

Evolutionary changes in three wheat composite cross populations under natural selection in Germany and the UK

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Wheat population



Background

In 2001, a new European composite cross population (CCP) project was created for winter wheat by the Organic Research Center, Newbury and the John Innes Center, Norwich, UK. Four years later, seeds of the F5 generation of these populations were brought to the University of Kassel/Witzenhausen, Germany, and propagated in both countries. Thus, the present populations in Germany and the UK originate from the same seed lot from 2005. The F9 generations are presently grown under organic as well as under conventional conditions in both countries.

Project outline

In a DAAD-funded project which is being carried out at the University of Kassel/Witzenhausen, Germany, and the Organic Research Centre, UK, the development of the German CCPs are being compared to the British ones. In addition to the question of variability between and within the populations referring to disease severity and growth stages, attention is being given to the question of plant competition within the populations. The populations consist of many different genotypes, expressed in varying plant sizes and morphologies. It is likely, therefore, that individual plants will perform better than others, and plant height is expected to be a key character linked to plant performance, since taller plants may produce more offspring and therefore contribute more seed to the next generation. The populations may therefore have become taller from year to year. To test this hypothesis we are analyzing height data of the last few years from Germany and the UK.

An interesting way for a plant to increase height without using more resources is to produce either thinner or less dense straw. Along the grain yield we are therefore also measuring the density and diameter of the straw.

Crop height is not only important for the competitiveness of a plant against other plants (such as other wheat plants or weeds), but is also of more direct practical relevance for farmers. Tall plants are more likely to lodge. This makes harvesting difficult, and increases plant disease risks. Lodging resistance is related to straw height, diameter and density. The proposed study will therefore also be of direct relevance for assessing lodging in the wheat populations.

The project will give insights into the evolution of plant communities and the effect of genetic diversity on the overall performance, fitness and stability of performance in plants. At the same time it will generate data that may help to improve breeding approaches in wheat, e.g. in the selection of appropriate varieties for evolutionary breeding.

The research project is a collaborative project between University of Kassel, Germany and the Organic Research Centre. For more information contact: Dr Thomas Döring, The Organic Research Centre - Elm Farm, Hamstead Marshall. RG20 0HR, Tel. office: 01488 658 298. thomas.d@organicresearchcentre.com