

## **COBRA: a new European research project for organic plant breeding**

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### **Background**

One of the obstacles to the successful development of organic farming systems is the lack of appropriate plant varieties that are adapted to conditions of organic agriculture (e.g. Wolfe et al. 2008). For resolving this issue plant breeding efforts for organic systems need to be better coordinated. In addition, using greater plant material with higher genetic diversity has great potential in breeding for these systems. Crop genetic diversity is particularly important in organic agriculture because germplasm suitable for organic conditions often stems from management systems that do not use synthetic inputs. Also, higher levels of in-field diversity can be used to buffer against the relatively high environmental variability in organic systems.

### **Approach**

In conjunction with the need to breed specifically adapted pure line varieties for organic crop production, a complementary approach is the use of plant material with High genetic Diversity (Hi-D) e.g. as in Composite Cross Populations (CCPs) (Döring et al. 2011). Apart from buffering against environmental fluctuations and providing insurance in stressful environments, Hi-D-based approaches allow for evolutionary adaptation to organic farming conditions. However, despite the promising results Hi-D-based systems have shown under organic management, their benefits cannot be used at present due to agronomic, technical and regulatory hurdles. These constraints of Hi-D breeding approaches are shared with and linked to organic plant breeding in general. A new European research project called COBRA (Coordinating Organic plant Breeding Activities for Diversity) aims to unleash the potential of plant genetic diversity for organic agriculture by linking up efforts on both pure line breeding and Hi-D systems. The project, led by the Organic Research Centre (UK), started in March 2013 and brings together 41 partner organizations from 18 countries. COBRA focuses on four major arable crops: wheat, barley, pea and faba bean. It will address five specific areas: (1) seed health; (2) response of crops to multiple stresses; (3) improvements in breeding efficiency for organic systems; (4) structural issues such as funding for breeding and the regulatory framework; and (5) networking and coordination. This paper describes the background to the project and introduces its unifying concepts.

### **References**

- Döring, T.F., Knapp, S. Kovacs, G., Wolfe M.S. & Murphy, K. (2011) Evolutionary plant breeding in cereals— into a new era. *Sustainability*, 3: 1944-1971.
- Wolfe, M. S., Baresel, J. P. Desclaux, D., Goldringer, I., Hoad, S., Kovacs, G., Löschenberger, F., Miedaner, T., Østergård, H., Lammerts van Bueren. E. T. (2008) Developments in breeding cereals for organic agriculture. *Euphytica*, 163: 323-346.