Innovation and Knowledge Transfer in Agri-Science: Ensuring effective development and commercialisation

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Exeter Sep 2014

Global Food Security Challenges and Opportunities

- The Global Challenges are enormous
  - Providing sustainable Food, Energy, Water Security for a population of 7 billion today, and 10 billion by 2080
    - ….in the face of Climate Change,
    - ….a difficult economic outlook,
    - ….natural resource shortages
- Sustainable Intensification of Agriculture
  - **The key concept** from UK Foresight report
- ....defined as producing **more output from the same area** of land while **reducing the negative environmental impacts** and **using all inputs more efficiently** – land, water, nutrients

Syngenta Strategy; $1.5bn pa R&D Investment

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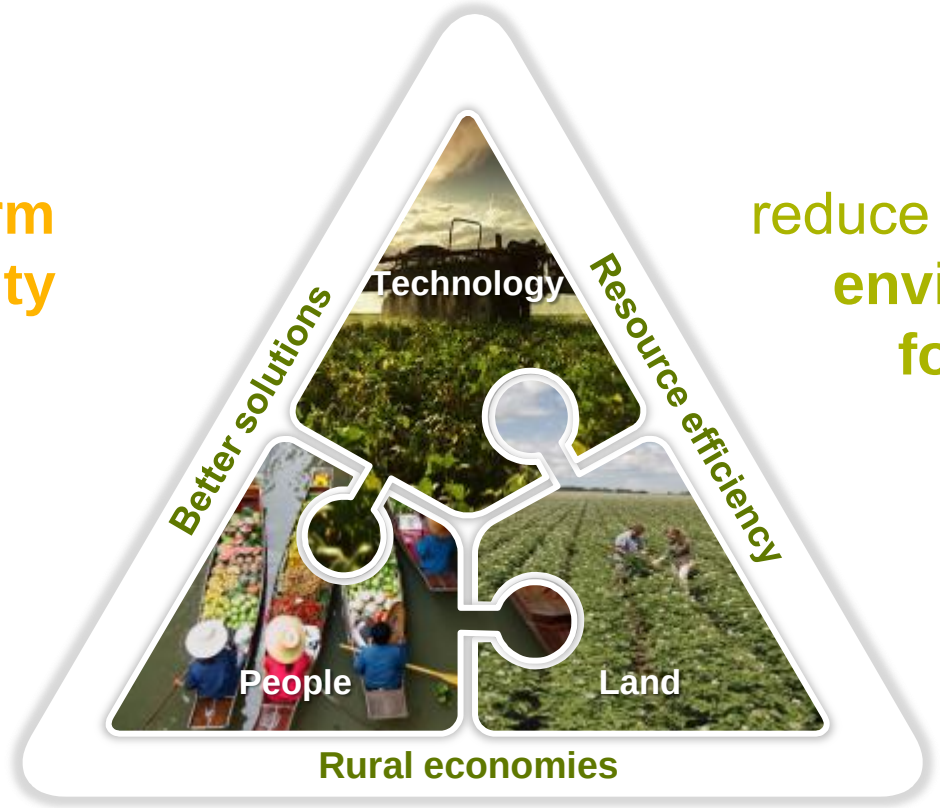
How can we….?

Grow more from less

improve **farm productivity**

reduce agriculture's **environmental footprint**



build **rural prosperity**

Knowledge Intensification

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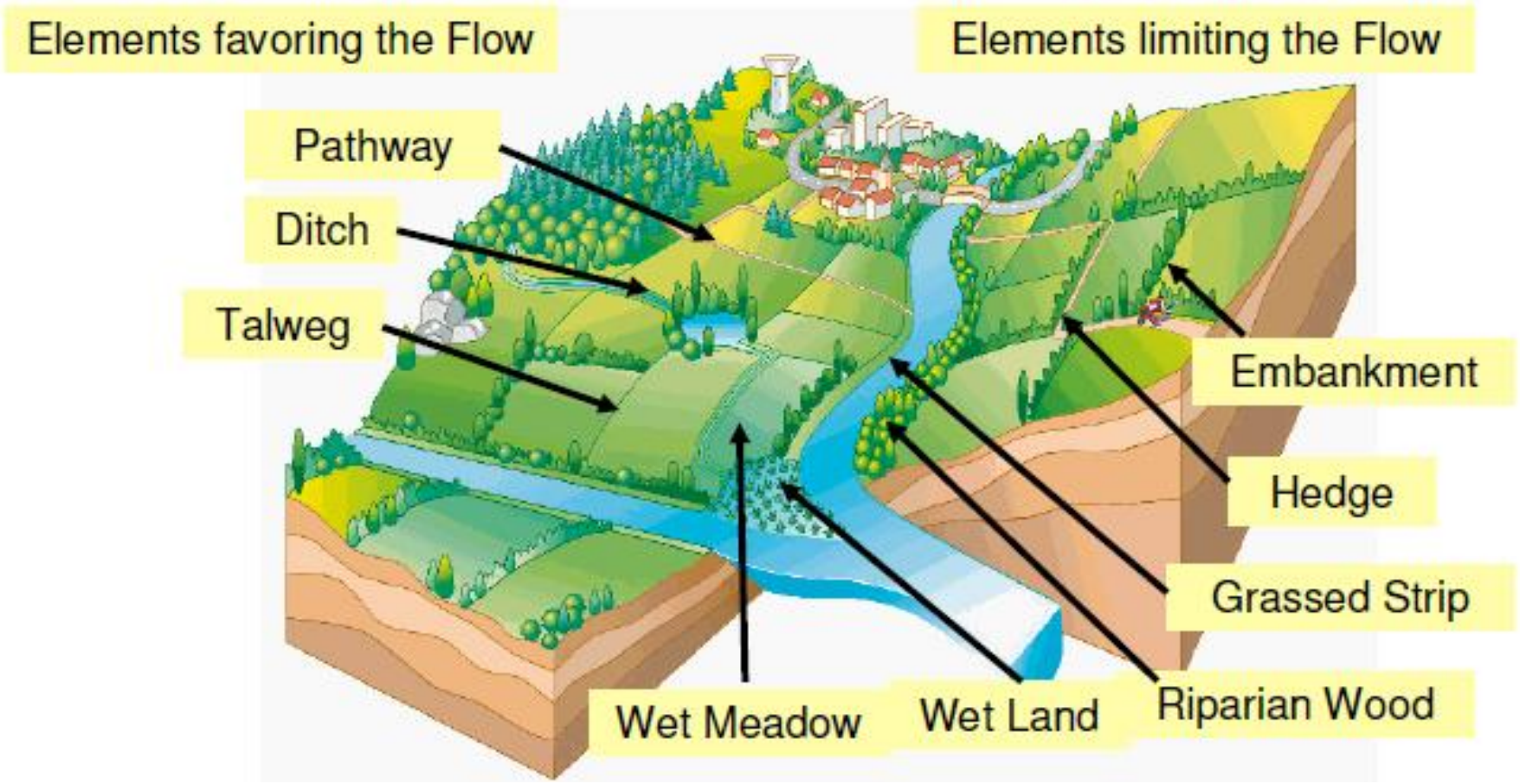
Water Quality (and aquatic biodiversity) – Best Management Practices



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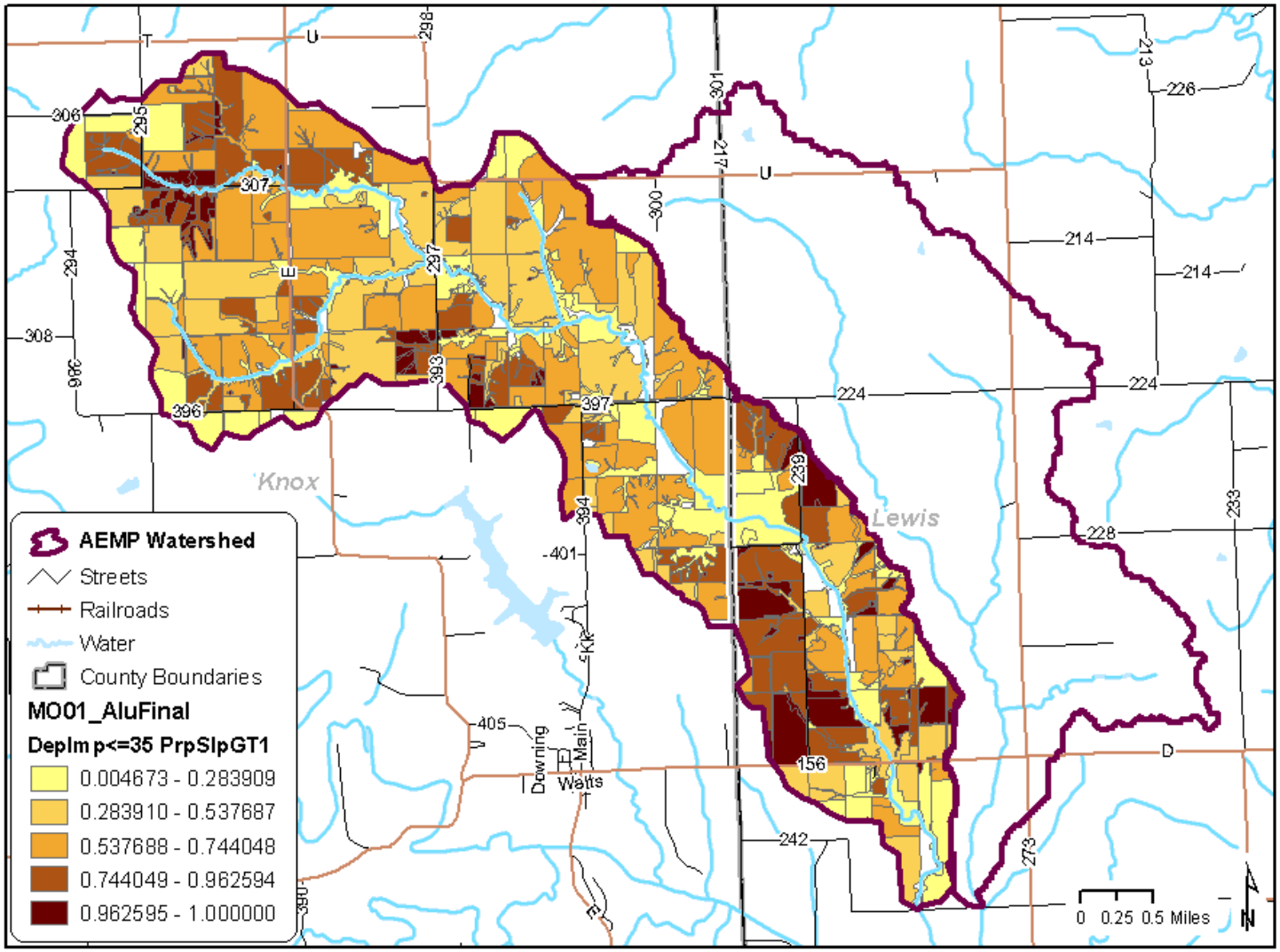
Fields Ranked by Potential for Extreme Runoff



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Operation Pollinator

Pollen and Nectar rich margin – legumes only

Pollen and Nectar rich margin - wild flower and grass mix

Translating Scientific Information into Knowledge

From gene data across technologies and crops….

- Corn
- Wheat
- Sorghum
- Soybean
- Tomato
- Pepper
- Cassava
- Poplar
- Melon

- Stress Tolerance
- Yield
- Flowering
- Fruit and petal color
- Taste
- Disease resistance
- Nutrient efficiency
- Insect Resistance

….to trait and marker knowledge within crops

Breeding for plant health, stress tolerance and consumer values

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

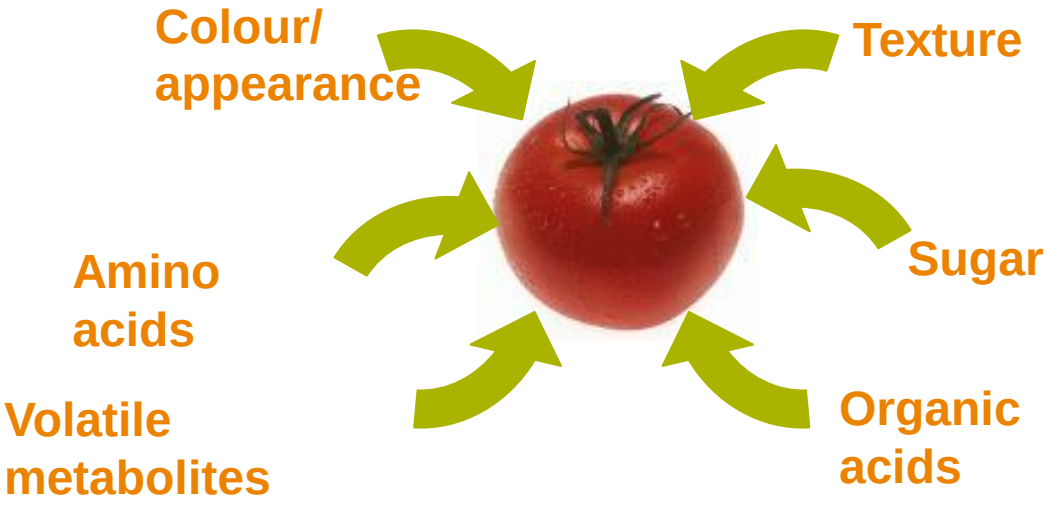
Elevating crop disease resistance with cloned genes

Jonathan D. G. Jones, Kamil Witek, Walter Verweij, Florian Jupe, David Cooke, Stephen Dorling, Laurence Tomlinson, Matthew Smoker, Sara Perkins and Simon Foster

Phil. Trans. R. Soc. B 2014 **369**, 20130087, published 17 February 2014

Agrisure Artesian™

Flavour is built from many components



"There has never been a better time to be a plant scientist"

Precision breeding approaches based on modern technologies, genetics and genomics

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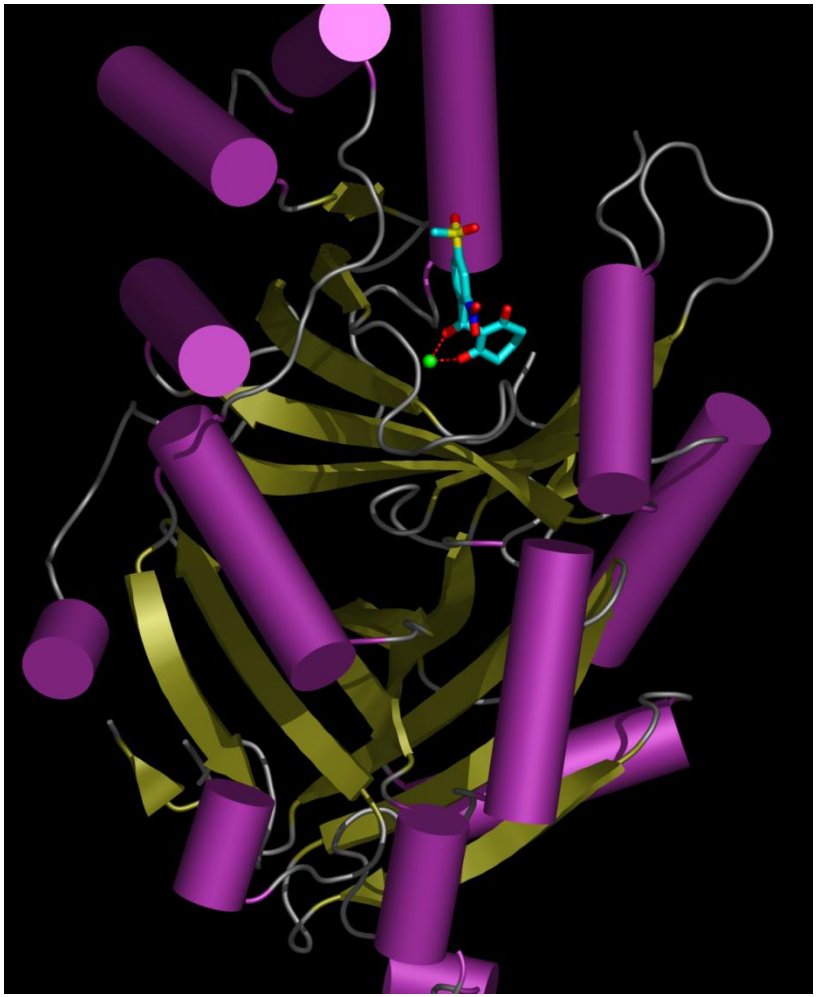
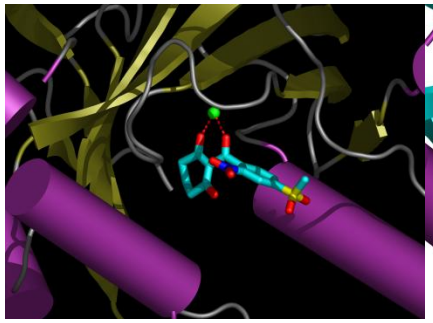
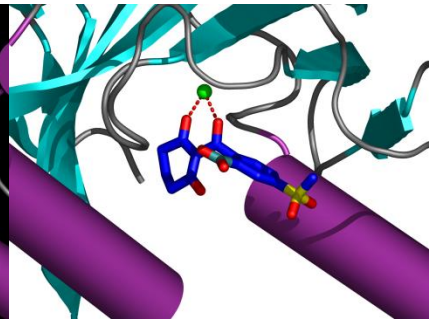
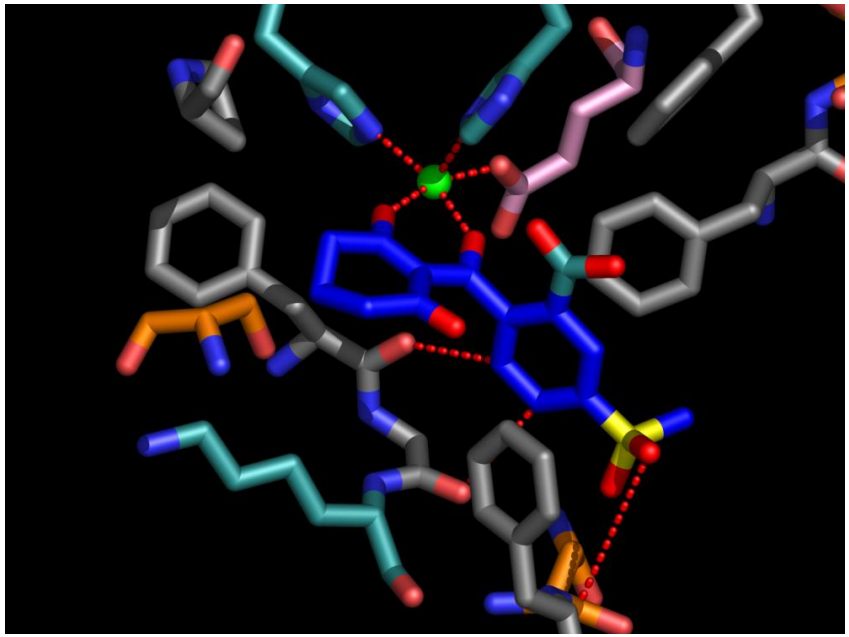
Innovative approaches: Hi-technology tools for Design









- Protein Science, crystallography, modelling, Smart Assays

Crop protection compounds: a long road to market

Research

Develop

1 - 2

Development

Evaluate

30

Profile

5000 compounds

50-100,000 compounds

Discover

Stage Gate Process

Time

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Safety all around

Toxicology

Food

People

Protection of employees

Operator safety

Environment

Environment

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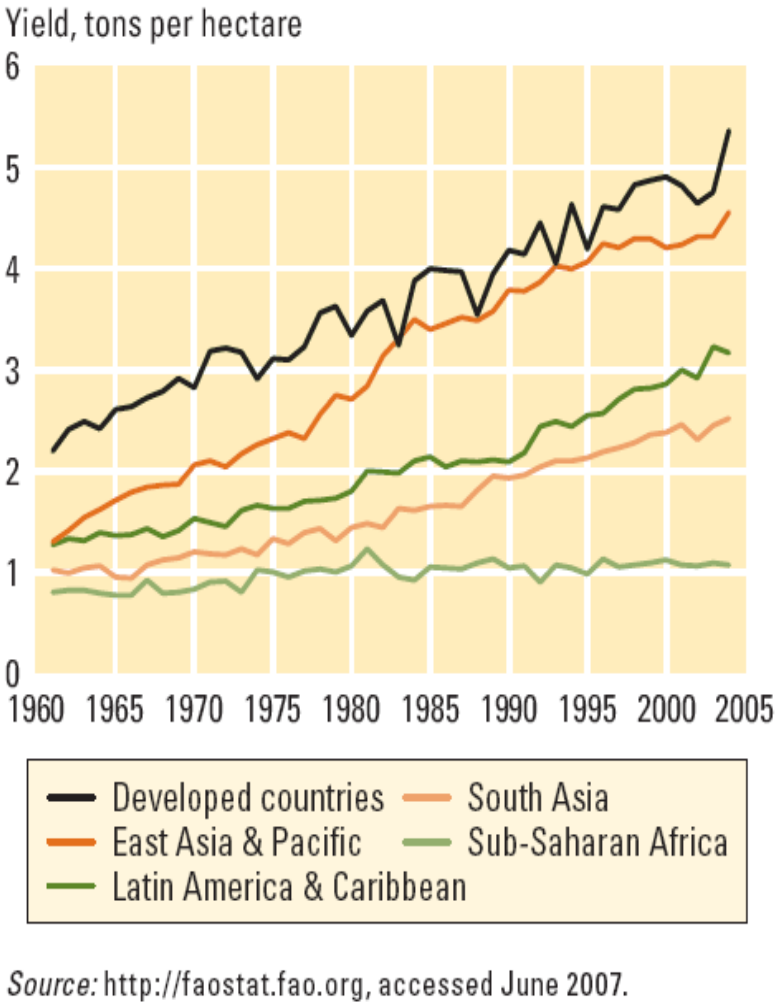
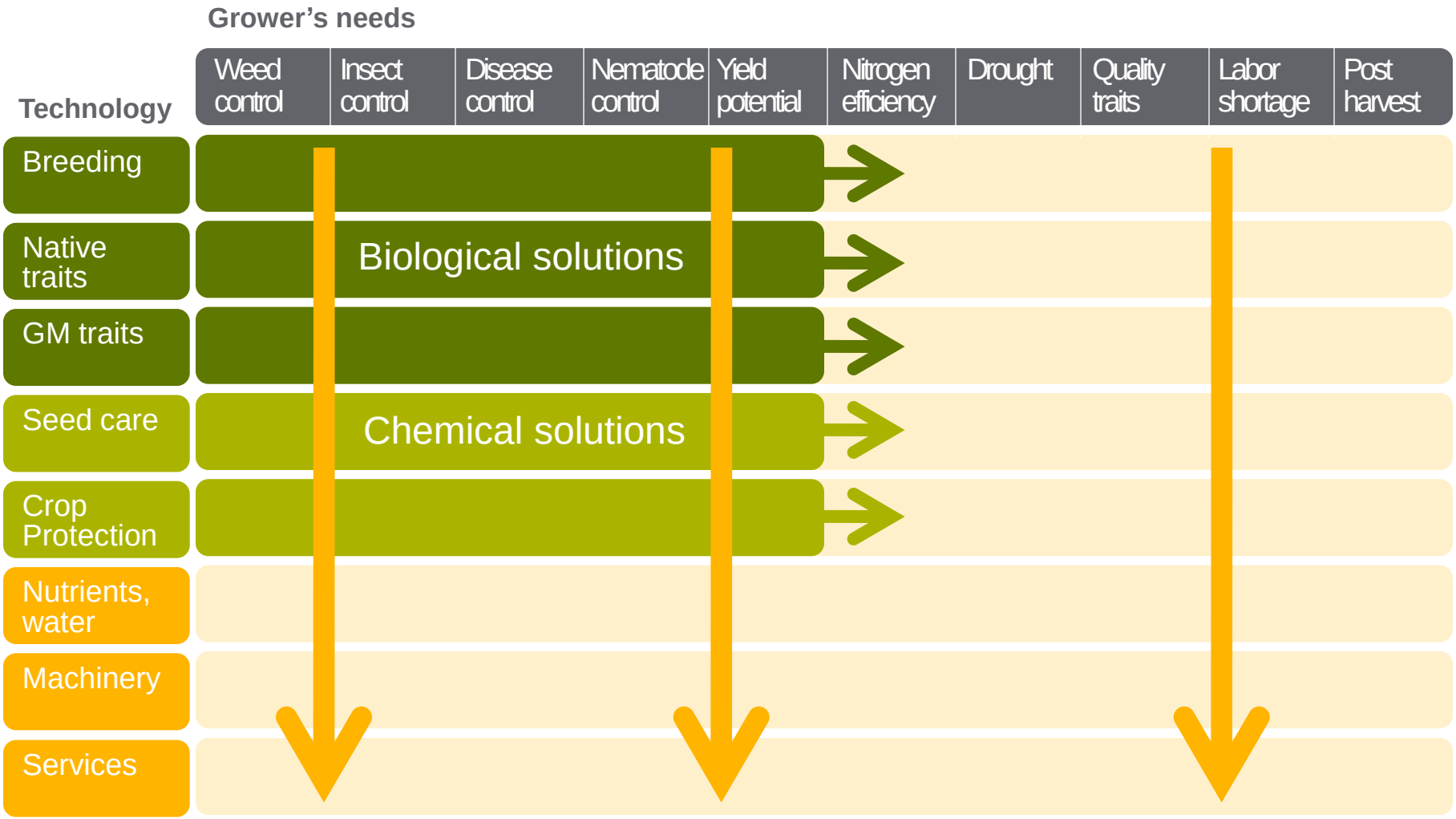
Think about Agricultural Systems



Source: http://faostat.fao.org, accessed June 2007.

Innovating across technologies to transform the way crops are grown



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Breakthrough ideas and achievements come from collaborating beyond boundaries

Complementary technologies

Research & Development

Better and safer farming practices

Food Value Chain

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Brazilian Coffee Jan 2008

Tanzania February 2012

Hainan China November 2008

Hyderabad September 2009

Rice: new solution to drive yield and simplify

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10 t/ha yield integrated solution: Chennai March 2011

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ICM in Vegetables

- **Andalucia (Almeria) Spain**
  - 2008- 100% of peppers, cucumbers and egg plant treated with ICM
  - Combination of cultural, chemical and biological control methods

Automatic boom height.

GPS guidance

Auto on-off

Self steering

Variable Rate Application

Record keeping (traceability)

HYVIDO™: hybrid barley seed technology

Delivering high-performing hybrid barley seeds to growers at scale

Huvido

- Unique seed technology innovation
- Delivering outstanding yield results under all growing conditions
- Cashback yield guarantee offered for growers following Syngenta protocols

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Poor soil fertility is generally obvious

NUE
Modern soil science
Micronutrients and NPK
Manures and composts
Inoculants
Precision application

Demo days allow hundreds of farmers to see the benefits of using Syngenta and Yara products

- Demo days are held on each of the sites at harvest time
- 50-100 farmers from each community attend and the Syngenta/Yara protocol is explained
- Has generated demand in the region - but product is often unavailable or accessible only in large pack sizes

Small-holder extension in Laikipia, Eastern Kenya: low cost plastic houses, water harvesting and links to markets

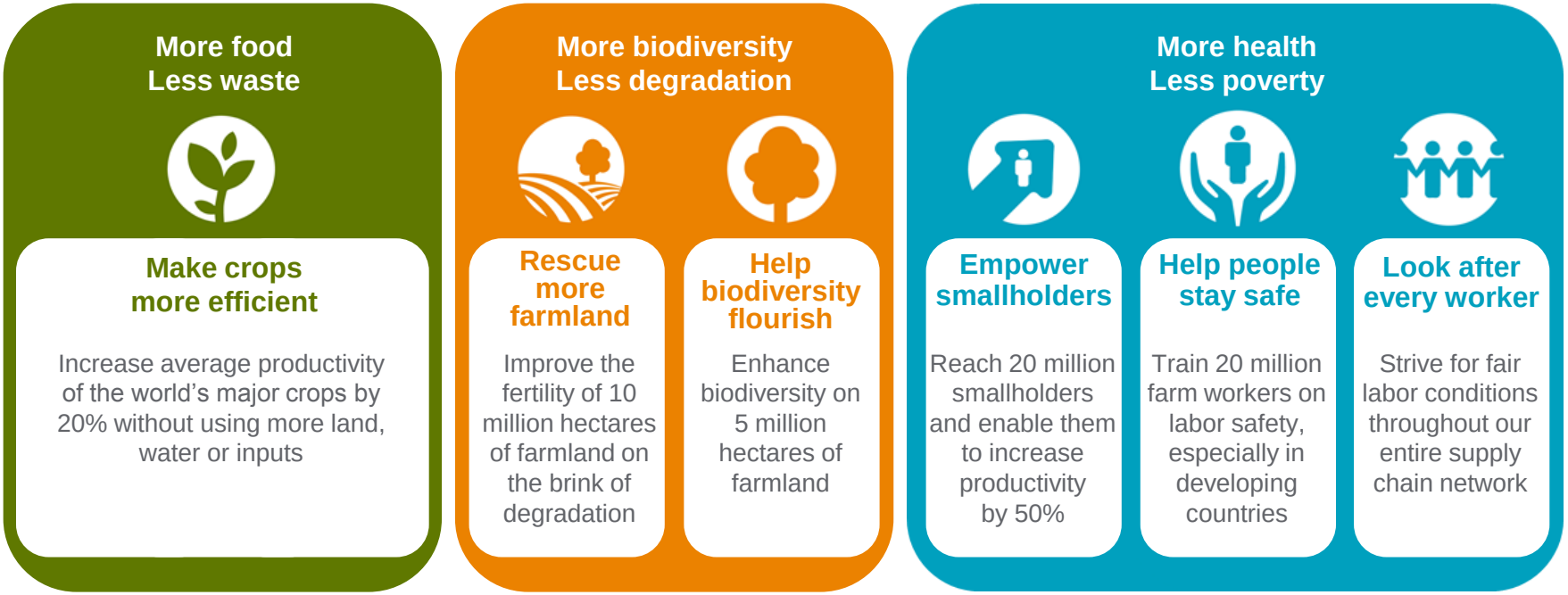
Mobile technology to support "farming as a business"

"*FarmForce*"

syngenta foundation for sustainable agriculture

The Good Growth Plan

We've made six commitments to help grow more food using fewer resources, while protecting nature, and at the same time helping people in rural communities live better lives



One planet. Six commitments.