Variety traits for the future

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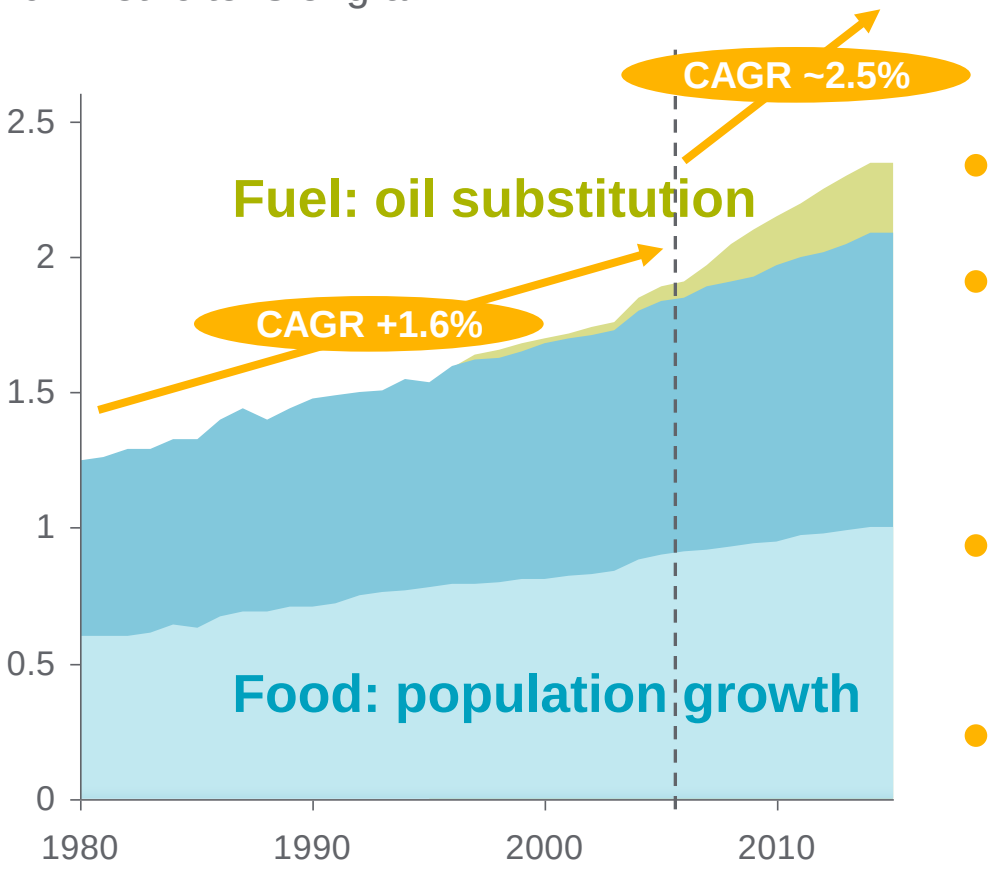
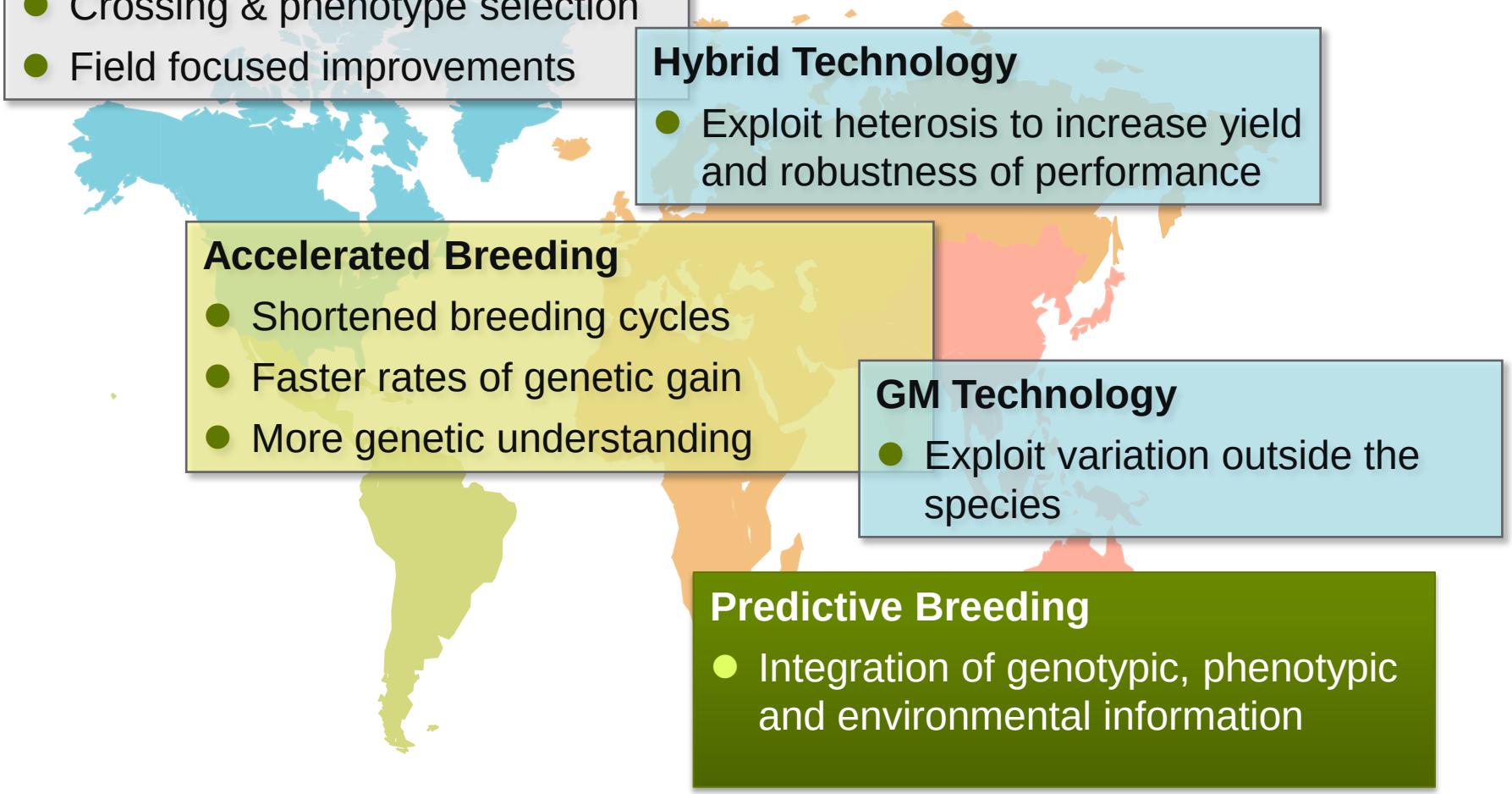
Increasing demand – Increased need for innovation



- Food, feed & fuel
- Emerging markets GDP growth drives agricultural demand
- Agriculture: intensify, modernize
- Restricting factors: land, water, climate, infrastructure, etc.

Source: USDA, Goldman Sachs Commodities Research

Technologies in plant breeding



Conventional Breeding

- Crossing & phenotype selection
- Field focused improvements

Hybrid Technology

- Exploit heterosis to increase yield and robustness of performance

Accelerated Breeding

- Shortened breeding cycles
- Faster rates of genetic gain
- More genetic understanding

GM Technology

- Exploit variation outside the species

Predictive Breeding

- Integration of genotypic, phenotypic and environmental information

Result

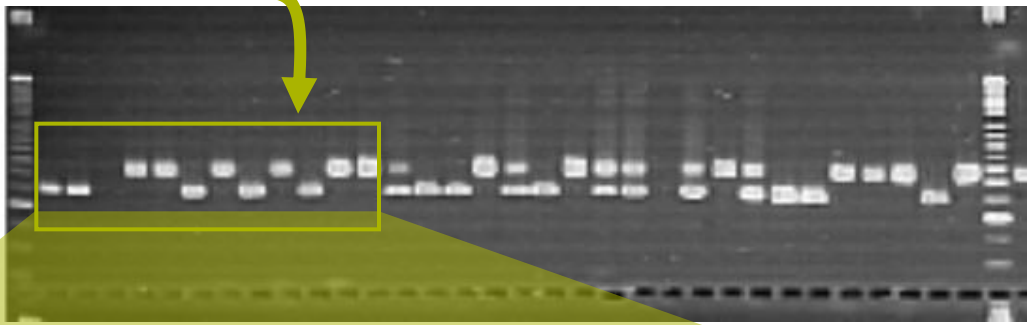

Volume winter barley gives you exceptional yields
Your only problem is where to put it all!
• Highest yielding winter barley on the HGCA Recommended List 2009/10*
• 111% UK treated yield (116% in the north)
• Impressive grain quality – low screenings and high specific weight (68.5 kg/hl)
• Excellent resistance to Rhynchosporium (8) and net blotch (8) coupled with resistance to BaYMV
• Early maturity
VOLUME
HIGH YIELDING WINTER BARLEY
syngenta
Syngenta Seeds Limited, CPC4, Capital Park, Fulbourn, Cambridge CB21 5XE
Tel: +44 (0) 1223 883400 Fax: +44 (0) 1223 882238 Email: cereal.enquiries@syngenta.com Website: www.newfarmcrops.co.uk
*Data from the HGCA Recommended List 2009/10. The full database can be consulted at www.hgca.com
HGCA

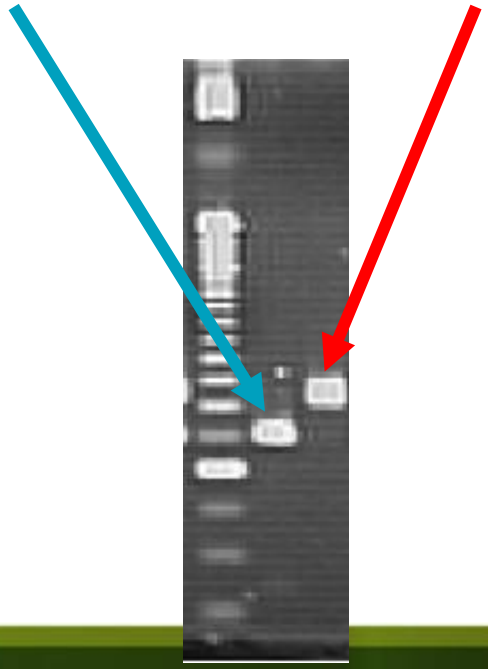
Marker assisted trait selection: an example in wheat

Healthy wheat

Infected wheat

Isolate DNA from young plants





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Selected plants

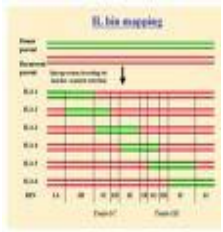
syngenta

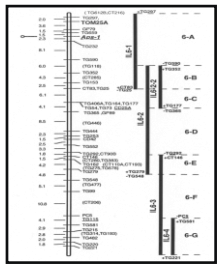
Benefits of double haploid breeding

- Double Haploid technology creates true-breeding lines in a single step
- Combined DH & molecular marker technologies result in increased rates of genetic gain.
- Facilitates multiple trait stacking/pyramiding
- Increases efficiency & probability of succesful product development
- Reduces time to market

Modern Breeding Research

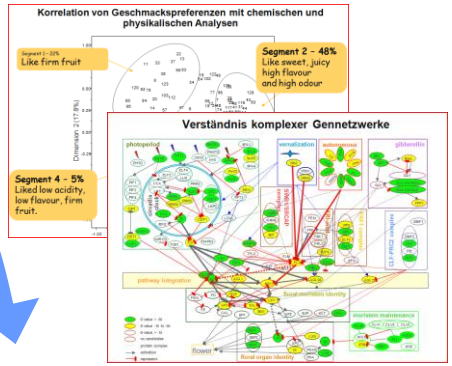
Technology integration for improved, faster product development





Marker Selection
Genotyping

Information
Technology



Correlation

Combination

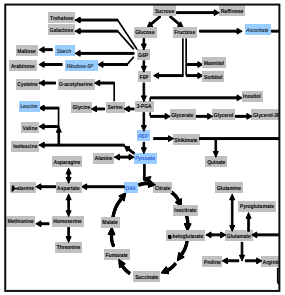
Effects / Traits

Knowledge & Science

Genetic Diversity

Selection

Phenotyping
"Metabolomics"



Allelic Diversity
Wild races

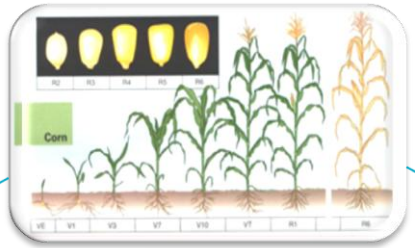
New Plant Variety

Example : tomato fruit quality

- 300 diverse lines for candidate gene selection
- “genome-wide” genotyping
- 100 agronomic traits and metabolites scored
- Genetic analysis to find markers/genes associated to the main traits (taste, colour, texture...)
- Integration of knowledge into ongoing breeding strategies

Integrate complex technologies to deliver increase in crop performance – move towards predictive breeding

Crop models



Complex trait assembly

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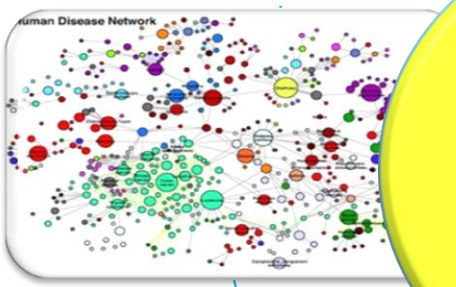
Collaboration network

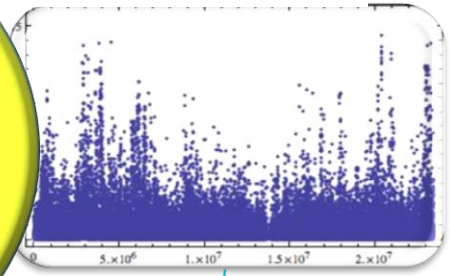
Gene networks



Plant performance:

- ✓Transgenes
- ✓Genetic factors
- ✓GenexGene effects
- ✓GxE effects
- ✓Gene x Chemical effects

Trait associations



Environments & Weather data

Strategic partnerships can deliver on priority traits: Water optimisation, heat stress, salt tolerance

Example: Drought - The Agrisure Artesian™ solution

- Using state of the art biotechnology and breeding capabilities...
- To deliver an innovative solution...
- Developed from the natural diversity of corn...
- That is on track to be the first to market drought tolerance product for farmers

Benefits of Agrisure Artesian™ technology

Source: Syngenta Chile Research Trial Photos

Example: Insect Management - Agrisure Viptera™

Location: Clarkton, NC – Bob Milholland – Board Level Agrisure Viptera Experience

Example Biofuels: Enogen Benefits In Corn Ethanol

Enogen corn contains a bacterial amylase gene which results in:

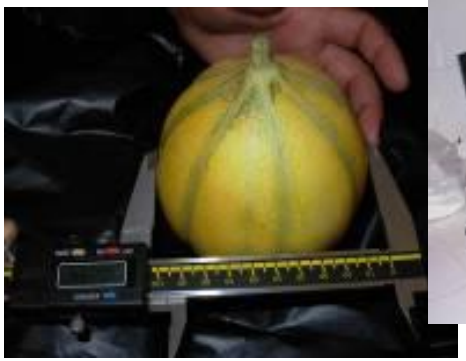
- Higher ethanol output (gal/mo)
- Reduced water and energy use
- Increased process flexibility
- Reduced maintenance cost
- Reduced environmental footprint
- Chemical savings

Greater productivity and sustainability

Example: Delicious Melons

Understand plant production

Understand the fruit



Understand flavor

Example: Healthy and Colorful Lifestyle

Salads that are fresh and nutritious when they reach your home

Flowers with new deeper colors that last longer and survive better

Summary

- The Plant breeder has novel tools which enhance his/her ability to deliver novel products

HOWEVER

- The demands of the world population not only increase but there is a paradigm shift to quality and sustainability

THEREFORE

- We need two levels of integration:
  - A focus on production systems, where agronomy leverages the benefits of plant genetics and crop protection
  - Open collaboration where knowledge networks ensure that we share and build our capabilities through public private partnerships

Thank you very much !

Bringing plant potential to life