How technology improvement can contribute to sustainable crop production

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Association for European Life Science Universities

How Technology improvement can contribute to sustainable crop production

- Brief presentation of Syngenta

- Need for sustainable crop production
- Key drivers influencing technology enhancement for crop production
    - Yield
    - Quality
    - Sustainability
    - Information management
- Research fields and collaboration with Life Science Universities

- Conclusion

Brief presentation of Syngenta

Who we are and what we do

Syngenta is one of the world's leading companies with more than 26,000 employees in over 90 countries dedicated to our purpose: Bringing plant potential to life.

Our Crop Protection and Seeds products help growers increase crop yields and productivity. We contribute to meeting the growing global demand for food, feed and fuel and are committed to protecting the environment, promoting health and improving the quality of life.

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Syngenta has three businesses

Crop Protection

Selective herbicides

Non-selective herbicides

Fungicides

Insecticides

Seed care

Seeds

Corn & Soybean

Diverse Field Crops

Vegetables

Lawn & Garden*

Flowers

Growing Media**

Chemical Controls**

Turf & Ornamentals**

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Global R&D capabilities

GOA
Chemistry

JEALOTT'S HILL
Chemical Discovery
Weed Control
Formulation
Bioscience
Environmental Science

GREENSBORO
Formulation
Environmental Science

Major R&D sites located on three continents

BEIJING
Biotechnology
R&D

SBI
Biotechnology
R&D

STEIN
Fungicides, Insecticides & Professional Products

Other sites

- Marker-assisted and seed breeding capabilities
- Global field station network

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Need for sustainable crop production

Need for sustainable crop production

- "Feed the world has been made possible thanks to evolution of agricultural technologies"
  - *Dr. Norman Borlaug ,'Father of the Green Revolution'; Nobel Peace Prize winner*
    - "Agriculture in the world cannot be sustainable without science"
      - *Dr. Per Pinstrup Anderson, Professor of Food, Nutrition and Public Policy, Cornell University; Former Director General, IFPRI*

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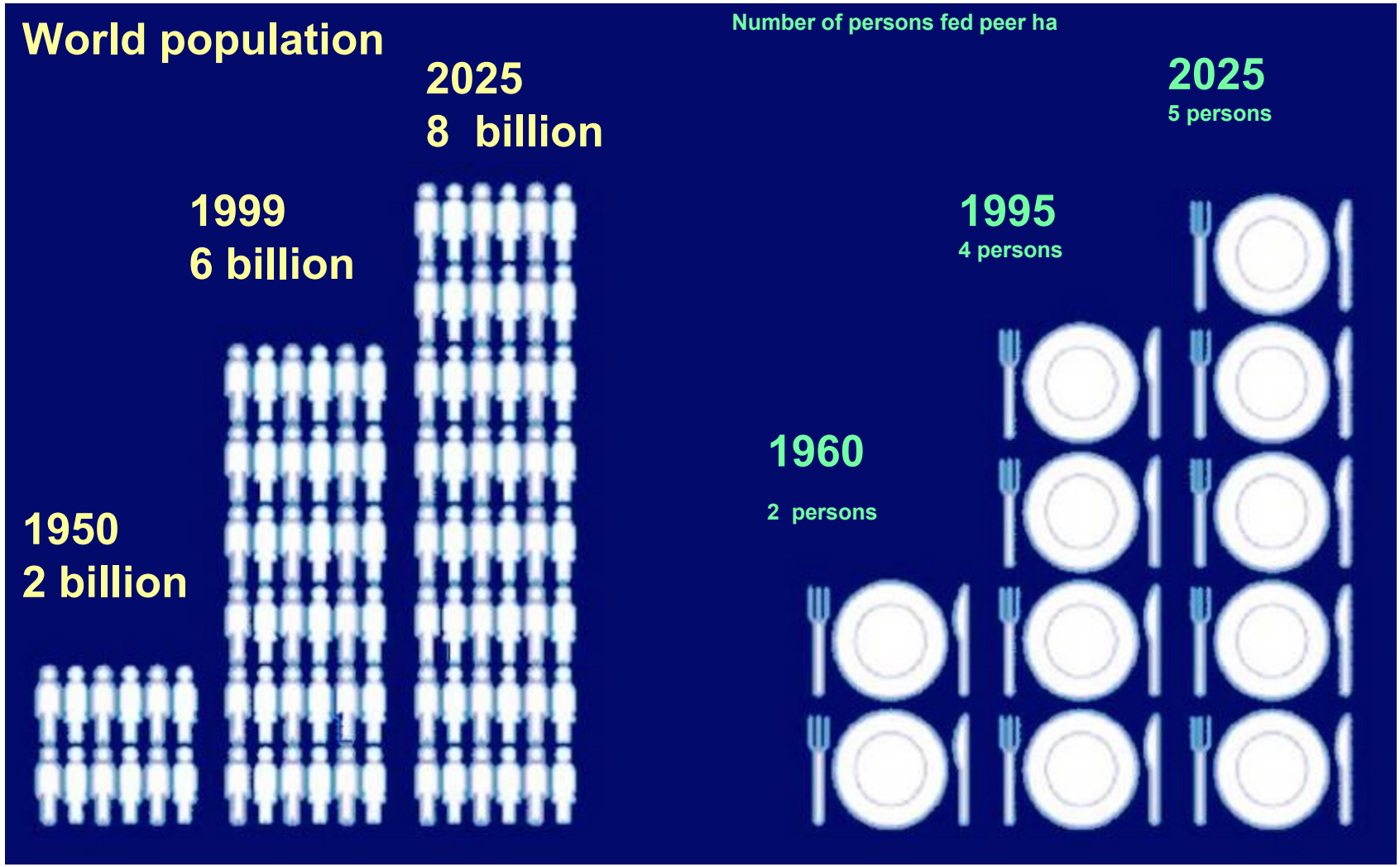
Need to feed growing population



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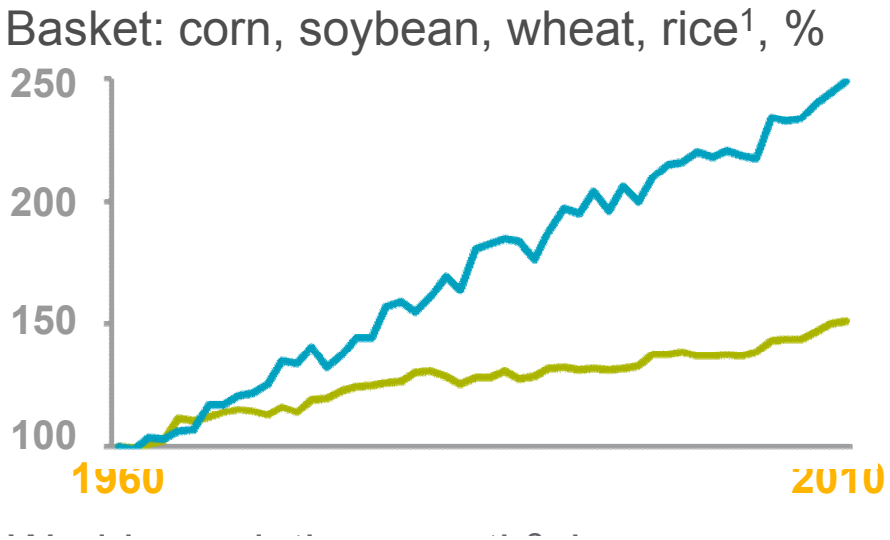
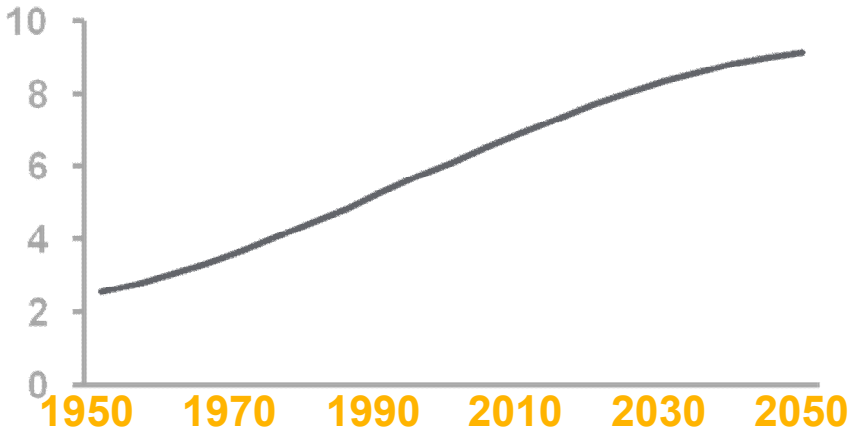
Growing more with less





- Limited resources: land, water
- Changes in climatic patterns
- Environmental sustainability
- Need for innovative and integrated technology solutions

1 Source: USDA, January 2010
2 Source: UN World Population Prospects: 2008 Revision, Medium variant

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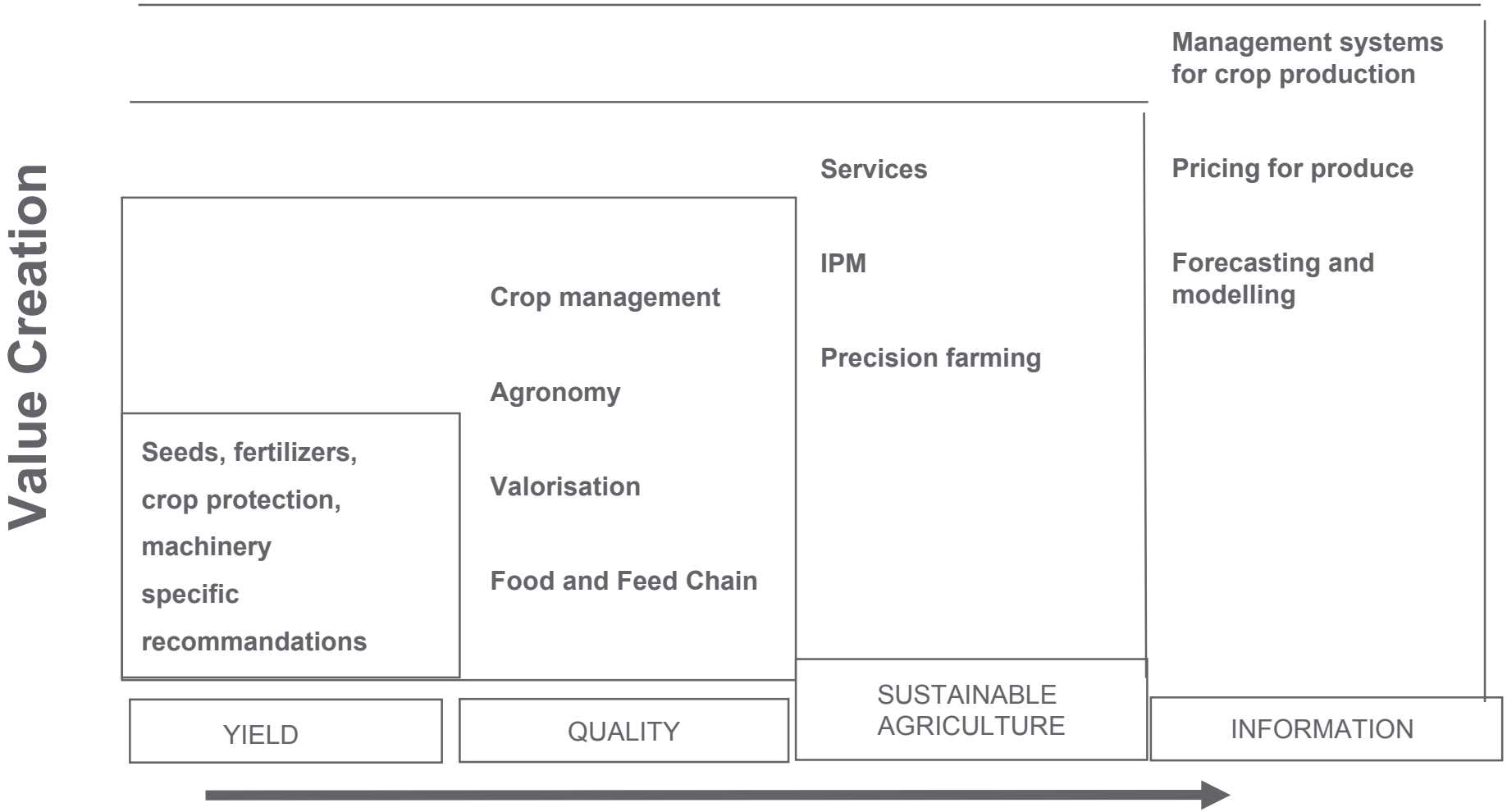
Key drivers influencing technology enhancement for crop production


Value Creation
Seeds, fertilizers, crop protection, machinery specific recommandations
Crop management
Agronomy
Valorisation
Food and Feed Chain
Services
IPM
Precision farming
Management systems for crop production
Pricing for produce
Forecasting and modelling
YIELD
QUALITY
SUSTAINABLE AGRICULTURE
INFORMATION

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Key drivers influencing technology enhancement for crop production

YIELD

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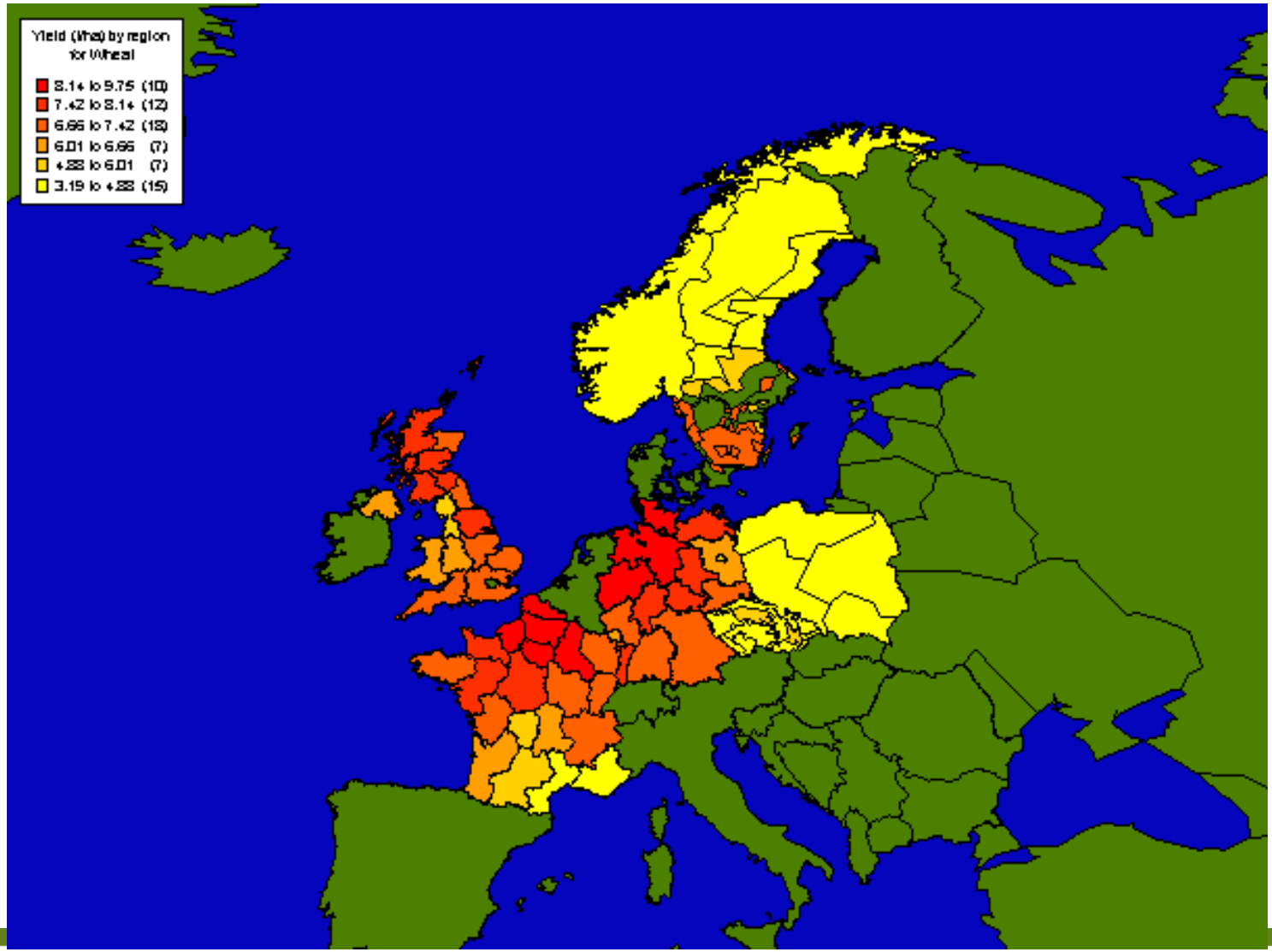
Wheat – Yield ton/ha



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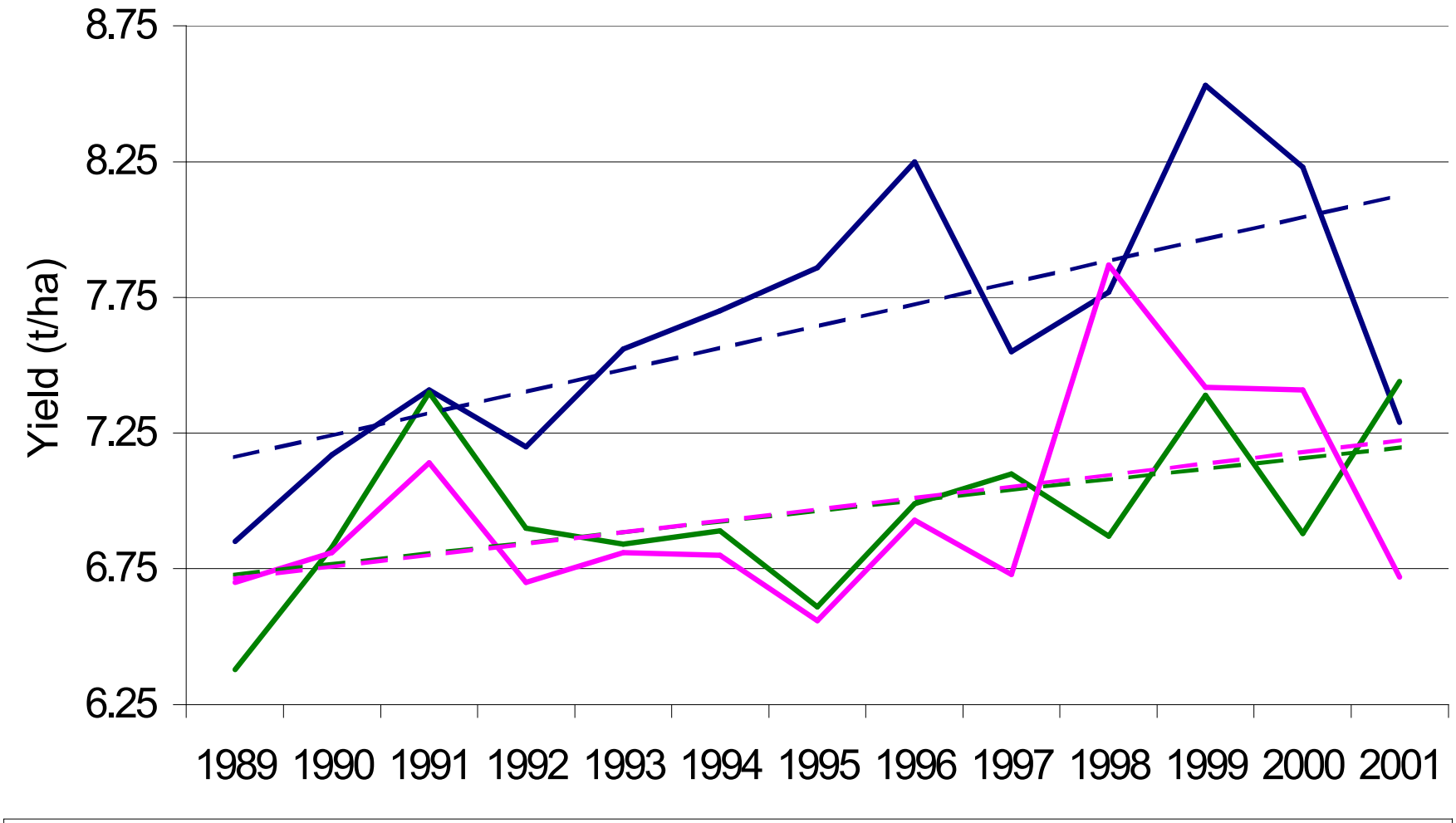
Constant increase in yield in Europe



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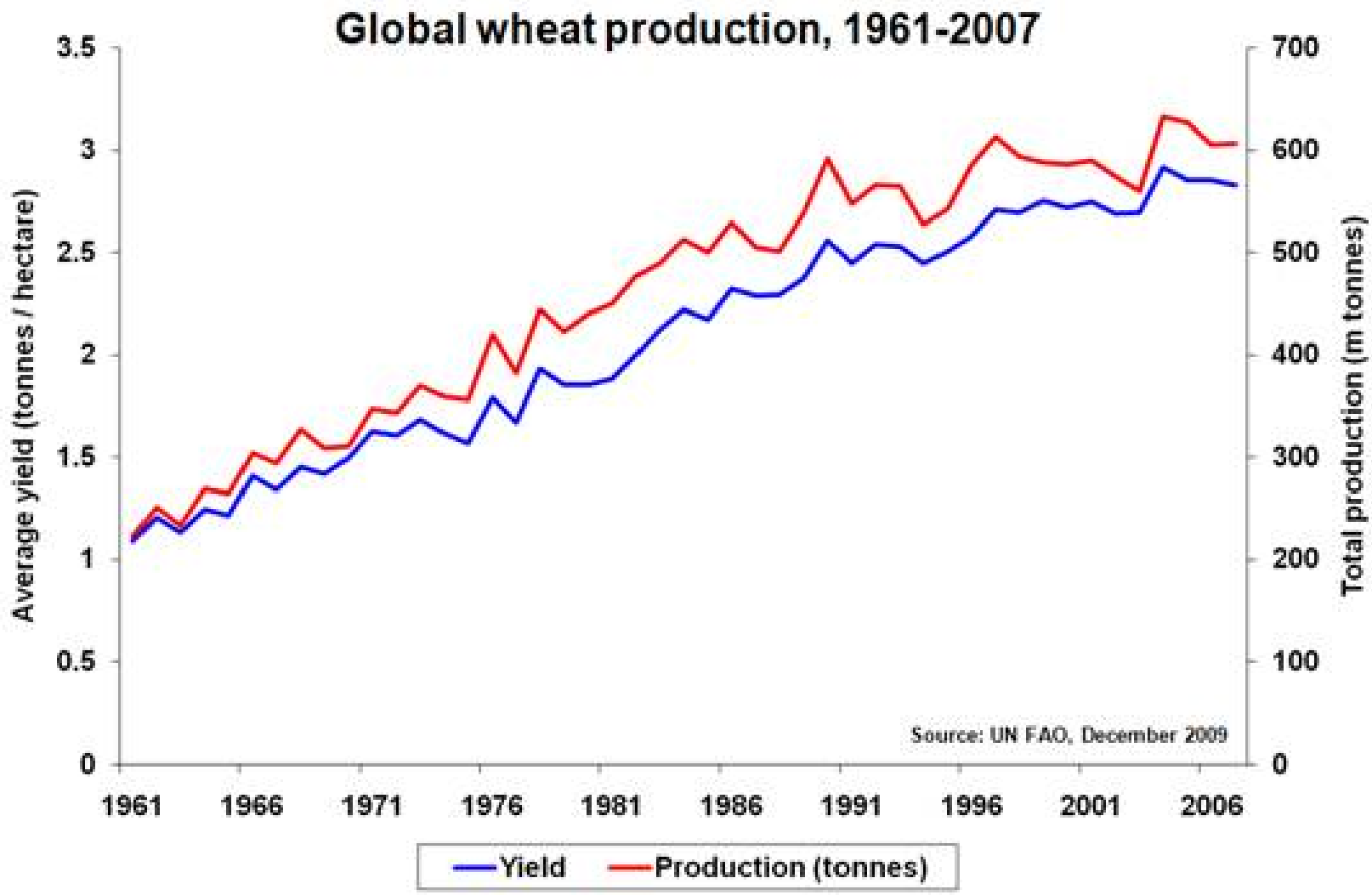
And in the world



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Key drivers influencing technology enhancement for crop production

QUALITY

Qualimètre®

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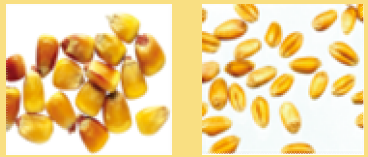
Monitoring of mycotoxins since 2000

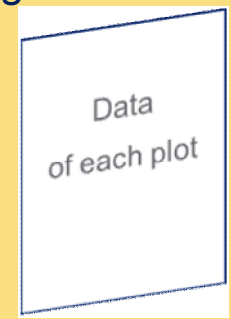
Clé des champs

FIELD PLOTS

Samples of grain



Agronomic form



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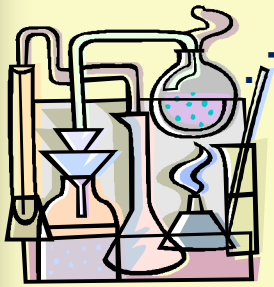
Database since 2000 :

Wheat 14 400 plots
. 12 000 soft wheat
. 2 400 durum wheat

Maize 7 500 plots

Spring barley 2 400 plots

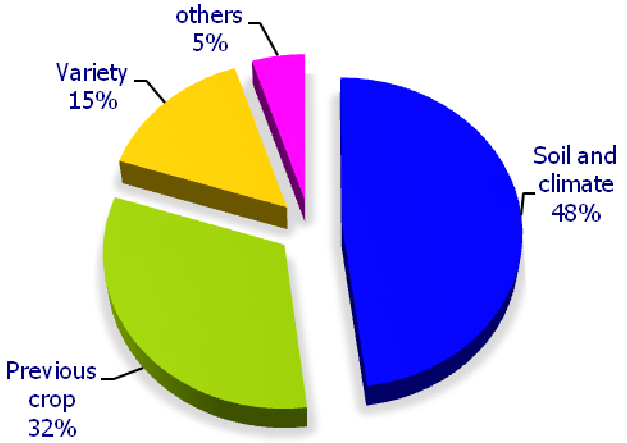
LABORATORY



. **Trichothecenes A and B analysis**
by chromatographic method

. **zearalenone and fumonisins**
by elisa method

Main factors
DON on wheat



Clé des champs

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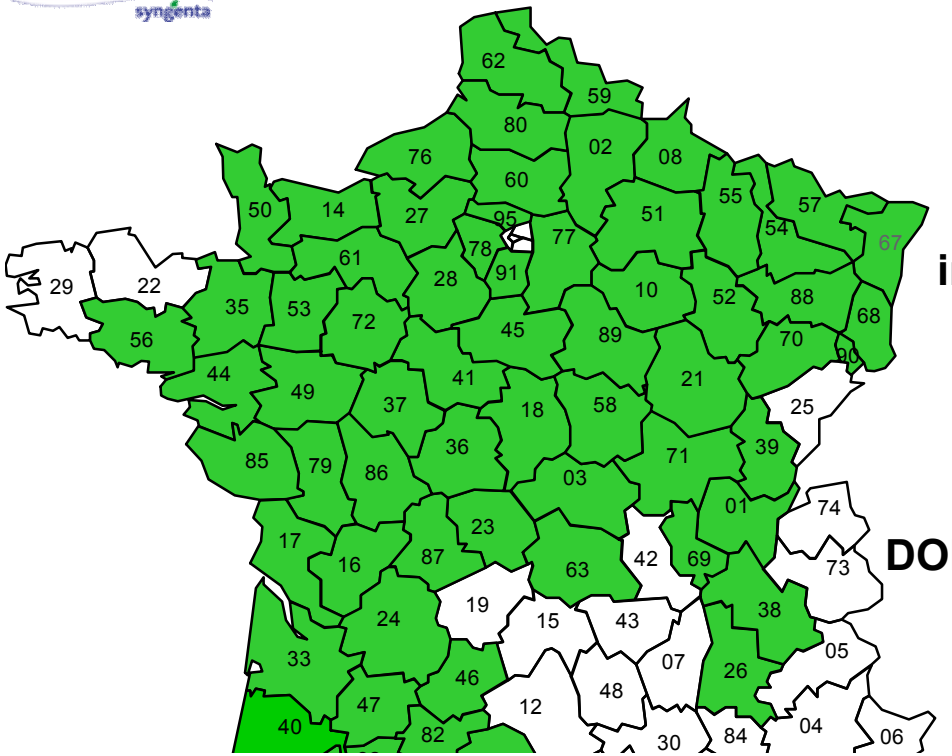
First models for mycotoxins prediction in France



DON predictions

in soft wheat and durum wheat

one month before harvesting

DON, ZEA and FUMO predictions

in maize during september

2011

8th year of prediction for wheat and 6th year for maize

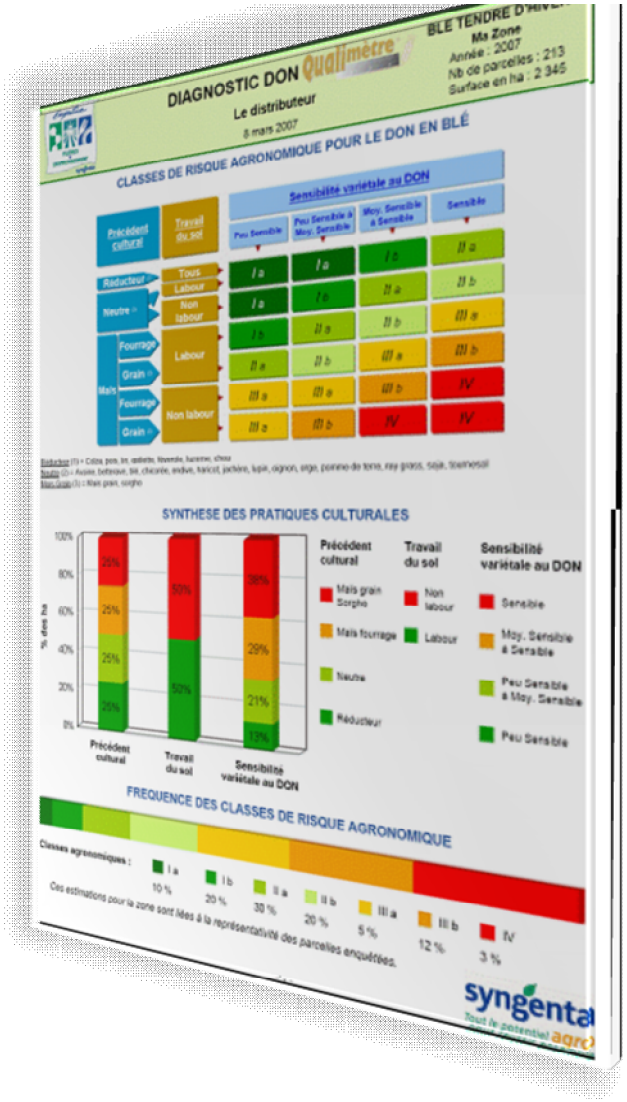
70 partnerships with grain collectors

300 grain collect area

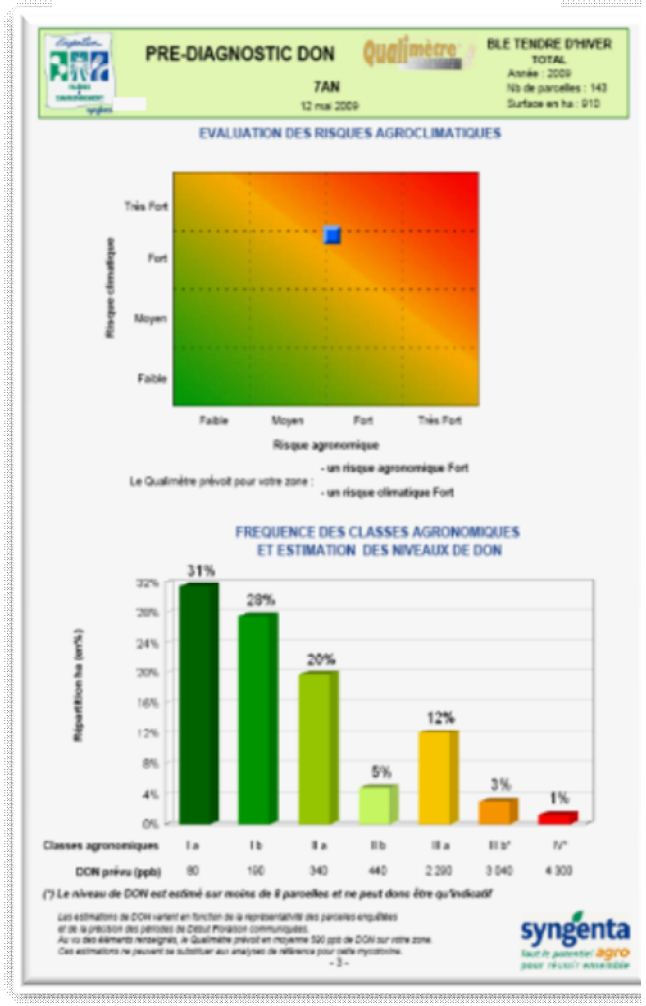
Forecast estimating 4.5 million hectares wheat and maize

Qualimètre® reports on wheat for a specific grain collect area

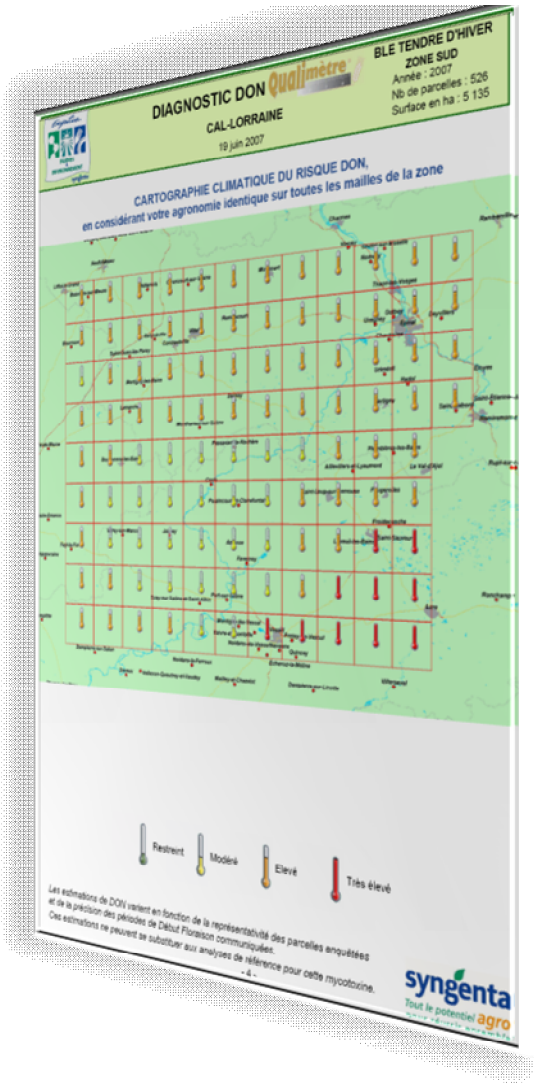
Agronomic report



DON forecast



Mapped risk

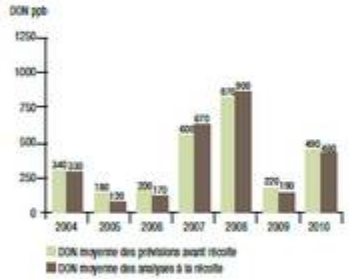


Qualimètre confirms ILLICO

Illico la nouvelle référence
Blé Tendre contre la fusariose

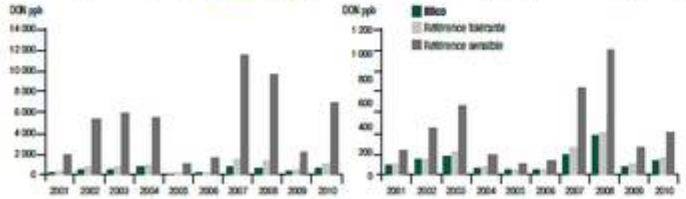
Illico et Qualimètre

Avec la distribution agricole, Syngenta mène depuis 2000 des enquêtes terrain sur blés. L'itinéraire cultural et le climat autour de la floraison de plus de 12 200 parcelles agriculteurs en blé tendre sont répertoriés. Des analyses du DON (déoxynivalénol) sont réalisées par HPLC sur les échantillons de grain représentatifs de chaque parcelle. L'analyse de cette base a permis de concevoir un outil de prévisions du risque DON un mois avant la récolte. **Qualimètre® fonctionne depuis près de 10 ans.** Il est utilisé par plus de 50 organismes de collecte dans les principaux bassins de production de blés. Ses **prévisions** sont calculées sur 300 zones de collecte représentative de plus de **4 millions d'hectares.** Ci-dessous, le graphique compare chaque année la moyenne des prévisions avant récolte avec celle des analyses DON réalisées à la récolte. Ce travail démontre la **fiabilité** du Qualimètre® quelle que soit l'année.



Le Qualimètre® nous permet de simuler le comportement de **Illico** dans tous les contextes agronomiques et climatique répertoriés ces dix dernières années. Les schémas ci dessous quantifient le DON moyen par année avec Qualimètre® dans des situations de risque agronomique fort ou faible sur 70 localisations en France. **Illico** ressort systématiquement avec des teneurs en DON inférieures à la référence tolérante du marché. Ceci est d'autant plus marqué que la situation agronomique ou climatique est à risque.

Comparaisons issues du Qualimètre avec un risque agronomique fort pour le DON depuis 2001



L'analyse Qualimètre® confirme **Illico** comme **la meilleure variété pour la gestion du risque DON.**

Illico
la nouvelle référence
Blé Tendre contre la fusariose

Résistance à l'accumulation des mycotoxines validée par le Qualimètre

Illico syngenta.

Illico syngenta.

Qualimètre®

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Key drivers influencing technology enhancement for crop production

SUSTAINABLE AGRICULTURE

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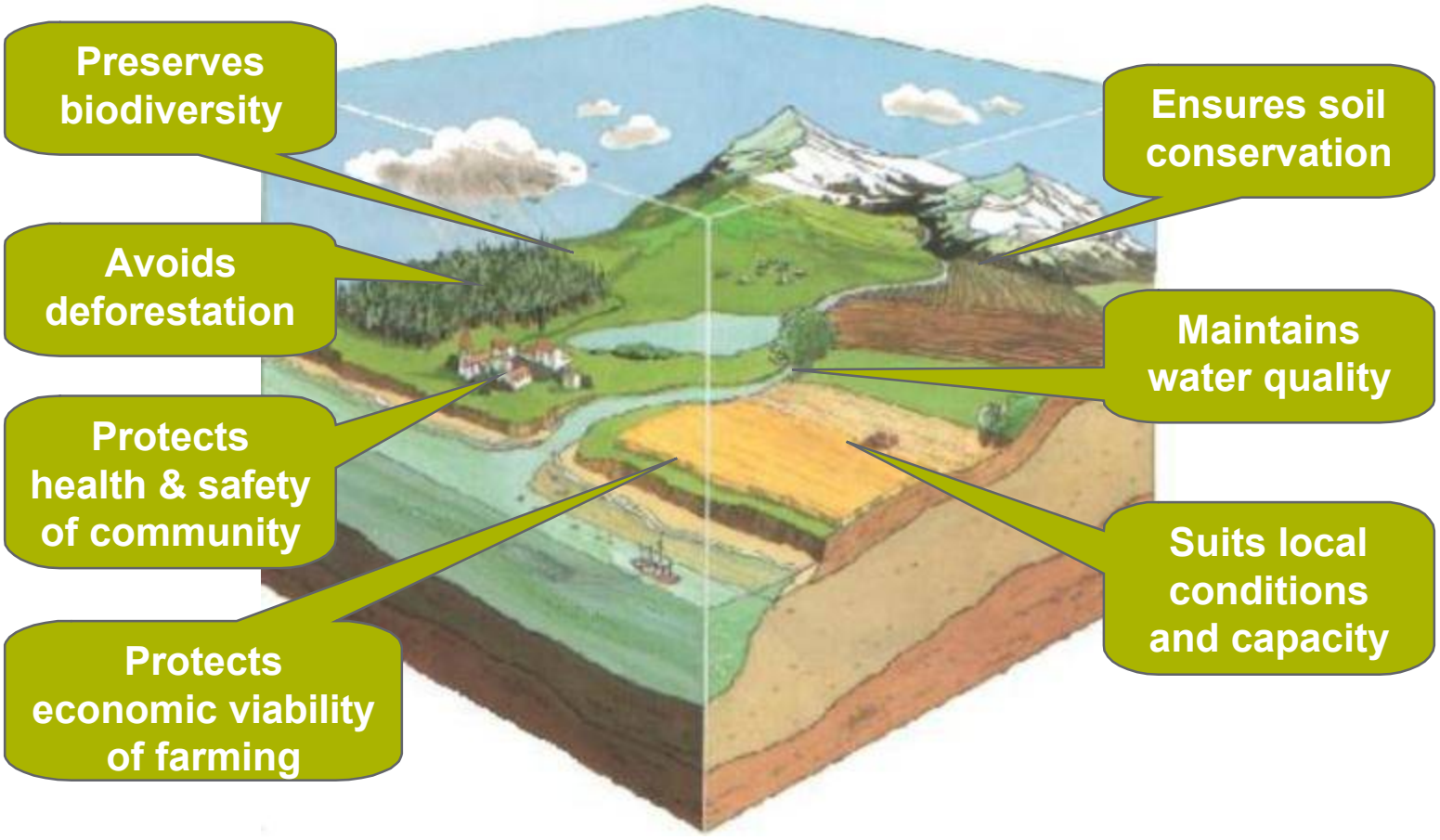
Sustainable agriculture

Our commitment: contribute to sustainable agriculture in the production of healthy food and the conservation of biodiversity



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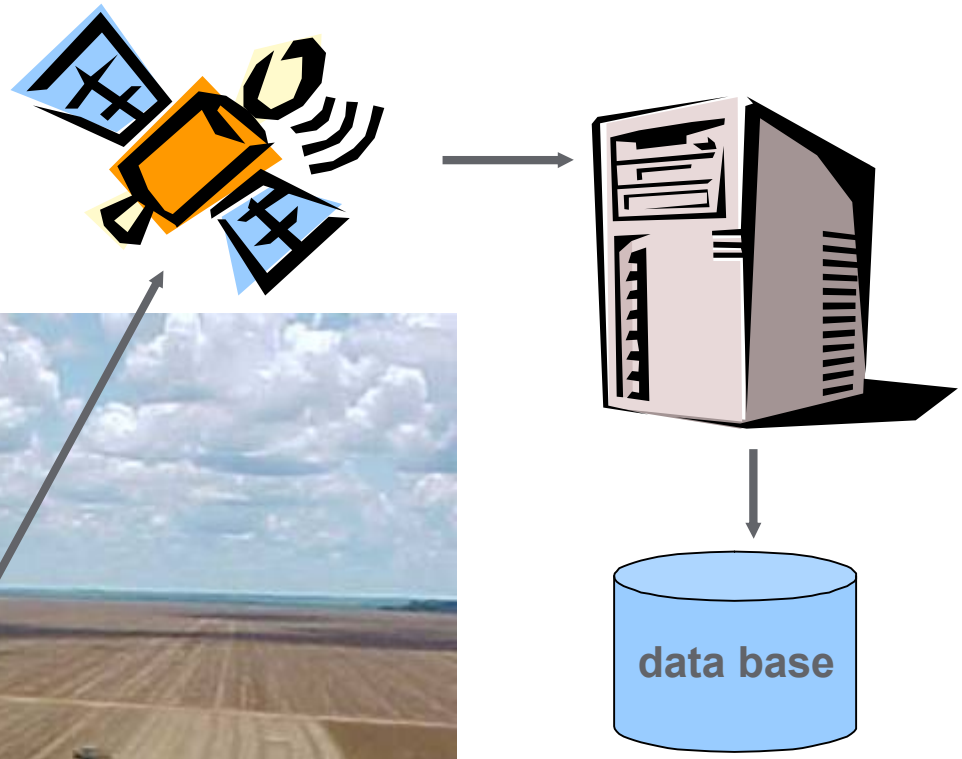
Key drivers influencing technology enhancement for crop production

INFORMATION MANAGEMENT

Immediate recording of

place,
yield,
quality
weather,
historical data



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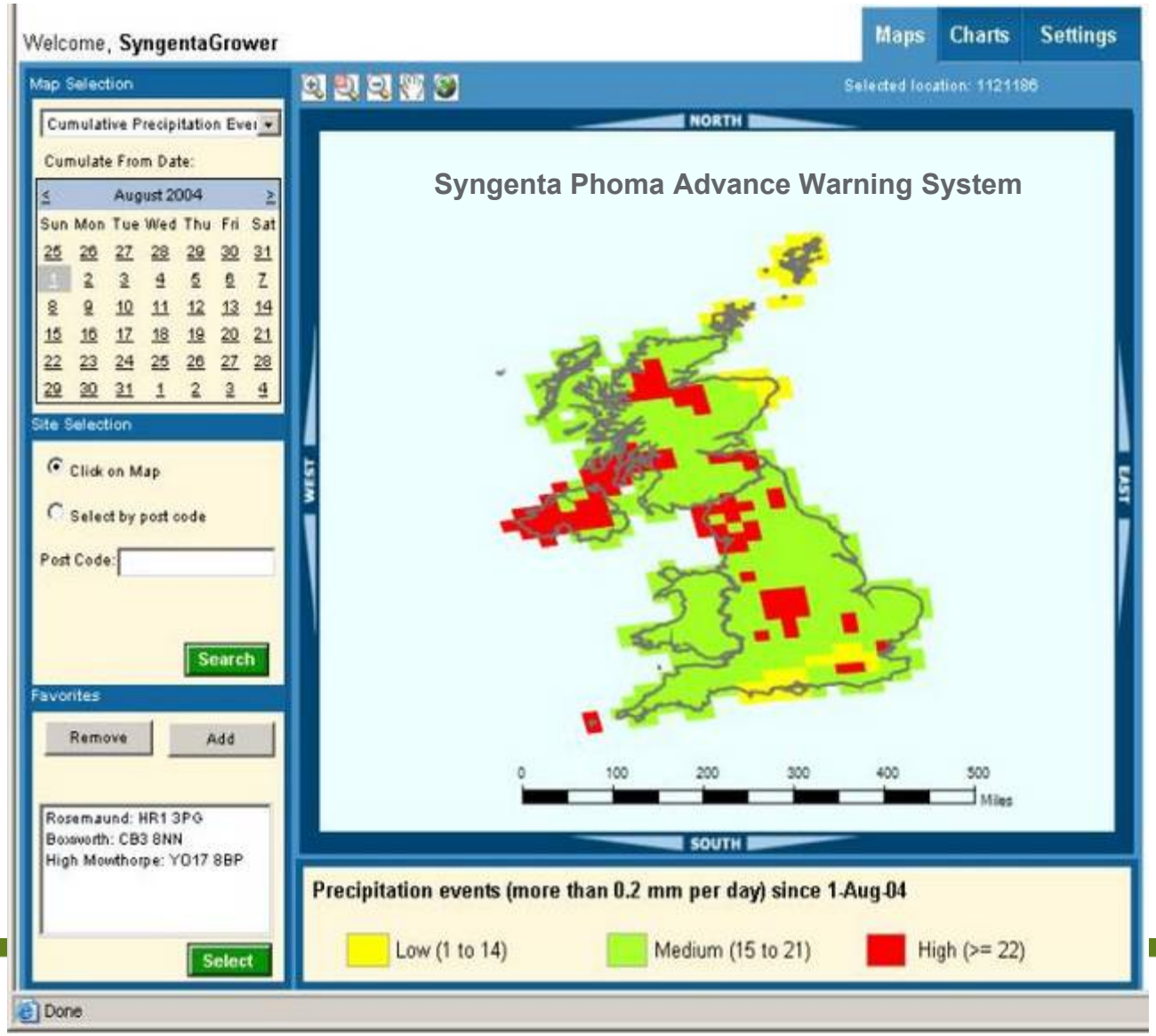
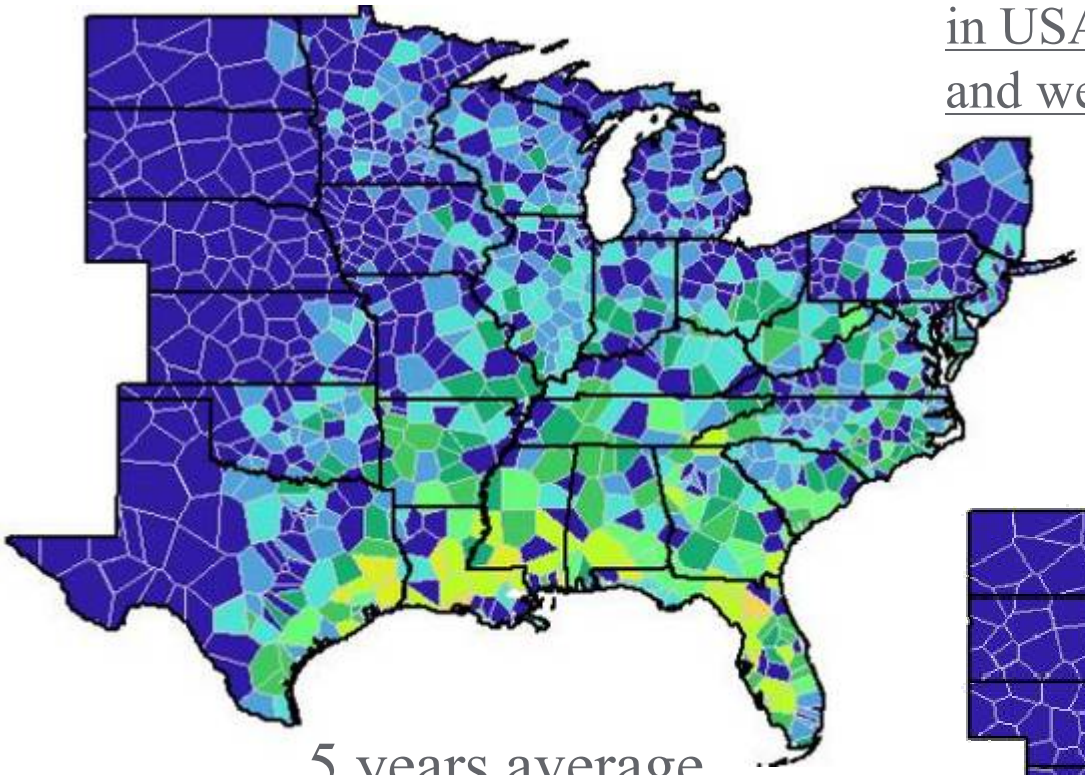
Mapping for risk management for diseases

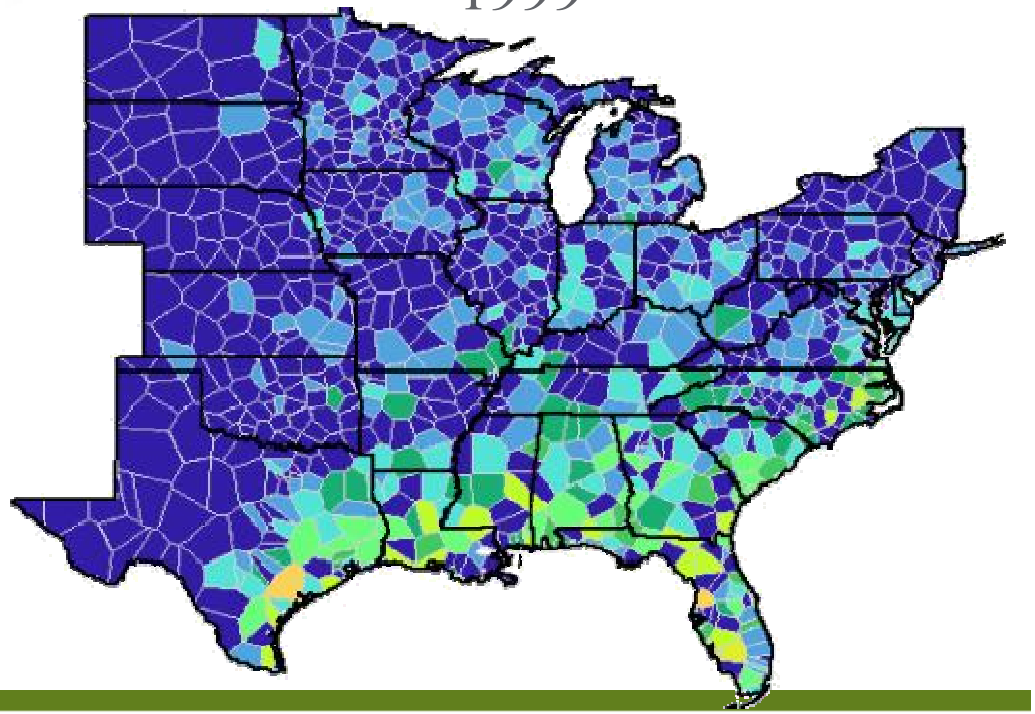


2002

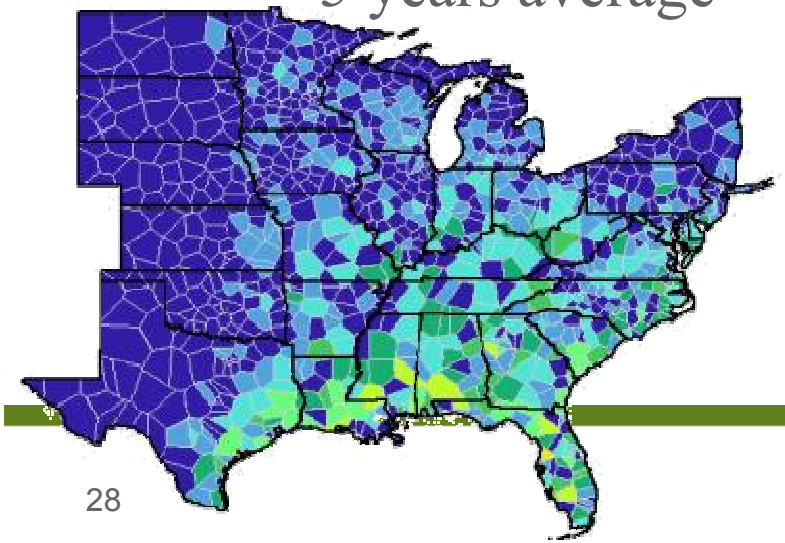


Monitoring of evolution of rust on Soybean in USA based on average historical data and weather forecasting

1999



5 years average



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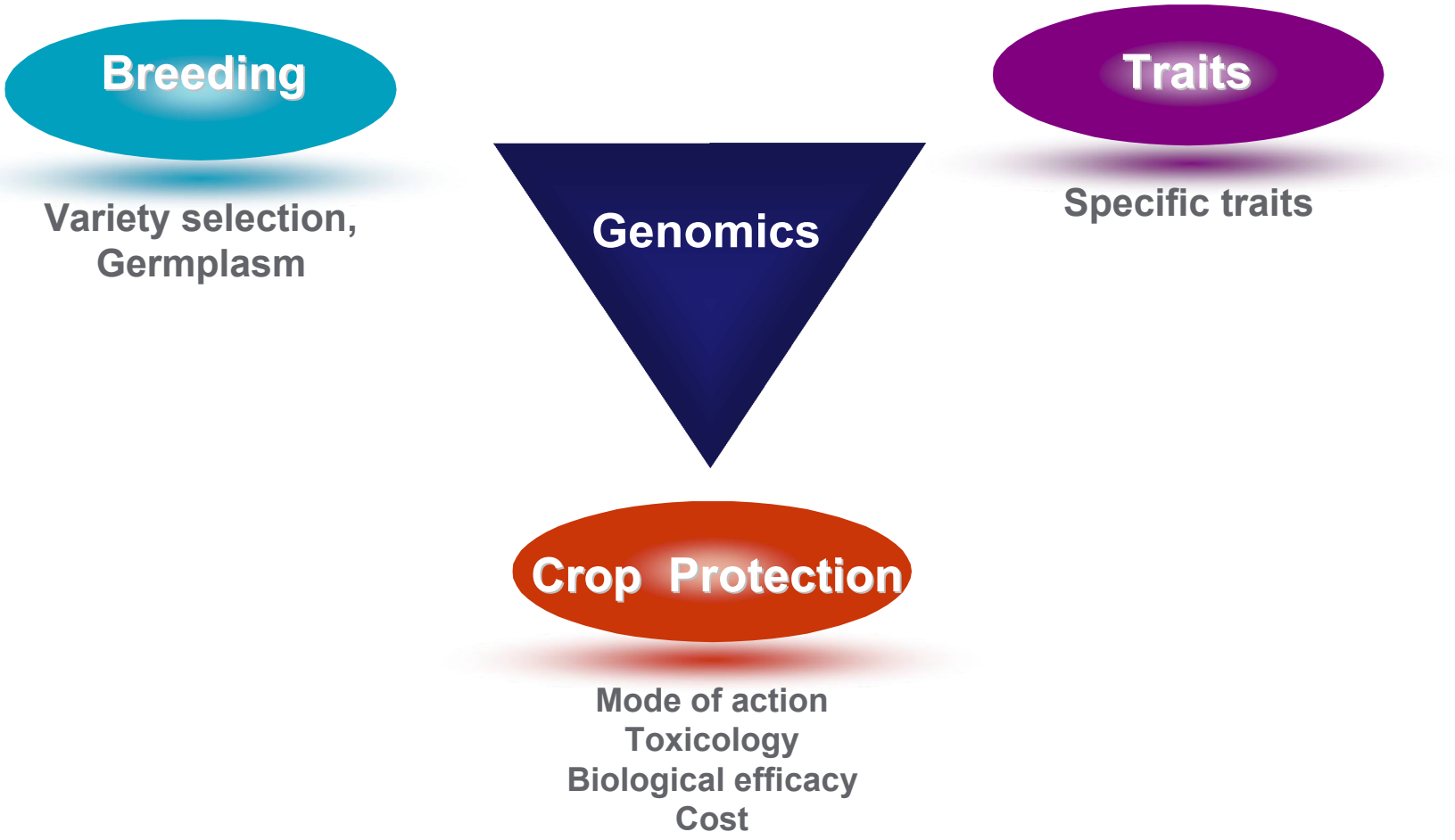
Research fields and collaboration with life science universities

Genomics platform



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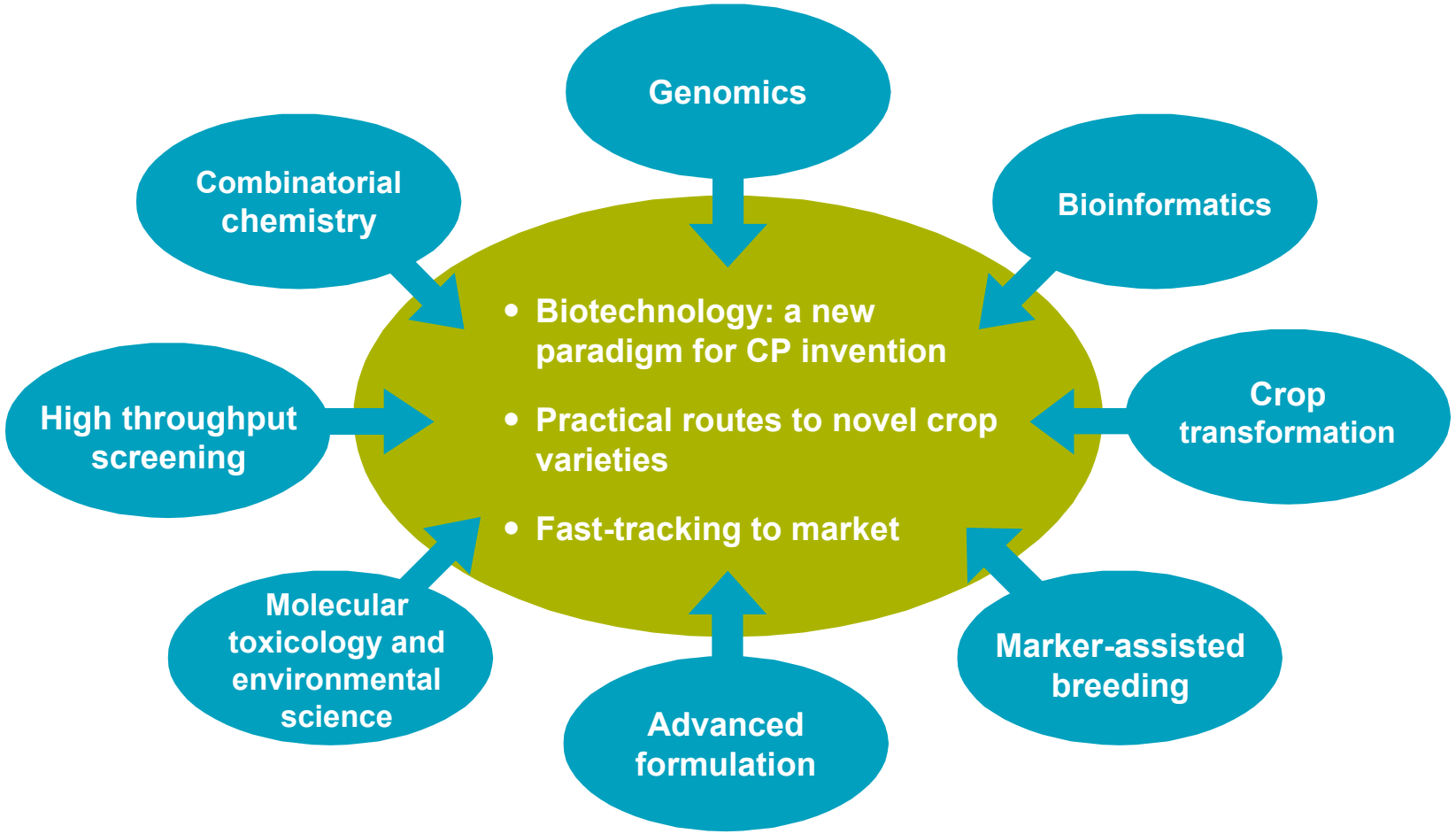
Unique combination of technology platforms



Strength in genomics is key to building new markets

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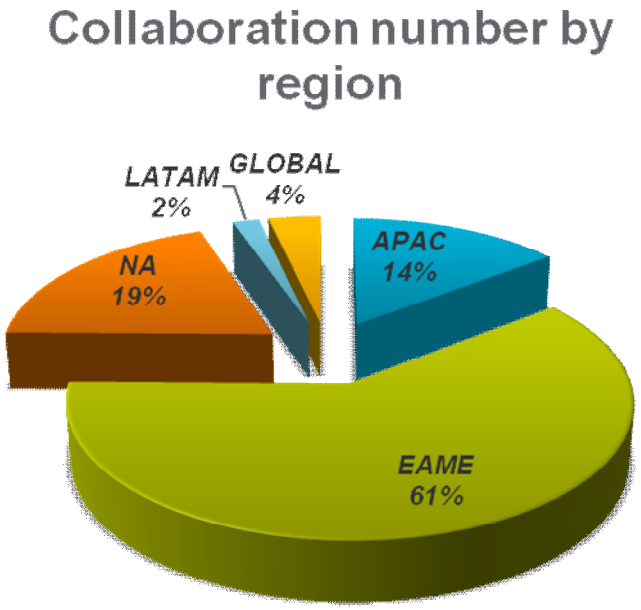
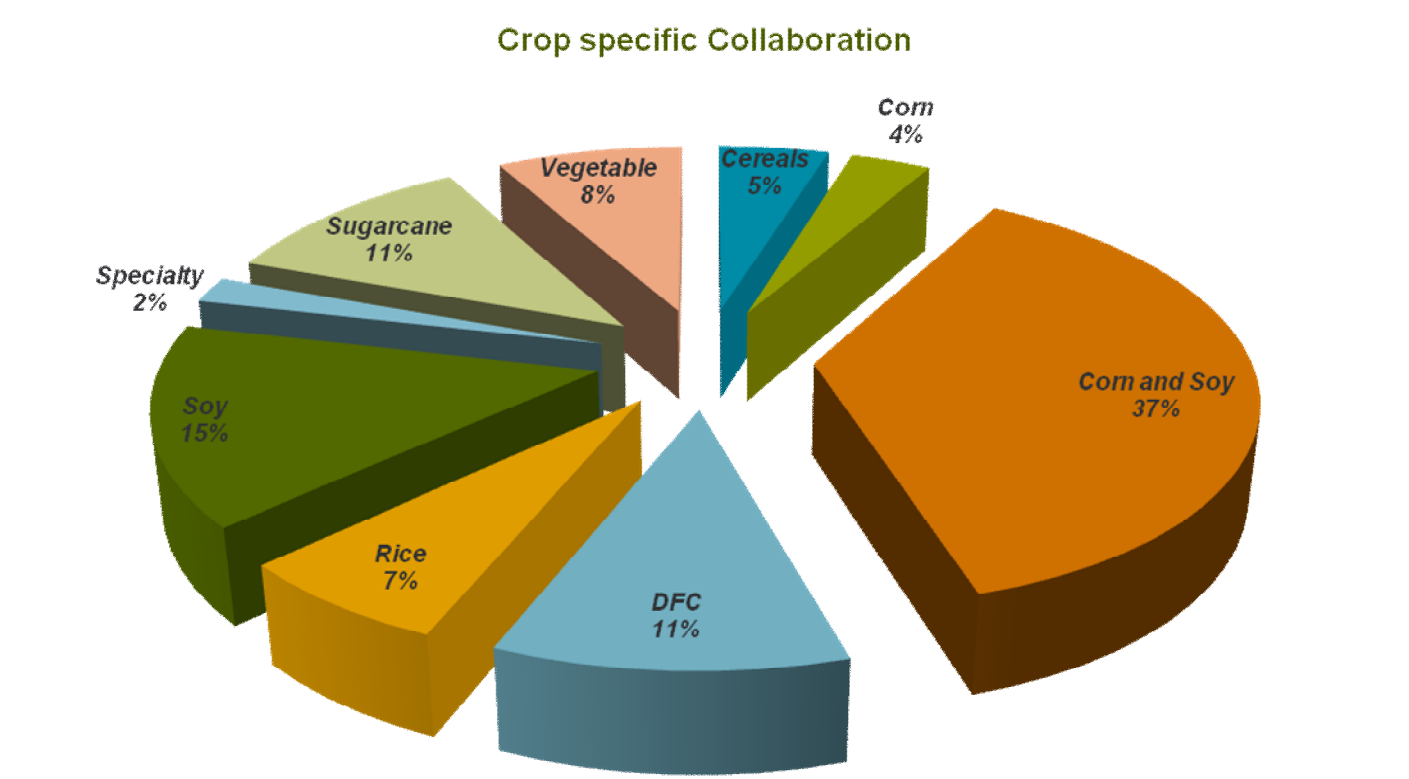
External activities within R&D in 2011



- *>450 active R&D Collaborations in 2011 in 28 countries*
- *37% spend on crop specific collaborations*
- *50% of Collaborations with Universities and Institutes*
- *>60% of Collaborations in Europe*

External activities within R&D in 2011



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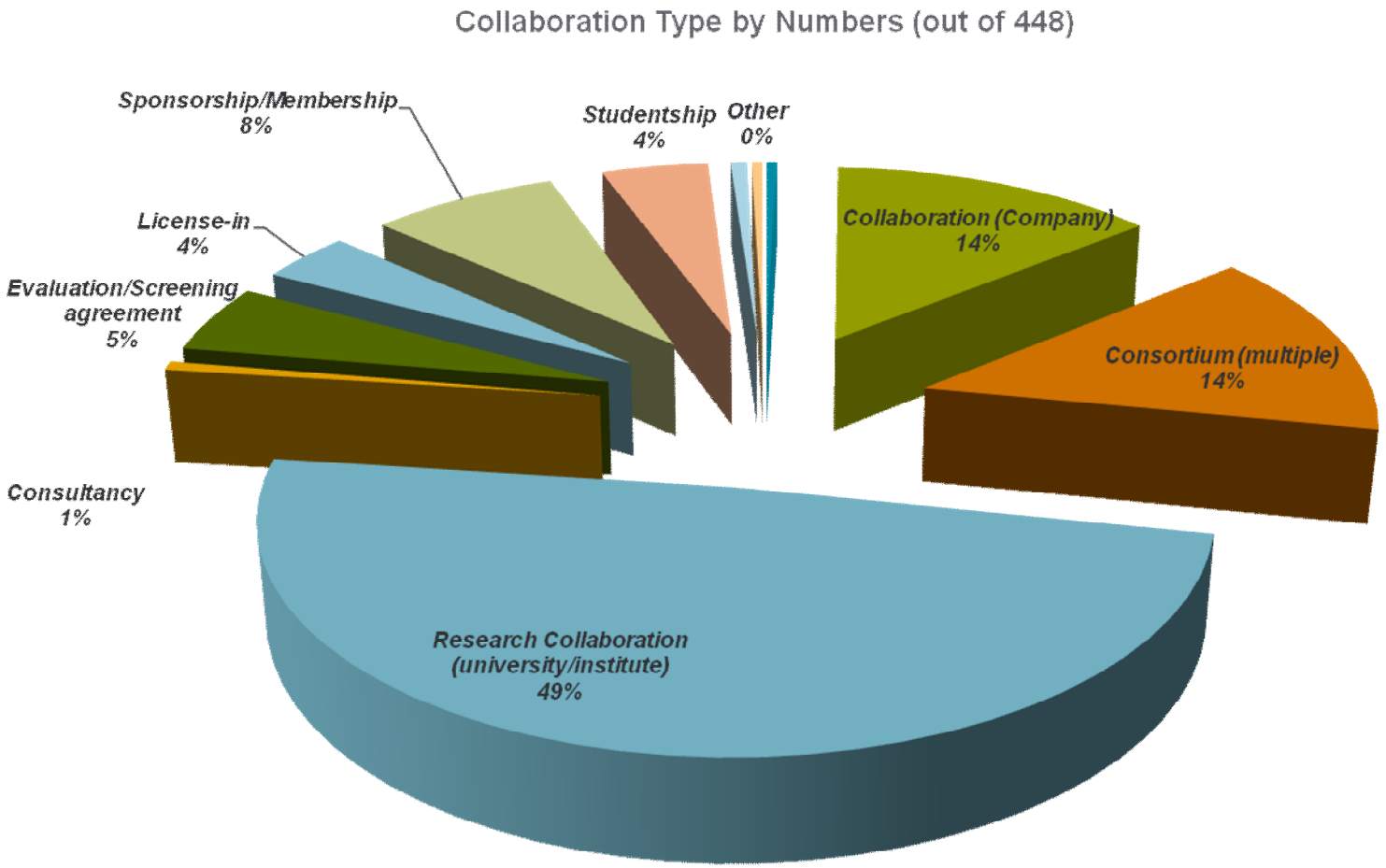
Different types of collaborations within R&D in 2011



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Non exhaustive list of collaboration in Europe - Research Projects

FR
Supagro (France)
Lasalle Beauvais (ferme du futur)
University of Blaise Pascal
Greece
University of Thessaloniki,
Italy
University of Bologna,
CH
Zürcher Hochschule für Angenwandte Wissenschaften (ZHAW)
CIS
IPPG
Stavropol
Czech
University of Life Sciences
DE
JKI (Julius-Kühn-Institut), Darmstadt
Leibniz Uni.
Univ. Kaiserslautern, DE
HGoTech, Uni Bonn
Wurzburg
ES
Barcelona Uni (CSIC)

Italy
Inst. Agro Biol. Padova
NL
Durham University
Wageningen University (Research Institute FBR)
PM EAME JH
IDNA
Insitute of Food Research (Norwich) PBL
Russia
Bikovskaya Cucurbit Selection Station (BCSS)
UK
BBSRC Warwick University
Bristol University
Cambridge University
Durham University
Exeter University
Imperial College, London
Leeds University
Manchester University
Newcastle University
Nottingham University
Oxford university
Reading University
Rothamsted & York University
Royal Holloway University of London
Sheffield University
UCL (University College London) -
Warwick University
Birmingham University
Hull University
York University
Ukraine
Inst of Pl. Physiol. & Genetics, Kiev,

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Collaboration with Universities – Training and development prgrammes

- Ferme du futur – Lasalle Beauvais
- Training field crops - ISA Lille, Lasalle Beauvais, ISARA, Purpan,
- Training Specialty crops - ESA Angers – Purpan - Wageningen
- Crop Management – Polytechnicum Zurich
- Sponsoring students ISFRADA in Eastern Europe IASI University
- Marketing - INSEAD

Conclusion and discussion points

In order to remain competitive and grow more with less

- Yield remains key element
- Valorisation of quality is essential
- Sustainable crop production is mandatory
- Information management is the future

New technologies with genomics platforms will contribute largely to this target

Innovation and transfer of knowledge are the challenges for our generation of scientists and professors

Bringing plant potential to life