Final report V1.0 for the CORE Organic II funded project: Coordinating Organic Breeding Activities for Diversity - COBRA - DTU Orbit (11/01/2019)

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Post project summary suitable for web publication

Background

Plant breeding is crucial in creating organic crop production systems that can better cope with interacting stresses such as pests and diseases (especially seed-borne diseases), weeds and the increasingly erratic and unpredictable variation in climate and weather. In this context, COBRA aimed to support and develop organic plant breeding and seed production with a focus on increasing the use and potential of plant material with high genetic diversity in cereals (wheat and barley) and grain legumes (pea and faba bean), through coordinating, linking and expanding existing breeding and research. Although systems based on high, within-crop diversity have shown promising results in organic systems and are now subject to intensive research, their benefits cannot be exploited currently, due to agronomic, regulatory and other hurdles. Also, it is currently unclear which plant breeding approaches, high diversity or otherwise, are most efficient to breed varieties for organic agriculture. To help these aims, COBRA’s work was arranged into a management workpackage to coordinate the work and the following five sub-programmes:

(1) To improve methods ensuring seed quality and health

Progress was made in handling individual seeds in terms of their actual and potential resistance to seed-borne disease. One of the most important problems, bunt of wheat, was advanced considerably in terms of the ‘gene for gene’ interaction between host and pathogen and in observing the performance of the, currently, most effective resistance genes. Wheat populations, grown over two generations, did not change in their response to bunt. In barley, progress was made in identifying and confirming known and novel resistances to a range of the most important seed-borne diseases. Benign sprays were confirmed as potentially useful for Ascochyta blight control in peas.

(2) To determine the potential to increase resilience, adaptability, and overall performance in organic systems by using crop diversity at various levels

Valuable progress was made in confirming, expanding and understanding the resilience of the performance of composite cross populations of wheat. A wide range of molecular markers were identified in barley which will help in selecting genotypes adapted to expected future changes in climate and weather. Progress was also made with organic trials of grain legumes. The early 6 of 54 development stages of composite cross populations in the field is now better understood in relation to nutrient use efficiency.

(3) To improve breeding efficiency and to develop novel breeding methods to enhance and maintain crop diversity

A range of different technologies has been improved for selecting within composite cross populations using NIR spectrometry, colour markers and molecular markers; many of these are non-destructive. Of more immediate value, new composite cross populations involving winter and spring wheat genotypes and including bunt resistant genotypes have now been made. Progress has also been made with bulk breeding of peas, although single genotypes may still be preferred for cropping applications.

(4) To identify and remove structural barriers to organic plant breeding and seed production

It was important to bring together interested individuals and groups from different European countries to cover available experience and discuss further developments. Most importantly, this was also done directly in consultation with DGSanco, and booklets on the discussions and findings were published and distributed.

(5) To improve networking and dissemination in organic plant breeding

COBRA successfully established and utilised its website, produced regular newsletters and undertook training and farm days throughout the life of the project to raise the awareness of the project and to also communicate and discuss the finds and outcomes of the work undertaken by its various partners.

Conclusion

COBRA’s strength is its focus on coordinating, linking and expanding ongoing organic breeding activities in cereals and grain legumes across Europe, drawing together experts from previously separated areas.

General information

State: Published

Organisations: Department of Chemical and Biochemical Engineering, Risø National Laboratory for Sustainable Energy, Department of Environmental Engineering, The Organic Research Centre (ORC), Aegean Agricultural Research Institute (AARI), Agrologica, L’Associazione Italiana per l’Agricoltura Biologica (AIAB), University of Natural Resources and Life Sciences, Vienna, Centro di Ricerca p. i. Produzioni Foraggere e Lattiero-Case, Centre de Recherche Public Gabriel Lippmann (CRP-GL), INAGRO, INRA Institut National de La Recherche Agronomique, Technical Institute of Organic Farming (ITAB), Institute for Sustainable Development (ISD), JNK Plant Breeding, University of Kassel, Lantmännen Unibake Denmark A/S, Nordic Seed A/S, SRUC, Sejet International ApS, Swedish University of Agricultural Sciences, Technical University of Munich, Seges Knowledge Centre for Agriculture, Bayerische Landesanstalt für Landwirtschaft, University of Udine, University of Maribor, Universität Gent, Oikos - Organic Norway, Forschungsinstitut für Biologischen Landbau, Graminor, Estonian Crop Research Institute, Organic Seed Producers, State Priekuli Plant Breeding Institute, State Stende Cereal Breeding Institute, Hungarian Academy of Sciences, Saatzucht Donau GmbH & Co. KG, Nordic Genetic Resource Center, Louis Bolk Institute, Humboldt University of Berlin, Aalborg University, Aarhus University, Norwegian Institute for Agricultural and Environmental Research, University of Copenhagen, MTT Agrifood Research
