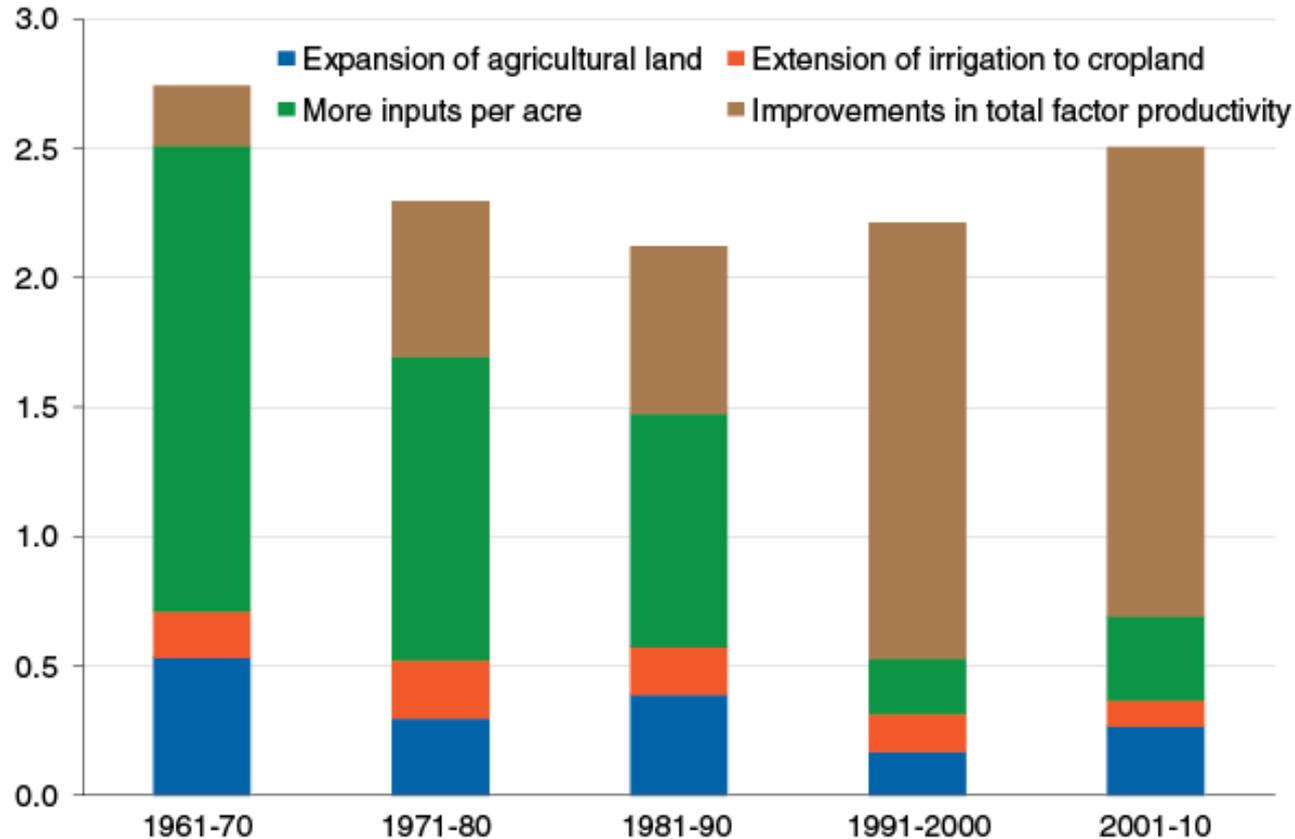# The Good Growth Plan farm network – Monitoring resource efficiency of crop production systems

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Efficiency-led growth has replaced resource intensification as the main driver of increased agricultural production.

Total output growth (percent/year)

Legend:
- Expansion of agricultural land
- Extension of irrigation to cropland
- More inputs per acre
- Improvements in total factor productivity

- Strong empirical evidence for the role of **public** investment in agricultural R&D and extension.

- What about the role of **private** investment?

Source: USDA, Economic Research Service, derived from Food and Agriculture Organizational the United Nations and other agricultural data using methods described in Fuglie et al. (2012).

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There is **little public acceptance of the role of private R&D and extension.**

Most respondents said
more arable land
is needed

What impact will this have on rainforests and national parks?

Most respondents said
more water is needed

Agriculture already uses 70% of the world's fresh water withdrawals

Most respondents said
more human labor
is needed

Urbanization is causing increasing labor scarcity

Source: The Agricultural Disconnect, Syngenta, 2013

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Syngenta launched the Good Growth Plan in 2013 and made six public commitments to sustainable agriculture.

By 2020,

More food
Less waste

Make crops more efficient

Increase average productivity of the world's major crops by 20% without using more land, water or inputs

More biodiversity
Less degradation

Rescue more farmland

Improve the fertility of 10 million hectares of farmland on the brink of degradation

Help biodiversity flourish

Enhance biodiversity on 5 million hectares of farmland

More health
Less poverty

Empower smallholders

Reach 20 million smallholders and enable them to increase productivity by 50%

Help people stay safe

Train 20 million farm workers on labor safety, especially in developing countries

Look after every worker

Strive for fair labor conditions throughout our entire supply chain network

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Syngenta uses a scientific approach to measure progress on increasing crop productivity without using more inputs.
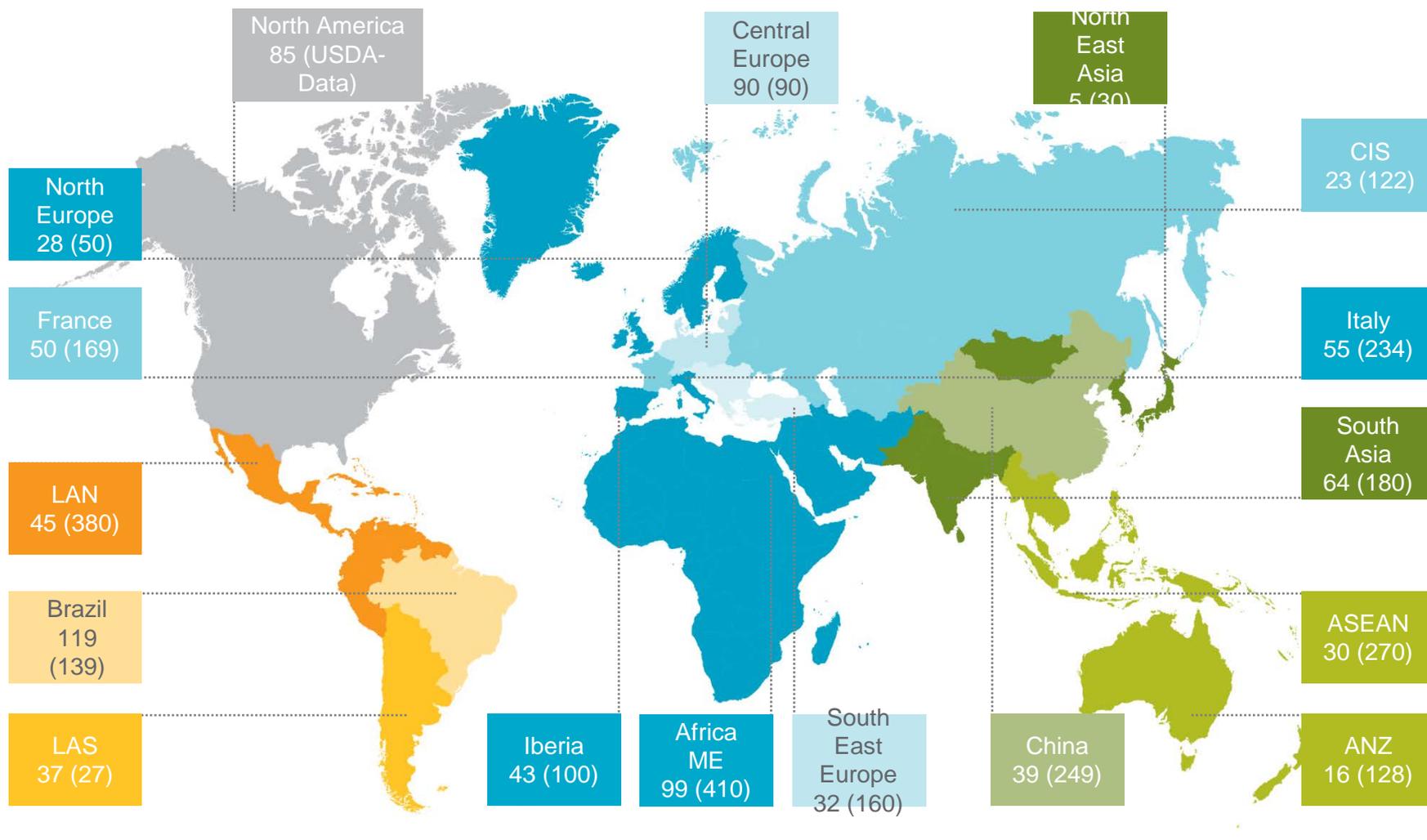
- Independency
  - Panel research design and data collection by Market Probe
  - Data and processes audited by PwC
- Research design
  - Panel with annual data collection on the same farms for 7 years
  - Cluster approach - farms are grouped by characteristics and agro-climatic conditions – representing strategic market segments
  - With reference farms selected by Syngenta and benchmark farms selected by Market Probe
  - Major crops
    - Field crops: Corn, rice, wheat, barley, sunflower seeds, oilseed rape, sugar beet,
    - Plantations: Sugarcane, cotton, banana, apple, cocoa, coffee, stone fruit, grape, pear, potato, oranges
    - Vegetables: tomato, cauliflower, pepper

Market Probe and Syngenta set-up a monitoring network of 3500 farms world wide.

North America
85 (USDA-Data)

Central Europe
90 (90)

North East Asia
5 (30)

CIS
23 (122)

North Europe
28 (50)

France
50 (169)

Italy
55 (234)

South Asia
64 (180)

LAN
45 (380)

Brazil
119 (139)

ASEAN
30 (270)

LAS
37 (27)

Iberia
43 (100)

Africa ME
99 (410)

South East Europe
32 (160)

China
39 (249)

ANZ
16 (128)

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Market Probe conducts f2f interviews using structured questionnaires to collect farm data before and after harvest.

- **General characteristics**
  - (GPS) location
  - Agricultural activities (e.g. crops grown, part-time/full-time)
  - Grower characterstics (age, education, gender, coop membership)
- **Agricultural practices**
  - Crop rotations
  - Soil conservation practices
  - Safe use of pesticide
- **Farm inputs**
  - Farm size
  - Application rates and dates for fungicides, herbicides, fungicides
  - Seed quantity and dates
  - Seed treatment
  - Organic and chemical fertilizer
  - Machinery use (type and hours)
  - Labor hours
  - Irriation water (where applicable)

- **Farm outputs**
  - Crop (marketable) yield
  - Crop quality
  - Harvest periods
- **Agro-ecological conditions**
  - Topography
  - Biotic and abiotic stress
  - Soil type and perceived quailty
- **Additional services received**
  - Agronomic advice
  - Free samples
  - Credit
  - Market access
- **Economics**
  - Output price
  - Input cost shares
  - Expected profitability
- **Satisfaction with services and recommended protocol**

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Syngenta uses partial productivity measures to report on progress.

1. Land productivity
- Tons of crop output per hectare land

2. Nitrogen efficiency
- Kg of Nitrogen input per kg of crop output

3. Pesticide efficiency
- Kg of Active Ingredients per kg of crop output

4. Application efficiency
- Number of pesticide applications per kg of crop output
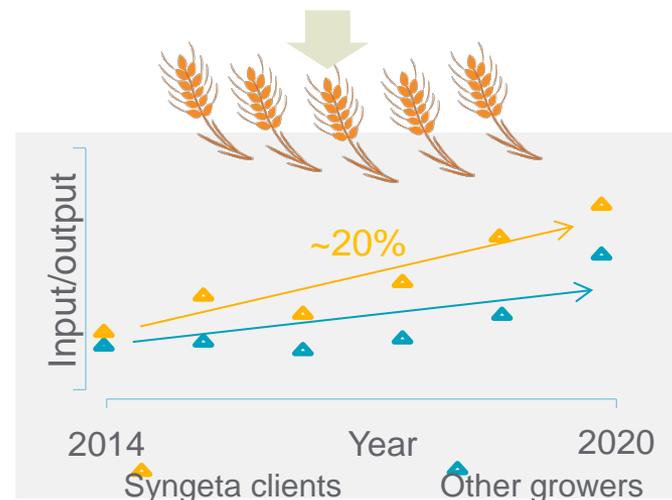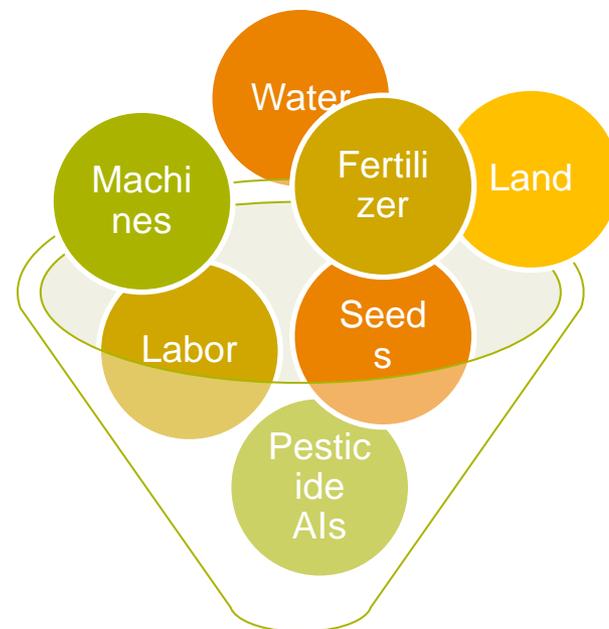
5. Labor efficiency
- Number of manhours per kg of crop output

6. Machine efficiency
- Number of machine hours per kg of crop output

7. Irrigation water efficiency
- Liters of irrigation water input per kg of crop output

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Syngenta widely shared the baseline surey results for 2014.

In the company's Annual Report

With respondent farmers
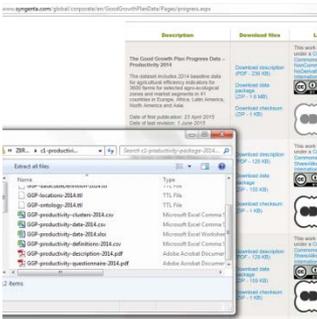
As open data for anyone to access

Applications and opportunities for collaboration

Monitoring

- Reporting on partial agricultural productivity measures
- Descriptive statistics on adoption of agricultural technology and practices

Impact evaluation

- Panel methods to assess determinants and impacts on Total Factor Productivity (TFP) growth
- Estimation of environmental impacts using LCA tools

Social innovation

- Publication of aggregated results as open data
- Integration with benchmarking tools for farmers

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Key conclusions

➢ There is little evidence of the impact of private R&D on total factor productivity (TFP) growth in agriculture. To close this research gap, Market Probe and Syngenta created a global network of farms to collect real-world data.

➢ For the year 2014, resource efficiency baselines were established for 23 crops in 41 countries to track crop-specific input and output relationships over time. LCA and panel methods will be applied to quantify drivers and impacts.

➢ Resource-efficiency benchmarks were provided to farmers to empower them to make better-informed decisions, save limited resources and reduce costs.

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