Public-Private-Partnerships in Plant Breeding Research within Germany

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German System of Public Private Partnership in the Field of Pre-competitive Research

Content

- Plant Breeding in Germany
- PPP in Plant Breeding Research
  - the GFP-model
  - Genomic research program – GABI, Plant 2030 and Plant KBBE
  - proWheat
- EVA II – PPP for Evaluation of PGR
- Conclusions
Plant Breeding in Germany

Breeding companies

- **130** plant breeding and seed trading companies (of which 58 breeding companies with own breeding programs)
- seed market volume **EUR 900 million** in Germany (plus 70.0 % exports)
- **5,773 staff** (breeding, excluding seed production) thereof 2,364 R&D staff
- **15.1 %** R&D-to-turnover ratio
- **3,500** ha breeding nurseries
- **225,000 m²** greenhouse area
- > **3000** total varieties listed
Number of Breeding Programs per Crop(s)

- Sugar Beet: 19
- Cereals: 23
- Oil & Protein: 8
- Fodder Plants: 11
- Maize: 12
- Potato: 7
- Vegetables: 4
- Ornamentals: 3

Quelle: BDP, 2014 fünfjährige F&E Umfrage
Mission of GFP

- stimulates innovation
- is central contact point and communication platform
- represents the interests of plant breeding companies with regard to plant breeding research
- stimulates public funding and visibility of plant and plant breeding research
- develops research strategies and agendas for plant research
- appears as instigator
- initiates and coordinates research cooperations as PPP
- stimulates technology transfer
How is GFP organized?

Board

General Assembly

Section Plant Innovation

Section proWheat

Section Cereals

Section Oil and Protein Plants

Section Fodder Plants

Section Maize

Section Vegetables

Section Ornamentals

Section SugarBeet

Section Vine

Section Grape

Section Potato

Scientific Advisory Board
Scientists + Representatives from Member Companies
How do GFP-Projects work?

Classical GFP-Joint-precompetitive-Research-Projects

- Definition of joint research interests
- Invitation of project proposals
- Joint decision on projects which should be funded
- Member companies appoint project tutor
- GFP-Secretariat organizes project funding
- GFP-Secretariat gives support to finalize project proposal
- GFP-Secretariat administers the projects
- Scientists report at GFP meetings
- Joint exploitation of project results
GFP-Projects 2014

• main research objectives are
  ➢ ca. 36 % climate change
  ➢ ca. 26 % resistance (biotic and abiotic stress)
  ➢ ca. 20 % development of renewable raw materials and energy plants
  ➢ ca. 8 % breeding methods and yield stability
  ➢ ca. 10 % quality improvement

• 99 projects running in 2014

• Ø 6,9 m €/year

• national research funding by ministries of agriculture, research, economy
- proWeizen was founded in 2012 and is funded by the German Wheat breeders (17)
- unique structure due to the diversity in company size ranging from small family run enterprises to multi-national companies.
- Goal: increasing visibility of wheat breeding in politics and public, both nationally and internationally
- communicate the need for
- acquisition of 10 projects, volume ~ 15 Mio € (10 Mio € public funding and 5 Mio € support by industry)
GABI - Genome Analysis within the Biological System of Plants and

PLANT 2030

• joint research program on plant genome research
• supported by
  • BMBF (Federal Ministry for Education and Research)
  • consortium of private companies (WPI) as a “public - private – partnership”
• initiated in 1999
• more than 350 scientists of more than 40 research institutions and companies involved
EVA II – National Program for the Evaluation of PGRs in Cereals

- long term initiative, since 1995 (EVA I) and EVA II since 2002
- 6 years public funding for scientific institutes
- no public funding for private partners
- grace period of 3 years for publication of evaluation data
EVA II – National Program for the Evaluation of PGRs in Cereals

Partner

private:
- Pflanzenzucht SaKa GmbH & Co. KG
- KWS LOCHOW GMBH
- Saaten Union GmbH
- Limagrain GmbH
- Dieckmann GmbH & Co. KG
- SECOBRA Saatzucht GmbH
- W. von Borries-Eckendorf GmbH & Co. KG
- Lantmännchen SW Seed Hadmersleben GmbH
- RAGT 2N
- Nordsaat Saatzuchtgesellschaft mbH
- Deutsche Saatveredelung AG
- Saatzucht Josef Breun GmbH & Co. KG
- Saatzucht Streng-Engelen GmbH & Co. KG
- Pflanzenzucht Oberlimpurg Dr. Peter Franck
- Saatzucht Bauer GmbH & Co. KG
- Syngenta Seeds GmbH

public:

EVA II (since 2002)
- The Bavarian State Research Institute for Agriculture, Freising
- Landwirtschaftliche Lehranstalten Triesdorf
- Julius Kühn-Institute, Quedlinburg (database)

EVA I (1995-2001)
- IPK
- ZADI (database)
- JKI
- University of Halle
EVA II

- material (wheat and barley)
- 50-100 accessions (2 years cycle)
  - gene bank material
  - national and foreign varieties
  - breeding material from JKI and breeding companies

acquisition, multiplication and distribution of seeds (JKI)

Evaluation (data with regard to)
- Plant pests
- Plant development
- Ripening
- emphasis on specific traits depending on interests of partners

- multi location trials
  - 27 locations ww
  - 20 locations wb
  - 18 locations sb
  - 7 locations sw

Quelle: JKI, Institut für Epidemiologie und Resistenzressourcen
1. Fundamental research (model organisms)

2. Applied genomics: genomic research in agricultural crops

3. Applied research: development of materials, breeding methods

4. Company Research: Selection of parent lines, cross-breeding

5. Variety development: selection, testing for several years at several locations

6. Official variety testing

7. Listing, Plant Variety Protection

8. Seed production

The long way to a new variety
P.P.P. - Public Private Partnership

Evaluation Characterization

Pre-Breeding

Plant Genetic Resources

Public Research

Needs & Expectations of Society

Consumer

Processors/Industry

Sustainable, high-performing Agriculture

Breeding

Existing Varieties

germplasm of breeders

Private Breeding Companies

new, superior and locally adapted varieties

Public Research

Plant Genetic Resources

Evaluation Characterization

Pre-Breeding

Consumers/Industry

Sustainable, high-performing Agriculture

Breeding

Existing Varieties

germplasm of breeders

Private Breeding Companies

new, superior and locally adapted varieties
Conclusions

Lessons learned – What do we need?

• Access to wide range of PGR from different countries

• We do not really know what is already inside of genebanks
  more networks for the characterization and evaluation of plant
  material (e.g. interlinking public research on PGR and
  testing/evaluation in field trials by industry)

• More publicly funded pre-breeding activities within the pre-competitive
  research area

• Development of improved network structures in bioinformatics for improved
  data analysis

• Development of improved (pre-)breeding techniques to transfer interesting
  genes from PGR into elite material (especially for quantitative traits)

• Public and private contributions to improve ABS-Systems
Role of Private Plant Breeding Industry in Germany

Contributions to Goals of CBD/Nagoya and ITPGRFA

Breeding Exemption

- Varieties for Diversity
- CD-Seed project (Ethiopia)

Conservation and sustainable use of PGR

- International Treaty (Benefit Sharing Fund and Global Crop Trust)
- Nagoya Regulation

Financial Contribution

- DivSeek
- EVA-Project and others

Evaluation of PGR

Communication and strategic Alliances
(e.g. CGIAR, Science, GCDT etc.)
Who else but us sees to it that yields increase?

For more than 100 years we, the plant breeders, have been improving agricultural and horticultural crops. To create these new plant varieties, we have been investing 16.1 percent of our turnover into research and development. Our continuous output of new plant varieties and crops is what ensures farmers’ competitiveness.

www.diepflanzenzuechter.de