



**EUCARPIA**

EUCARPIA Cereal section meeting

&

2nd International Wheat Innovation workshop

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Polydôme, Clermont-Ferrand, France

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PVI-65 - Péter MIKÓ - Selection of winter cereals for organic agriculture

Selection of winter cereals for organic agriculture

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Productivity in agriculture has more than tripled in developed countries since the 1950s. Beyond the success of plant breeding, the increased use of inorganic fertilizers, application of pesticides, and spread of irrigation also contributed to this success. However, impressive yield increases started to decline in the 1980s because of the lack of sustainability. One of the most beneficial ways to increase sustainability is organic agriculture. In such systems the prerequisite of successful farming is the availability of crop genotypes that perform well. However, selection of winter cereals for sub-optimal growing conditions is still neglected, and the organic seed market also lacks of information on credibly tested varieties suitable for organic agriculture.

Quality and agronomic performance of a diverse set of 37 winter bread wheat varieties and 14 winter durum varieties were examined in organic and conventional management systems of Austria, France (only durum) and Hungary through 3 years to identify traits sensitive to management systems.

Based on the results of the winter wheat trial, seven traits showed significant management × genotype interaction. Heading date, sensitivity to leaf rust and powdery mildew had high heritability making it reasonable to select them for organic agriculture also in conventional field in early generations. However, it is suggested to select for the other four traits (grain yield, test weight, leaf-inclination and vigorous plant growth) later under organic growing conditions.

In the case of winter durum, heading time, wet gluten content, semolina yield and grain protein content are traits that showed genotype-dependent significant differences between the two management systems examined. Therefore, breeding for these traits could result in specifically adapted genotypes for organic agriculture in the different countries. Based on strong or moderate significant correlations between the winter durum traits, gluten index and plant height could also be specifically selected in an indirect way. The need for environmentally specific selection for grain yield in later generations was also demonstrated.

Our findings provide evidence for the influence of the selection environment, whether it is the management system or the growing region. Based on these findings, at least a partly separate winter cereal selection program is recommended for organic and low input agriculture in each country, where targeted selection could be carried out more effectively. Knowledge gained from these experiments will be used to design efficient cultivar testing strategies for organic farming in a European network. This will support farmers in their choice of cultivar with stable yield and high quality and thus support the emerging movement towards sustainable farming systems.

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Related publication:

Mikó, P., Vida, G., Rakszegi, M., Lafferty, J., Lorentz, B., Longin, C.F.H., Megyeri, M. (2017): Selection of winter durum genotypes grown under conventional and organic conditions in different European regions. *Euphytica*, 213: 169; DOI 10.1007/s10681-017-1953-x

Mikó, P., Löschenberger, F., Hiltbrunner, J., Aebi, R., Megyeri, M., Kovács G., Molnár-Láng, M., Vida, G., Rakszegi, M. (2014): Comparison of bread wheat varieties with different breeding origin under organic and low input management. *Euphytica*, 199(1-2): 69-80; DOI: 10.1007/s10681-014-1171-8

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[Table of content](#)