anomalies to support investment
- Operational
  - Analysis to support block management
    - Performance
    - Profitability
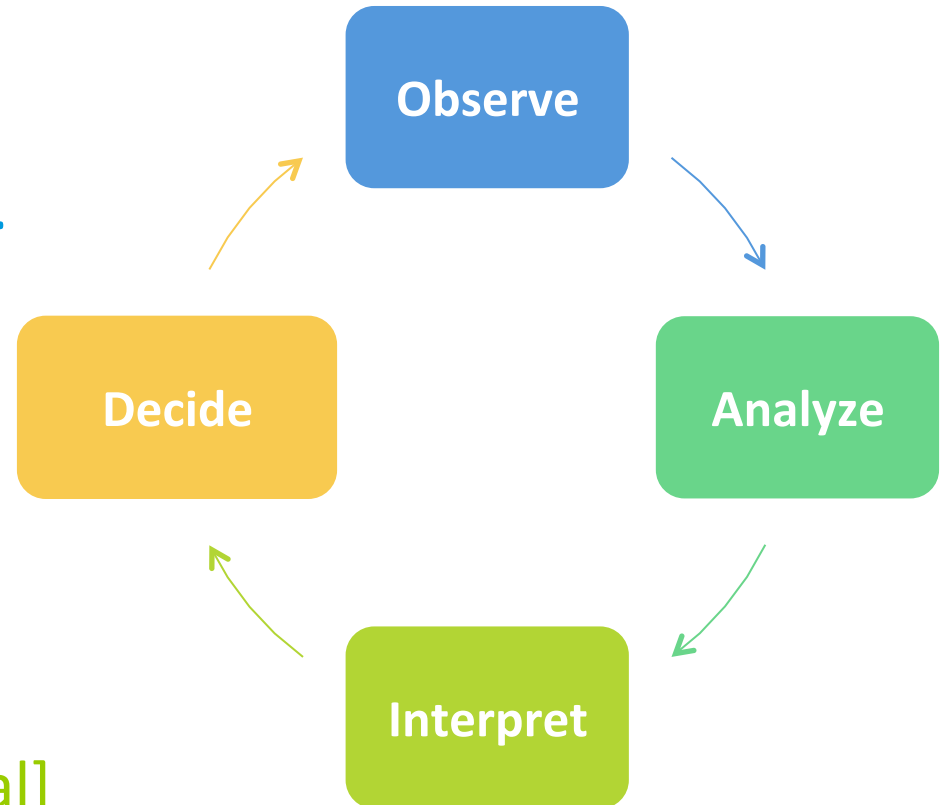   - Response to inputs
      - » Fertilizer
      - » Labour

The process

1. Engage.
2. Acquire data.
3. Clean and assemble data.
4. Filter and organize.
5. First analysis.
6. Follow-up analysis.
7. Discussion with field managers.
8. Experimentation [optional]
9. Review and decide

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An example:
Do you know what value you get from fertilizer?

- Fertilizer drives growth and profitability
  - Known but highly variable
- Essential for sustainability
  - Known but unquantified
- On average, growers spend about $500/hectare on fertilizer
  - Certain but variable
- *Return for blocks/divisions?*
  - *Uncertain*
- *Block-specific causes* of variation?
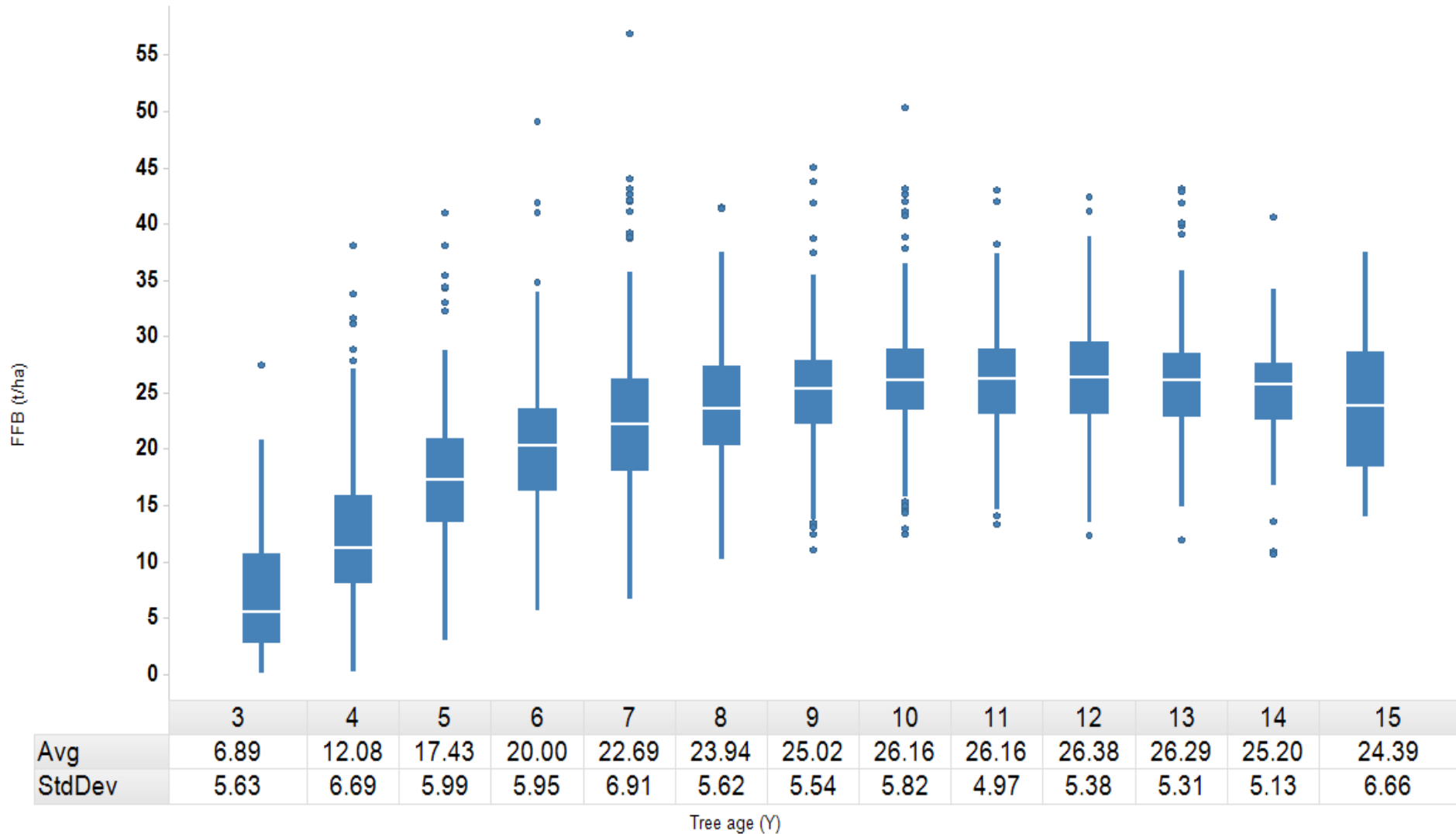 - *Uncertain*

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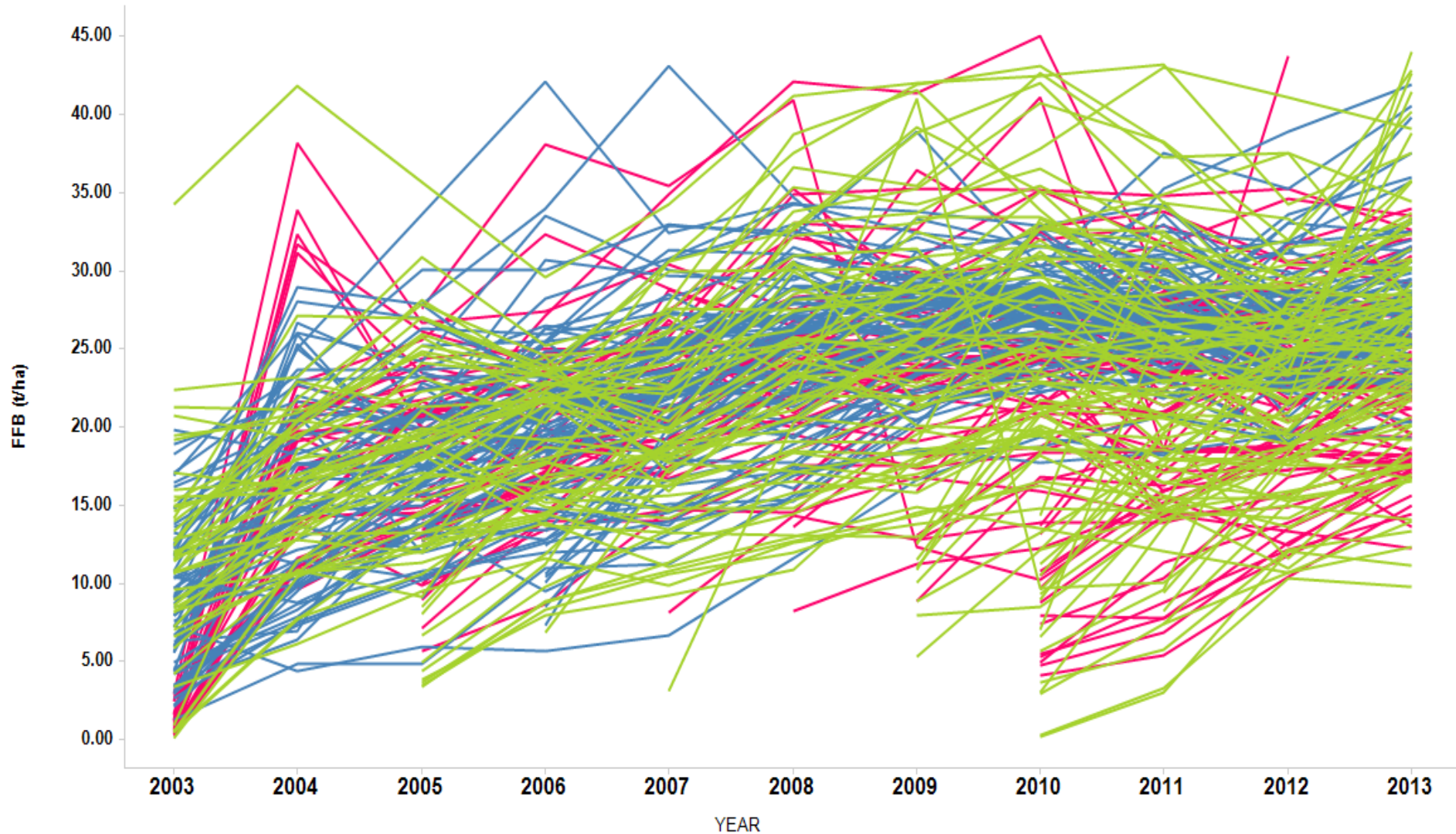IPNI

Start with basic observations…

Organize data

Yield age profile

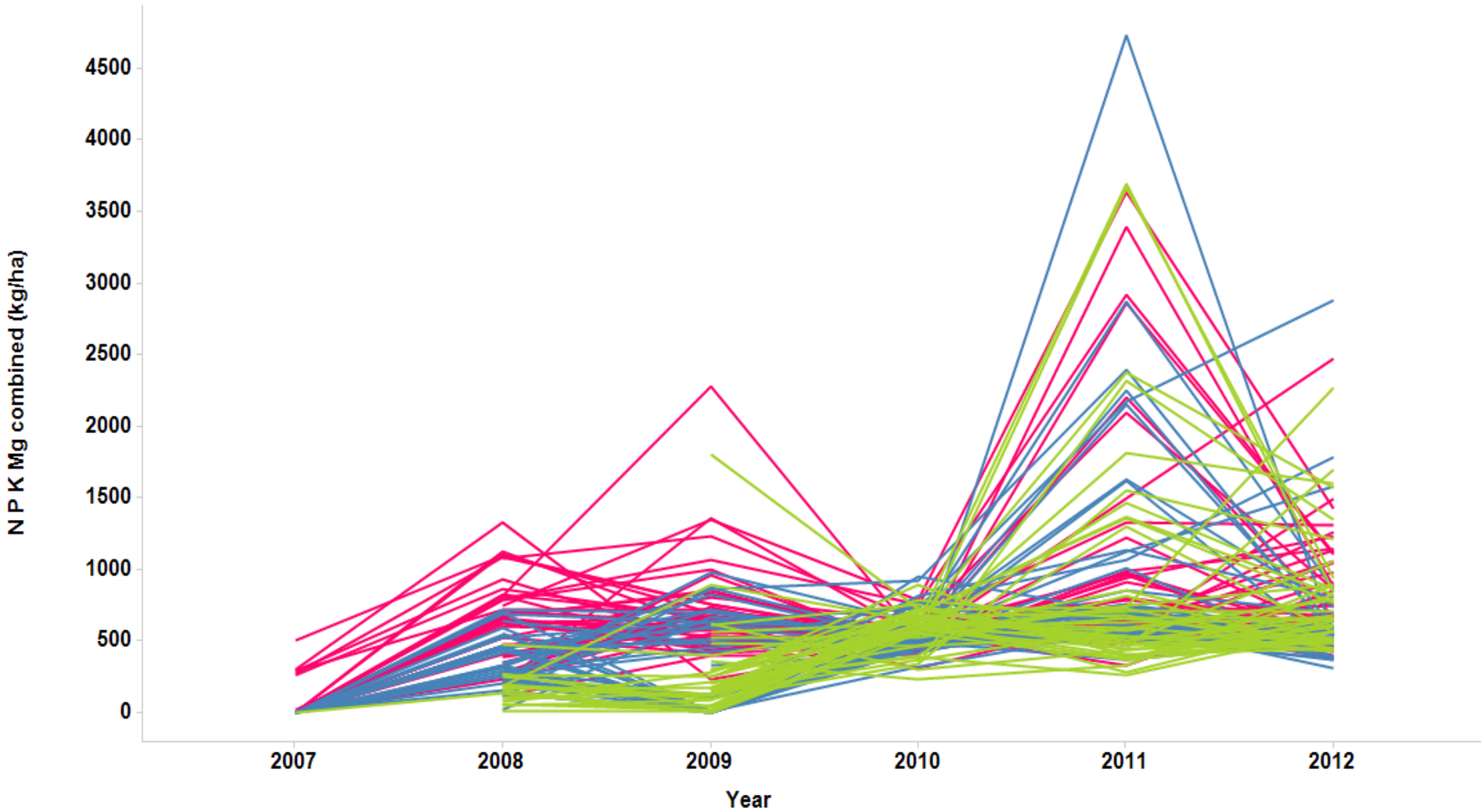| Tree age (Y)	3	4	5	6	7	8	9	10	11	12	13	14	15
Avg	6.89	12.08	17.43	20.00	22.69	23.94	25.02	26.16	26.16	26.38	26.29	25.20	24.39
StdDev	5.63	6.69	5.99	5.95	6.91	5.62	5.54	5.82	4.97	5.38	5.31	5.13	6.66

Massive variation between blocks
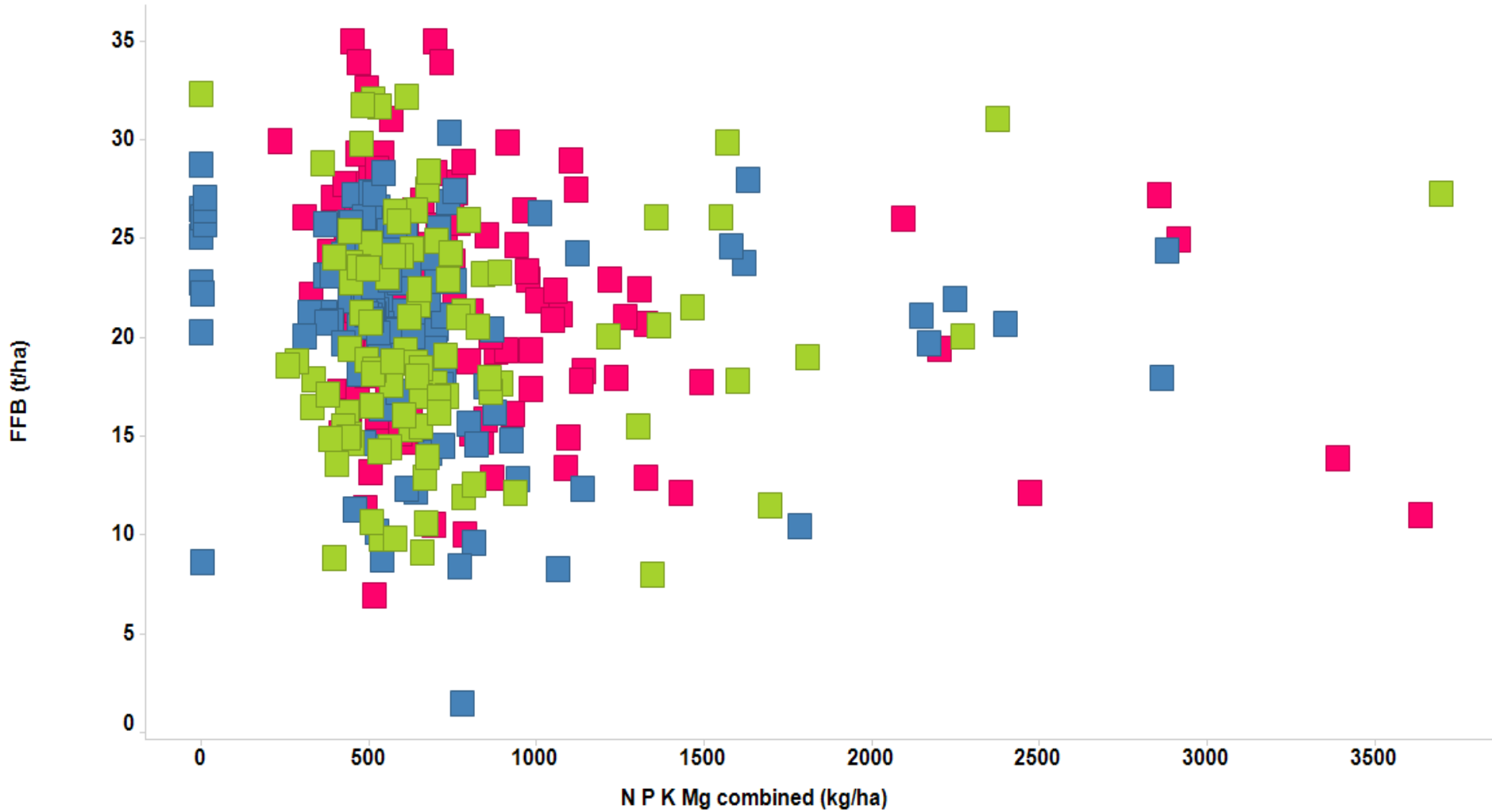

FFB for each block

Fertilizer application varies

Total fertilizer applied to each block

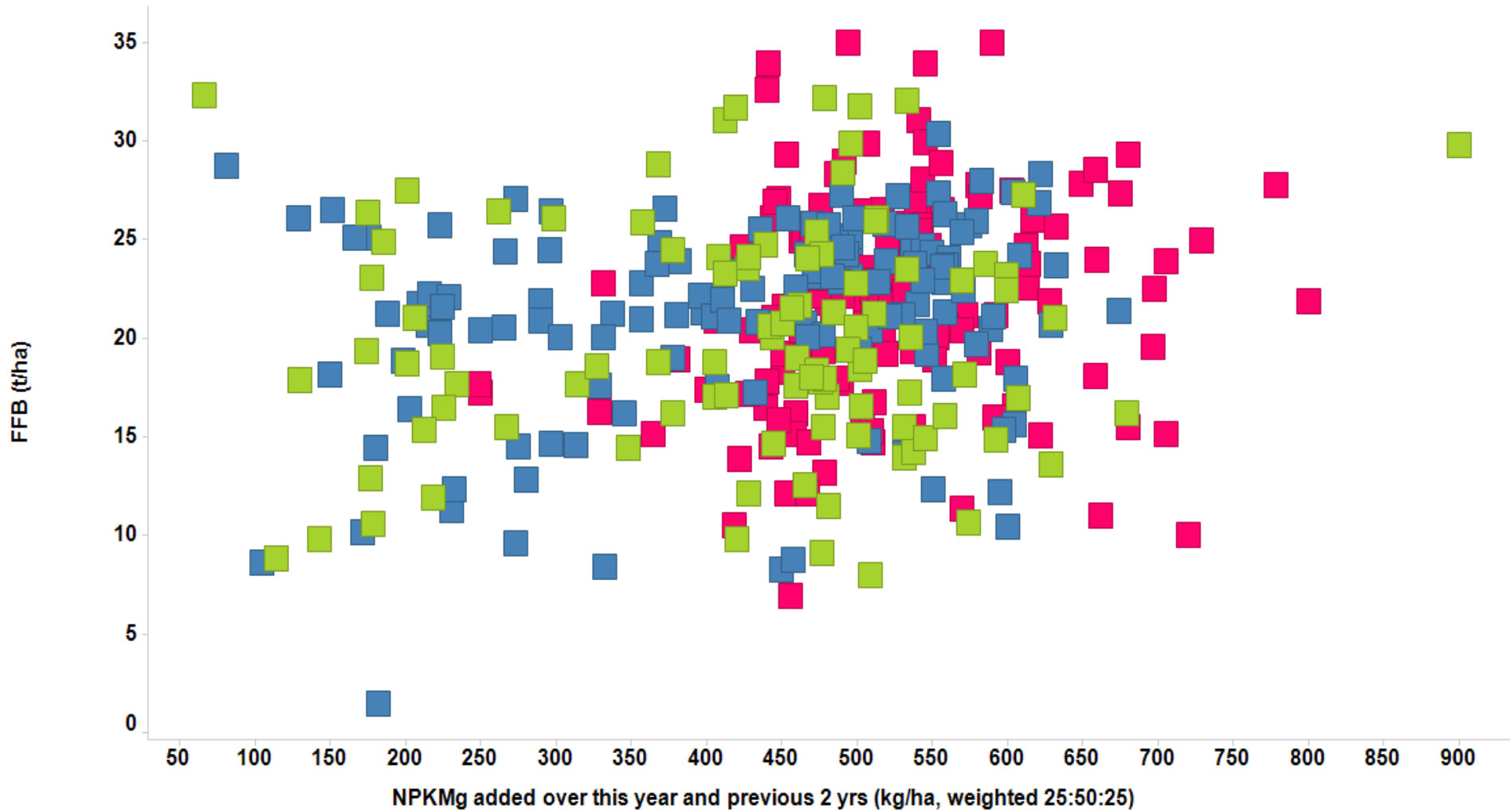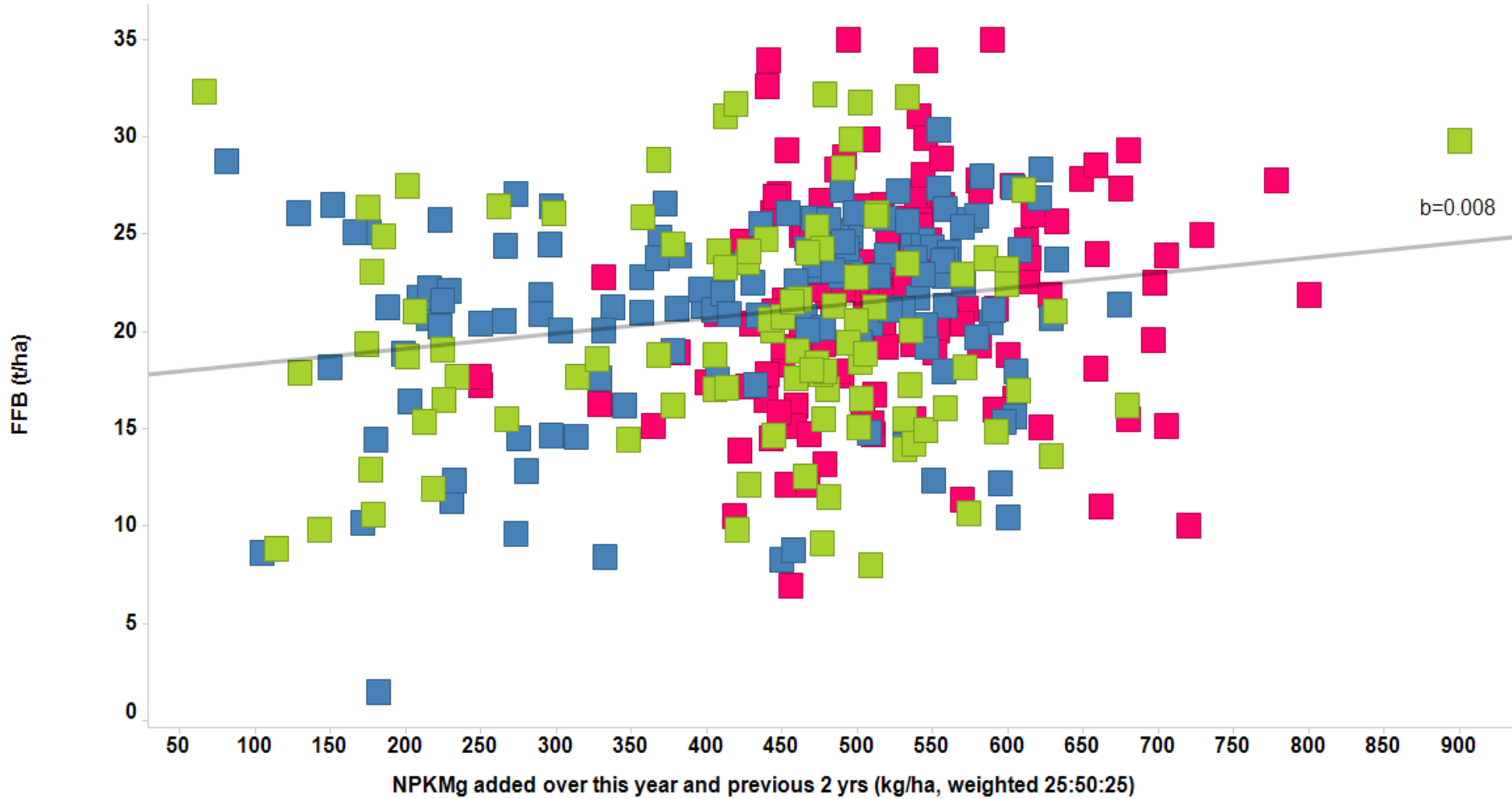# Compare FFB with fertilizer

Trees > 5 yrs old

Account for time lapse

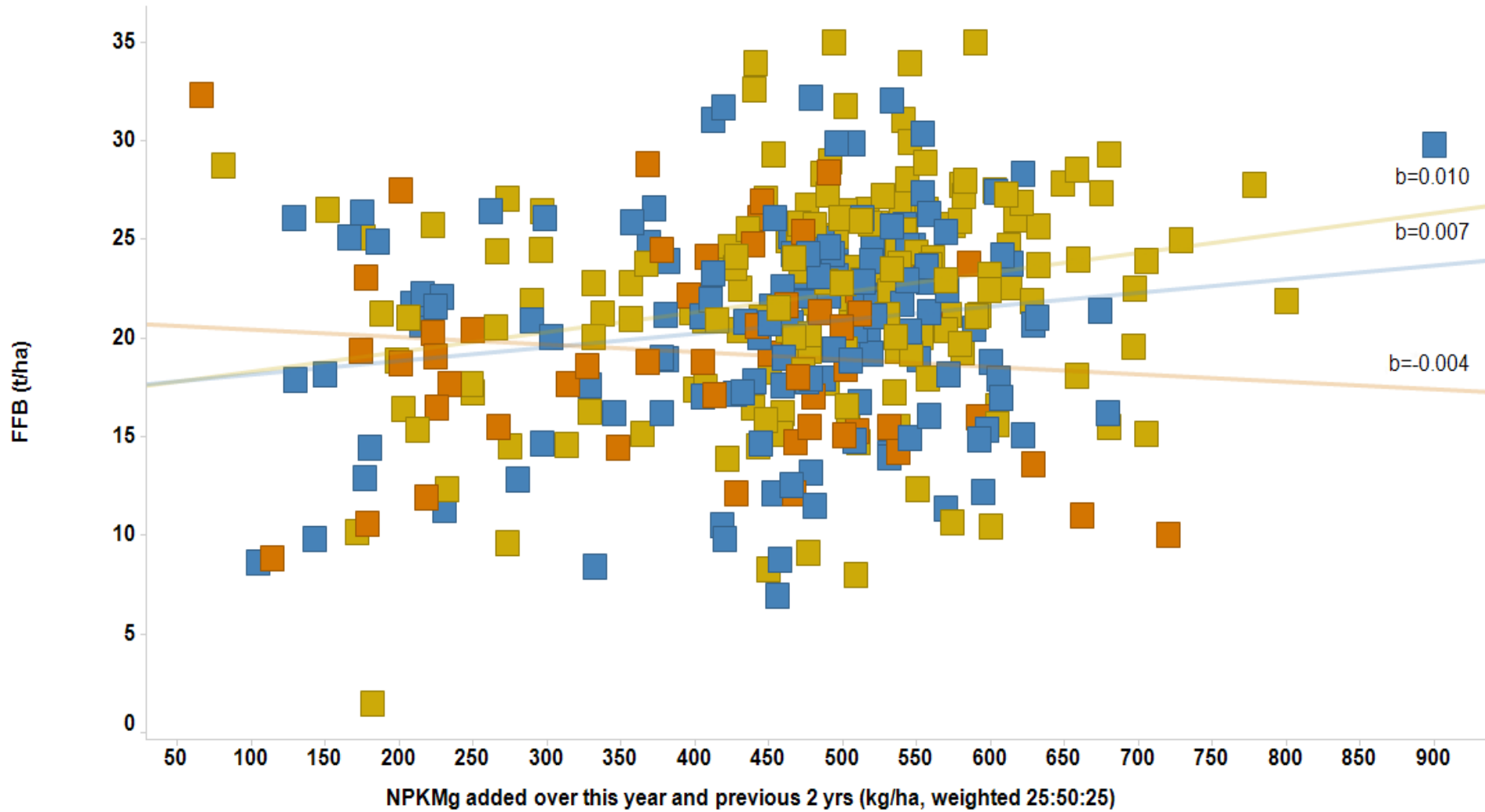Comparing with fertilizer applied over 3 years

FFB (t/ha)

NPKMg added over this year and previous 2 yrs (kg/ha, weighted 25:50:25)

Account for time lapse

Comparing with fertilizer applied over 3 years

FFB (t/ha) vs NPKMg added over this year and previous 2 yrs (kg/ha, weighted 25:50:25)
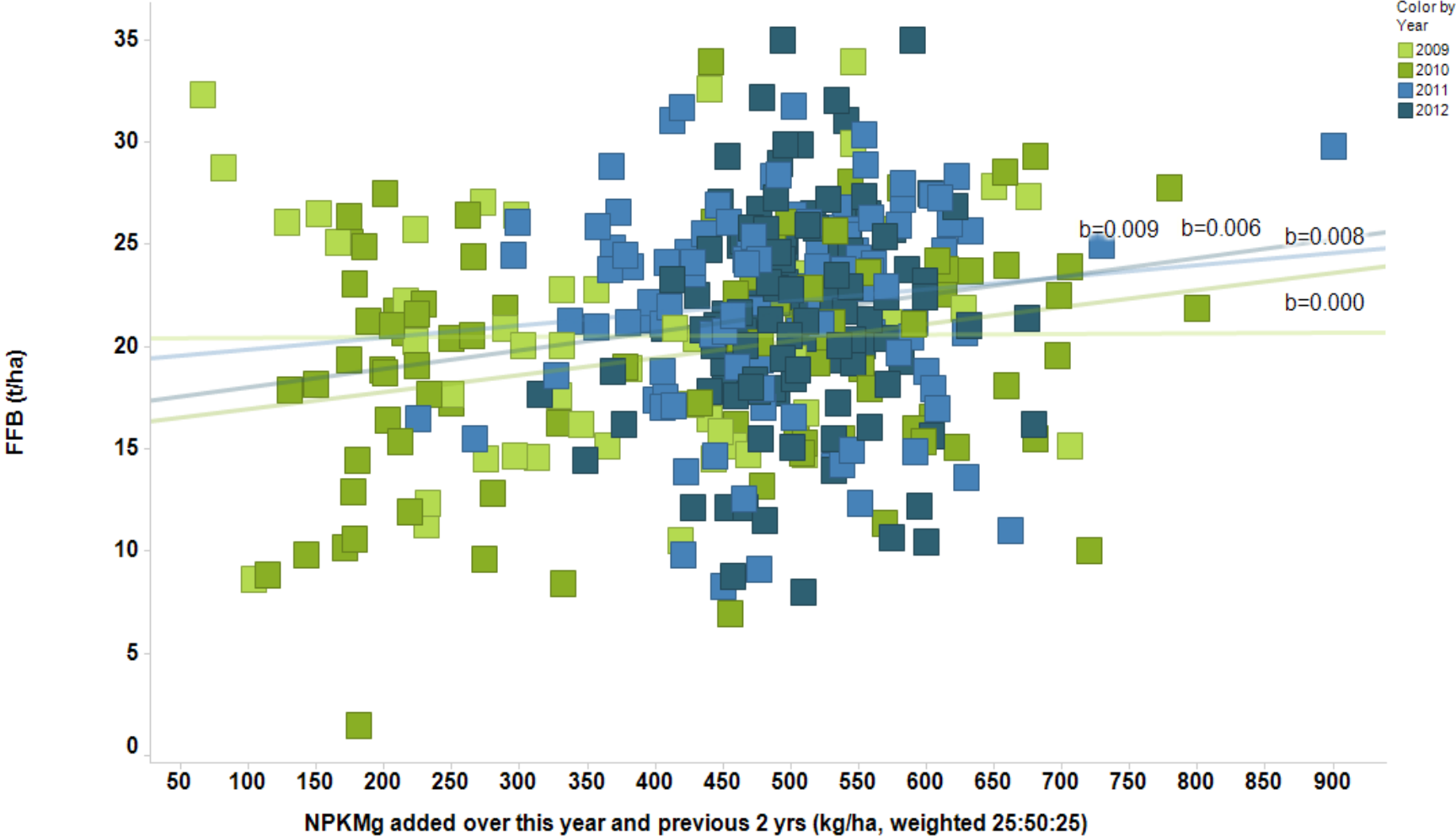
b=0.008

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Response varies by soil

Response varies by year

Combining soil and year

Variation by soil and year

'Normal' soil — Hardpan soil

FFB (t/ha)

NPKMg added over this year and previous 2 yrs (kg/ha, weighted 25:50:25)

b=0.013   b=-0.005   (2010)
b=0.015   b=-0.009   (2011)
b=-0.010   b=0.022   (2012)

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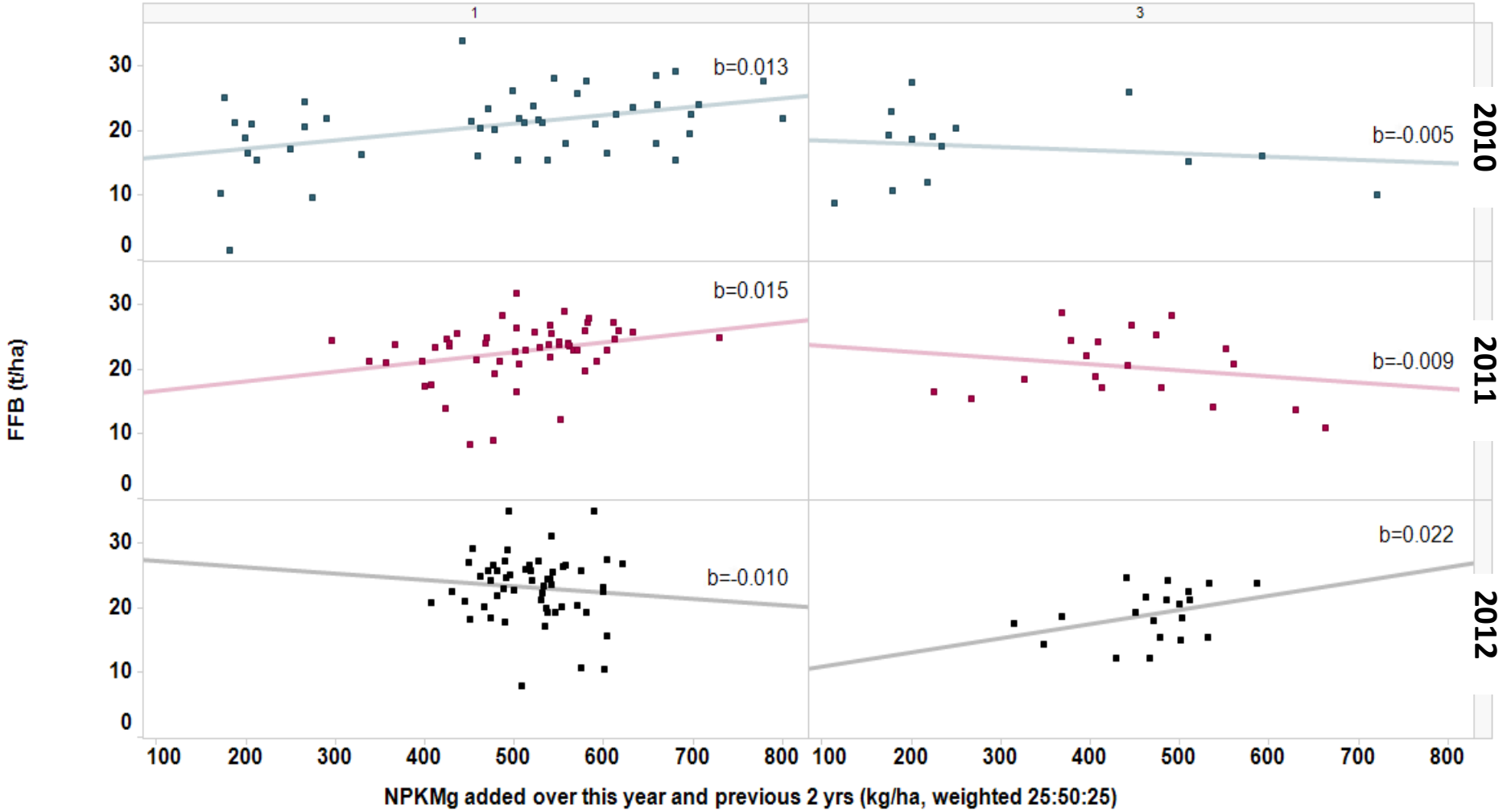
Labour affects fertilizer response
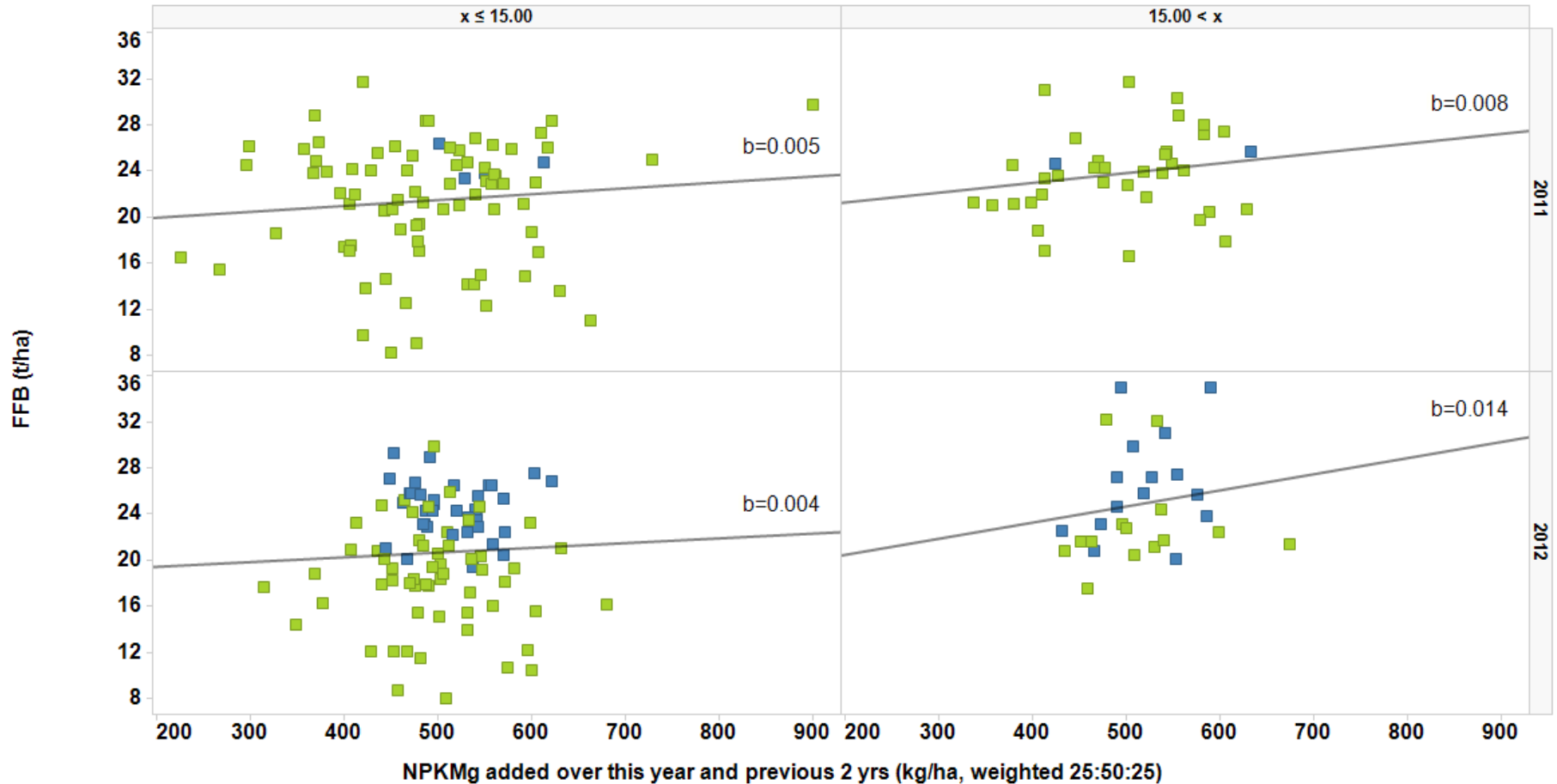
What happens next?

- Managers evaluate results
  Are these consistent with what I already know?
  What surprises?
  What suspicions do they confirm?

- Decide to change
  Increase / decrease fertilizer rates?
  Change mix?
  Decide later
  Experiment to test?

- Annual review and analysis
  Process of continual improvement

Summary

- "Plantation Intelligence" :
  Provides evidence from analysis at commercial scale
  - A kind of operations research

- Applies science at commercial scale
  - Making sense of complex commercial data
  - Working with managers, not providing recommendations 'from outside'

- Removes uncertainty to support difficult decisions
  - Accelerates change and continuous improvement

Thank you

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