

EVA II - a national network for the use of plant genetic resources in the resistance breeding process

L. Frese², E. Schliephake¹, H.-U. Leistner¹, S. Harrer³, and F. Ordon¹

Julius Kuehn-Institute, Erwin-Baur-Str. 27, D-06484 Quedlinburg, ¹ Institute for Resistance Research and Stress Tolerance; ² Institute for Breeding Research on Agricultural Crops; ³ Federal Office for Agriculture and Food, Information and Coordination Centre for Biological Diversity (IBV) Deichmanns Aue 29, 53179 Bonn, Germany



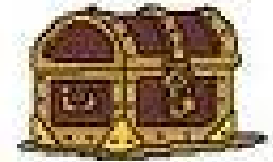


Outline

- Introduction
- Aims and principles of EVA II
- Structure of and cooperation in the network
- Data compilation and provision
- Summary

Are genebanks treasure chests?

Crop	No of genebank accessions worldwide (according SoW-2)	No of genebank accessions in Europe (according EURISCO)	No of genebank accessions in Germany (according PGRDEU)
wheat	856,168	170,006	26,842
rice	773,948	7,622	-
barley	466,531	100,051	22,093
maize	327,932	50,846	1,481
sorghum	235,688	7,120	370
oat	130,653	34,306	4,799



plant genetic resources

+



characterisation &
evaluation data

=

Value in plant
breeding

In the past

huge amounts of evaluation data for PGR have been generated for various species, but the use of these historic data for breeders is often very limited, mainly caused by a lack of comparability caused by varying and poorly documented test conditions

Aim of EVA

to provide plant breeders with accelerated access to reliable evaluation data and to resistant genotypes



Principles of EVA:

Up-to-date evaluation of genotypes (accessions) from genebanks and scientific projects by the users of the plant genetic resources (breeders & scientists)

- as multi-location evaluation
- by standardized evaluation methods on small plots
- only for disease resistance traits (focus on fungal diseases: *Fusarium* spp., *Drechslera tritici-repentis*, *Septoria tritici*, *Puccinia triticina*, *Puccinia striiformis*, *Blumeria graminis* f.sp. *tritici*, *Stagonospora nodorum*, *Drechslera teres*, *Puccinia hordei*, *Rhynchosporium secalis*, *Blumeria graminis* f.sp. *hordei*)
- for wheat and barley (winter & spring)
- online information system for data presentation / sharing



EVA accelerates the introduction of new resistance genes from plant genetic resources into the breeding process



Organizational structure of EVA – the partners

Breeding companies

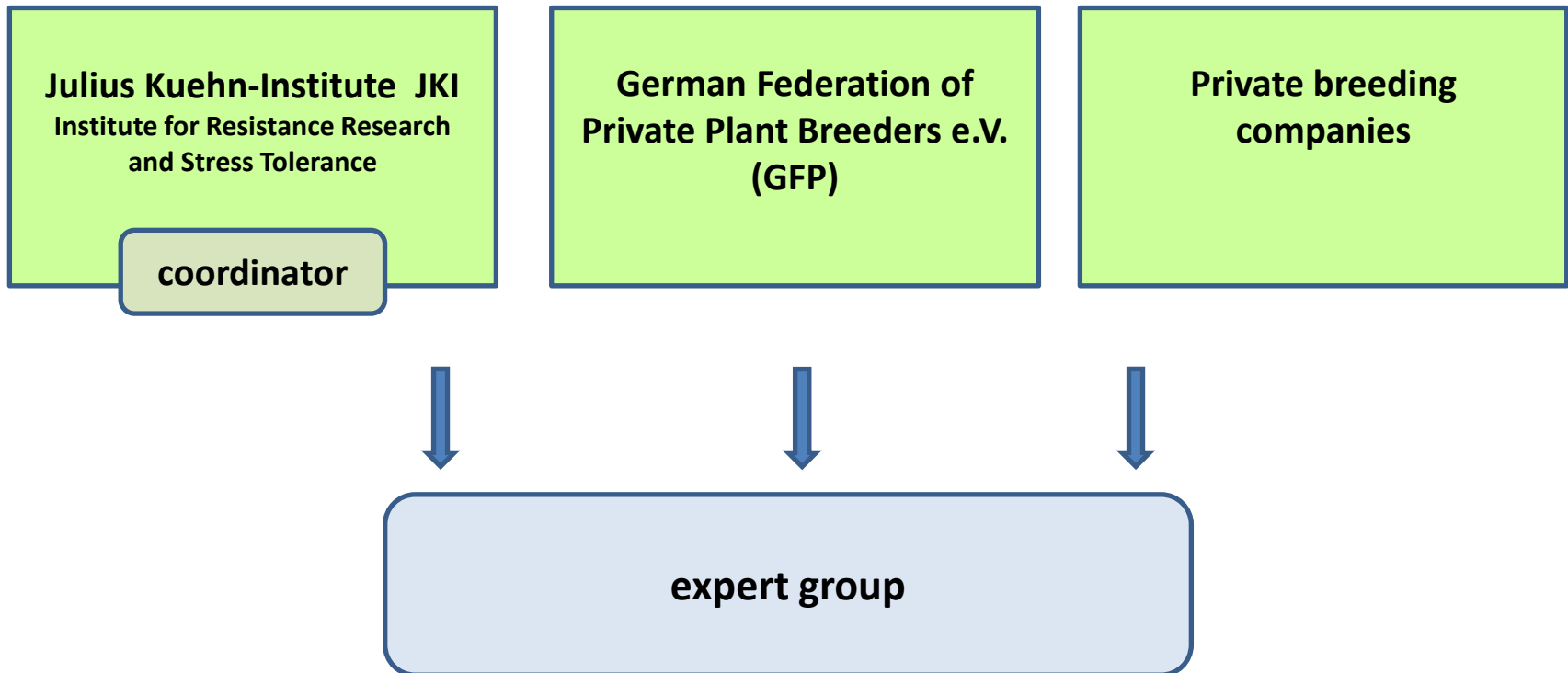
1. Pflanzenzucht SaKa GmbH & Co. KG
2. KWS-LOCHOW GmbH
3. Saaten Union GmbH
4. Limagrain GmbH
5. Dieckmann GmbH & Co. KG
6. SECOBRA Saatzucht GmbH
7. W. von Borries-Eckendorf GmbH & Co. KG
8. Lantmännen SW Seed Hadmersleben GmbH
9. RAGT 2N
10. Nordsaat Saatzuchtgesellschaft mbH
11. Deutsche Saatveredelung AG
12. Saatzucht Josef Breun GmbH & Co. KG
13. Saatzucht Streng-Engelen GmbH & Co. KG
14. Pflanzenzucht Oberlimpurg Dr. Franck
15. Saatzucht Bauer GmbH & Co. KG

Scientific institutions

1. Julius Kühn-Institut, Quedlinburg
2. Landesanstalt für Landwirtschaft, Institut für Pflanzenbau und Pflanzenzüchtung, Freising
3. Landwirtschaftliche Lehranstalten Triesdorf



Organizational structure of EVA – the expert group



Focus of the evaluation sets

evaluation sets were prepared for

year	wheat	barley
2005	DTR; Septoria; Fusarium	non parasitic leafspots
2007	leaf rust	Rhynchosporium
2009	DTR	BYDV
2010	Septoria (leaf) ; DTR	Rhynchosporium

- winter wheat
- spring wheat
- winter barley
- spring barley

approx. 50 genotypes / set / year

Composition

- new genotypes (~ 60%)
- best genotypes from last evaluation year for repeated testing (~ 30%)
- defined susceptibility/resistance standard genotypes for different diseases (~ 10%)
- genotypes with doubtful results in previous evaluations (<<10%)
- “functional” genotypes (as needed) to study the pathogen diversity



Sources for the evaluation sets

Pre-evaluated gene bank material

- by search for specific resistances in databases
- publications
- from genebanks (e.g. ICARDA, CIMMYT)

foreign varieties

- publications
- recommendations by the breeders

material from research projects with e.g.

- new resistances
- combination of different resistances or resistance genes



Organizational structure of EVA – the coordinator

(Dr. H.-U. Leistner, JKI Quedlinburg, Institute for Resistance Research and Stress Tolerance)

Management of project partners

- Communication with the partners
- Acceptance of new partners



Field plots for seed multiplication , JKI Quedlinburg

Management of evaluation sets

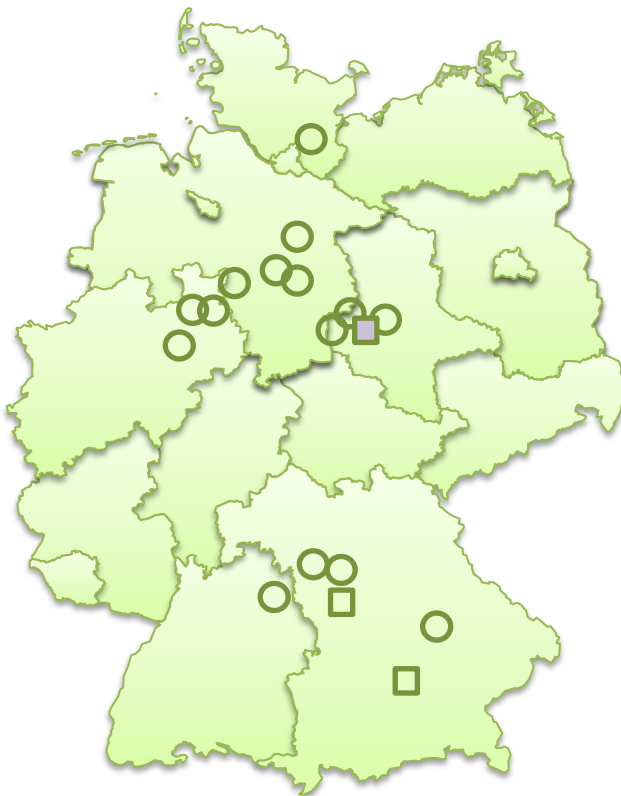
- ordering of material
- multiplication
- distribution to partners

Management of the evaluation process

- evaluation methods (standardization)
- compilation / processing of the data
- maintenance / updating of the database



Organizational structure of EVA – the evaluation



- Multi-site evaluation in different regions
- standardized evaluation methods
- micro-plots of 1m²
- one or several replications

Locations of EVA-project partners:

breeding companies



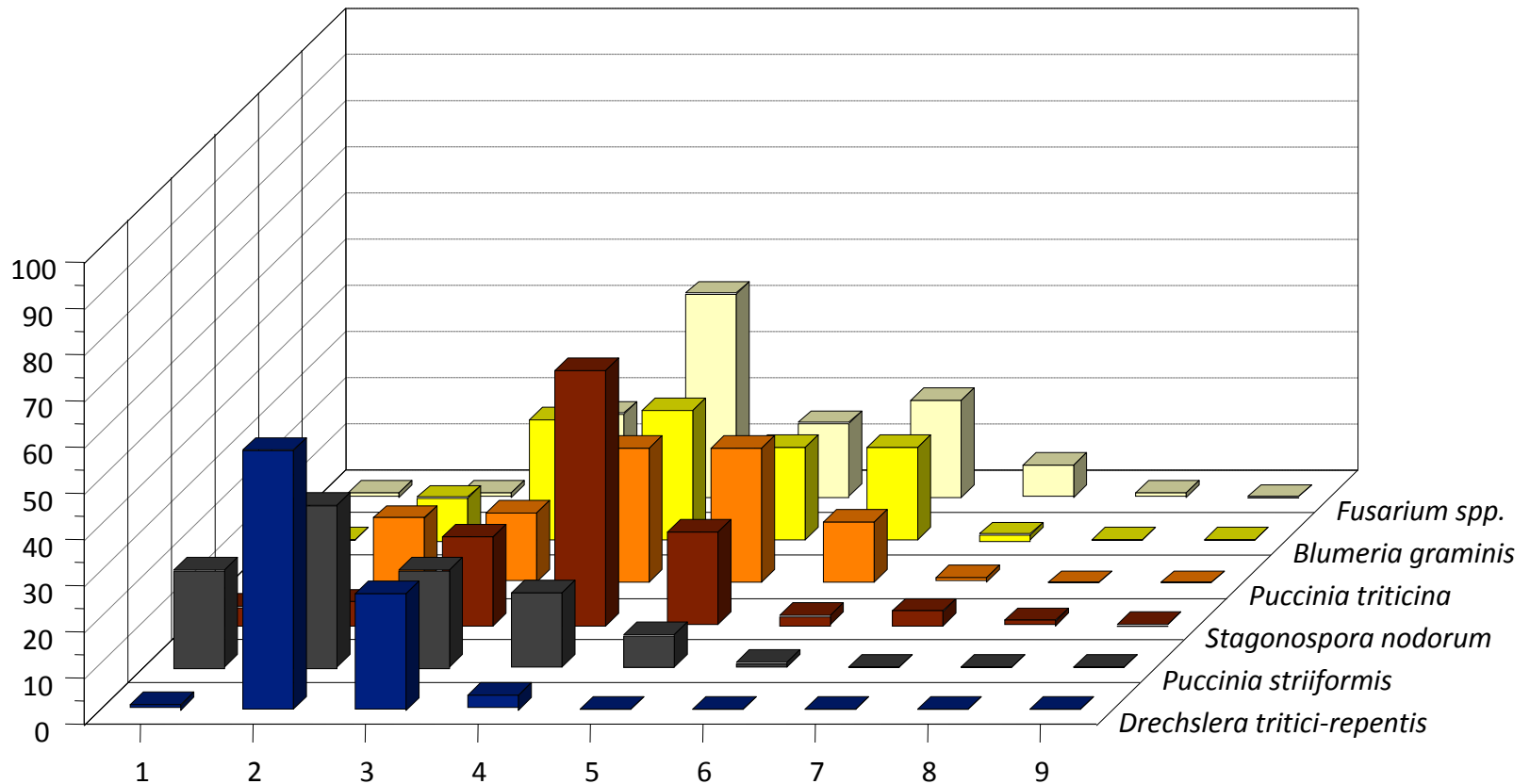
scientific institutions





Organizational structure of EVA – the evaluation

score frequency for evaluated diseases of winter wheat set (2002)





Data compilation and provision

data table : spring barley – powdery mildew 2001

selection of data



Informationssystem für Evaluierungsdaten pflanzengen-

Evaluierungsdaten des Kooperationsnetzwerks EVA II

Übersichtsdarstellung

Wählen Sie bitte eine Kulturart in einem Erntejahr:

Erntejahr:

Sommergerste Winterweizen

Erntejahr:

Sommergerste Wintergerste Winterweizen

Erntejahr:

Sommergerste Wintergerste Winterweizen

Welche Auswertungen wollen Sie sehen?

Tabelle 1: Mittelwerte in jedem Ort für eine bestimmte Krankheit

Tabelle 2: Mittelwerte für jede Krankheit in einem bestimmten Ort

Tabelle 3: Mittelwerte über Orte für jede Krankheit

Suche nach verschiedenen Kriterien

Wählen Sie bitte eine Kulturart:

Sommergerste Wintergerste Winterweizen



Informationssystem für Evaluierungsdaten pflanzengenetischer Ressourcen

Evaluierungsdaten des Kooperationsnetzwerks EVA II

Tabelle 1: Mittelwerte für jeden Genotyp in jedem Ort für die Krankheit Mehltau (Blumeria graminis)

Kulturart: Sommergerste

Erntejahr: 2001

Freiland, natürliche Infektion

Genotyp	Aschersleben (BAZ)	Gatersleben (BAZ)	Herzogenaurach (Saatzucht Breun)	Lemgo (Saatzucht Secobra)	Quedlinburg (BAZ)	Rieste (Pflanzenzucht Carsten)	Silstedt (Saatzucht PBI/Monsanto)	Uffenheim (Saatzucht Streng's Erben)	Weihenstephan (Bayerische Landesanstalt für Landwirtschaft)	Mittelwert über alle Orte
Adonis	3	1	1	1	2	1	1	1	1	1
Alexis	7	5	2	1	5	1	1	1	1	4
Annabell	6	5	9	3	5	1	4	4	5	6
Apex	1	1	1	1	1	1	1	1	1	1
Barke	2	2	2	1	1	1	1	1	1	2
BR 6429B16	4	2	1	1	4	1	3	1	1	2
Cellar	3	1	1	1	2	1	1	2	1	1
CI 2750 (Canadian Lakeshore)	2	2	7	7	3	9	8	-	3	7
CI 5401 (Rojo)	4	4	9	9	4	9	8	5	8	8
CI 5791	1	2	9	9	2	7	8	8	8	7
CI 739 (Manchurian)	5	4	9	7	3	7	8	-	8	7
CI 9820	3	4	7	-	4	5	6	7	2	5
CI 9819	4	2	6	6	3	5	5	9	2	6
Danor	1	1	1	1	1	1	1	1	1	1
DH 115 (Krona x HOR 1063)	5	5	9	7	5	5	5	-	5	6
DH 130 (Krona x HOR 1063)	3	2	3	1	3	1	3	-	2	2
DH 14 (Krona x HOR 1063)	4	4	3	1	3	1	2	-	1	3



Data compilation and provision

user specific search for specific disease traits

Kulturart: Sommergerste

Bitte wählen Sie eine (mehrere) Krankheit(en) aus und geben je einen Wertebereich für die Suche an

Das Suchergebnis beinhaltet Genotypen, deren Mittelwerte über alle Orte für alle ausgewählten Krankheiten innerhalb der jeweils gewählten Bereiche liegen

Krankheit	Minimum über alle Orte	Maximum über alle Orte	Wertebereich für Mittelwerte über alle Orte
<input type="checkbox"/> Blattflecken	2	7	<input type="text" value="2"/> < Mittelwert < <input type="text" value="7"/>
<input type="checkbox"/> Gerstenhartbrand (Ustilago hordei)	1	9	<input type="text" value="1"/> < Mittelwert < <input type="text" value="9"/>
<input type="checkbox"/> Mehltau (Blumeria graminis)	1	9	<input type="text" value="1"/> < Mittelwert < <input type="text" value="9"/>
<input type="checkbox"/> Netzflecken (Drechslera teres)	1	7	<input type="text" value="1"/> < Mittelwert < <input type="text" value="7"/>
<input type="checkbox"/> nicht parasitäre Blattflecken	1	9	<input type="text" value="1"/> < Mittelwert < <input type="text" value="9"/>
<input type="checkbox"/> Ramularia (Ramularia collo-cygni)	1	5	<input type="text" value="1"/> < Mittelwert < <input type="text" value="5"/>
<input type="checkbox"/> Rhynchosporium (Rhynchosporium secalis)	2	7	<input type="text" value="2"/> < Mittelwert < <input type="text" value="7"/>
<input type="checkbox"/> Zwergrost (Puccinia hordei)	2	8	<input type="text" value="2"/> < Mittelwert < <input type="text" value="8"/>

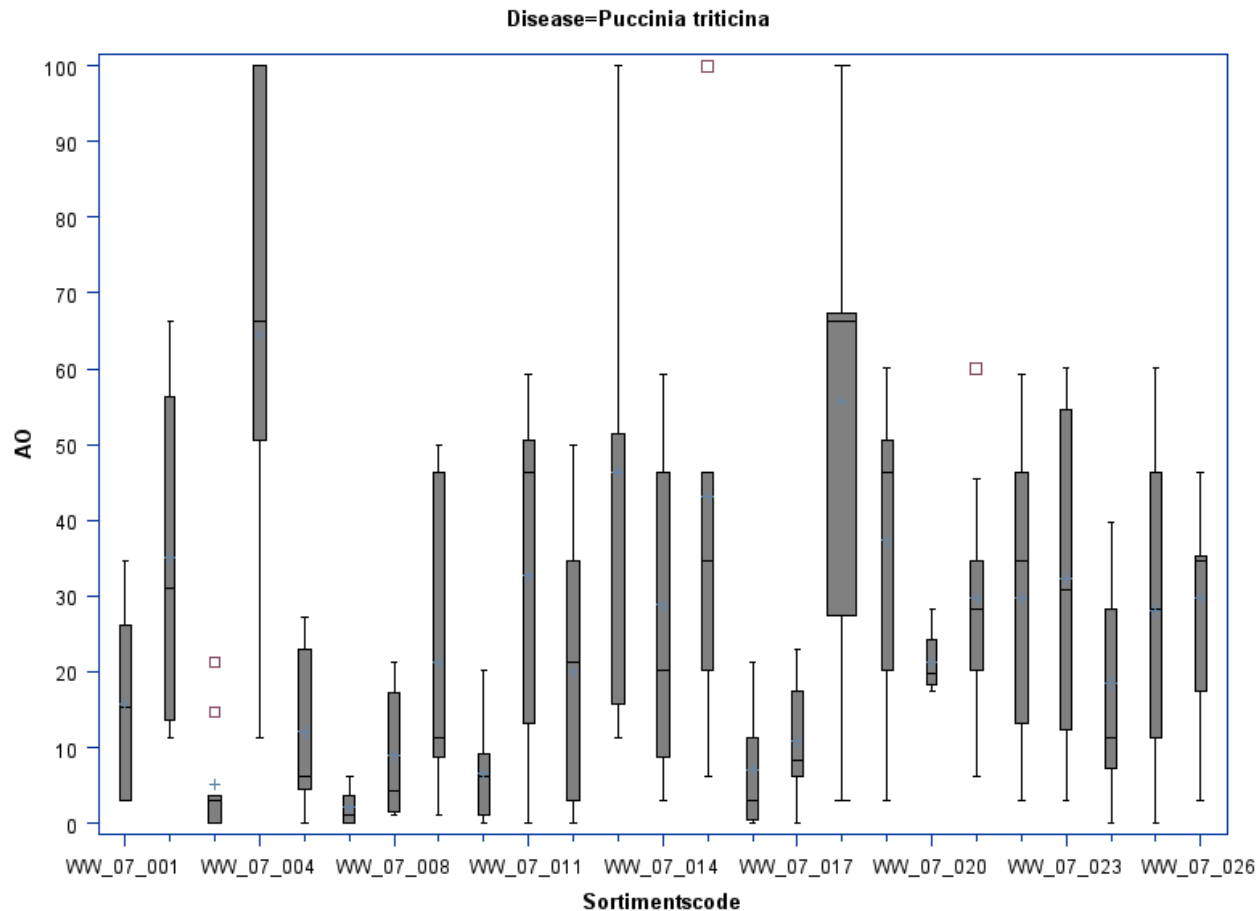
eine vordefinierte Tabelle oder eine andere Kulturart auswählen

© Zentralstelle für Agrardokumentation und -information (ZADI)



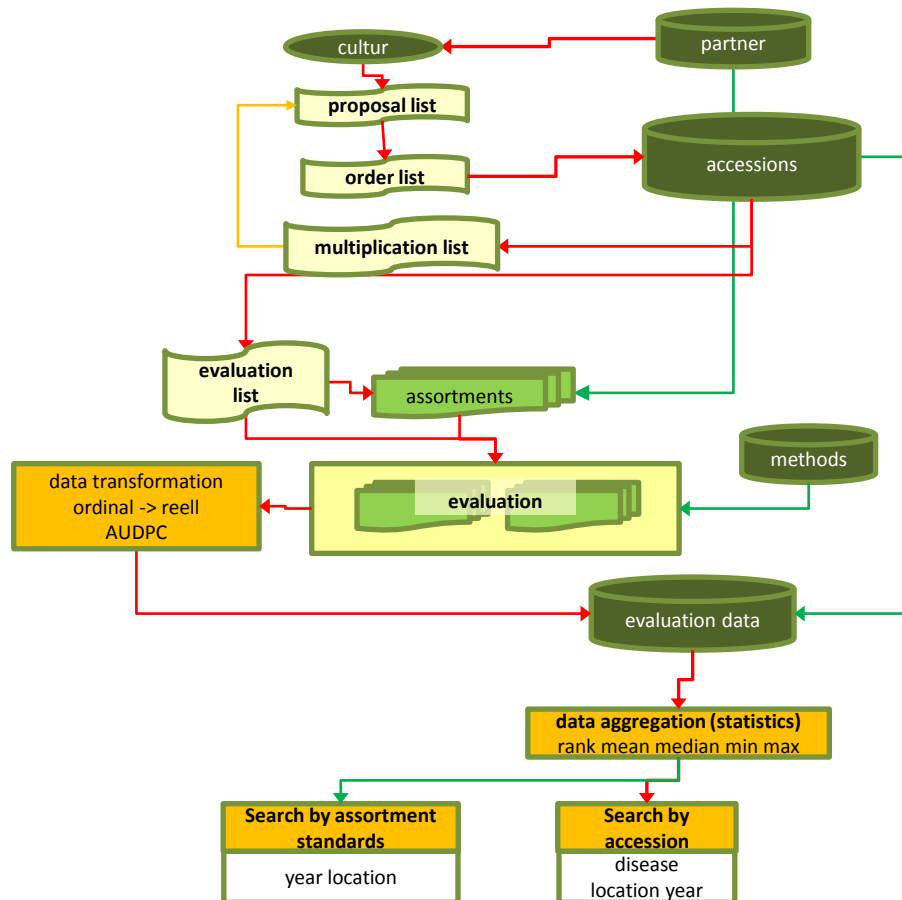
Data compilation and provision

data download for user specific statistical analysis



Information system for evaluation data of plant genetic resources

development of a new information system for evaluation data



open source technology

multilingual (German, English)

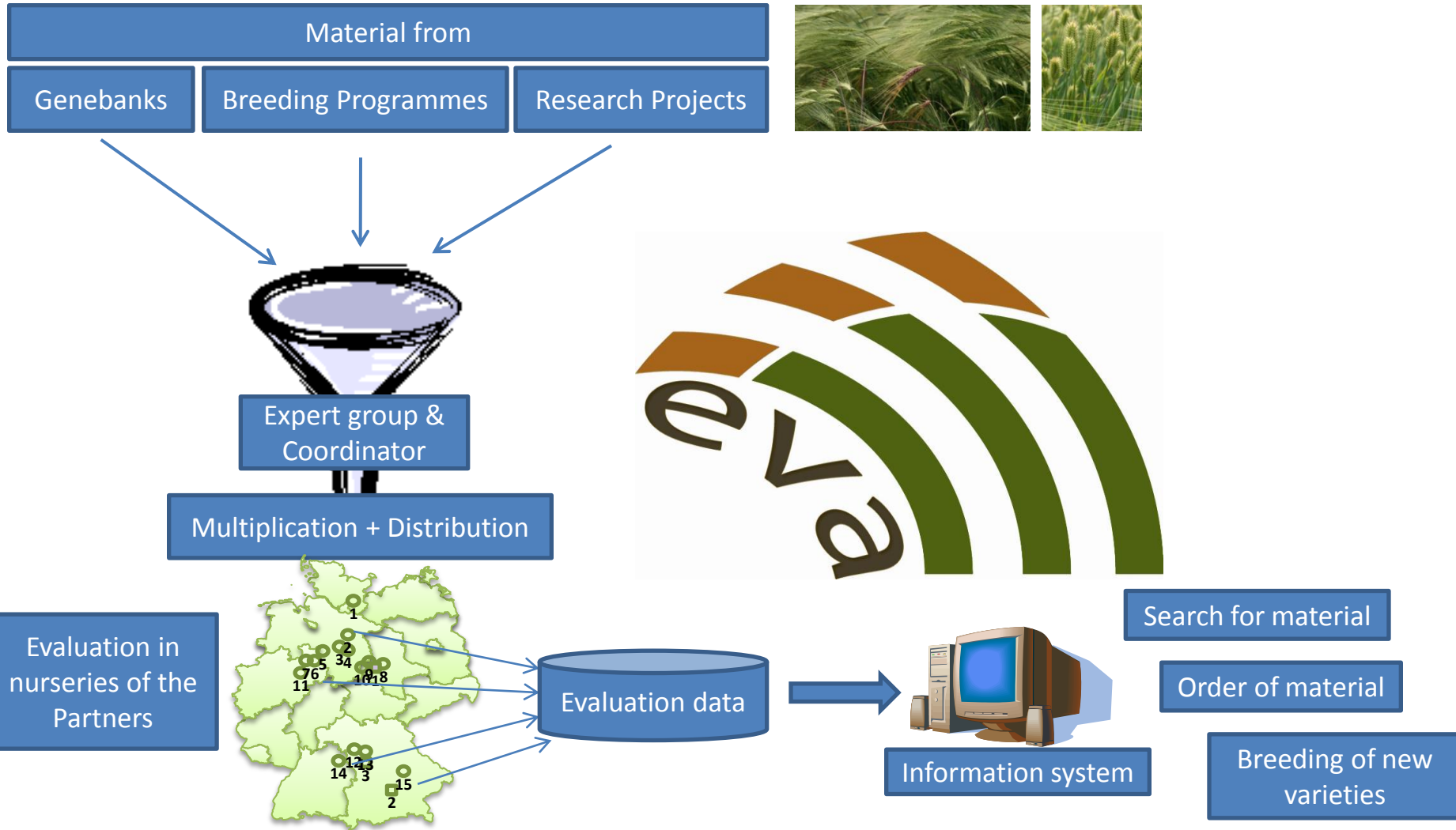
different user roles

- project partner
- privileged guest (all data visible)
- guest (only data older than 3 years)

online data up- and download

- CSV
- Excel

Summary





Bundesanstalt für
Landwirtschaft und Ernährung



Thank you for your attention!