4th Conference of Cereal Biotechnology and Breeding

jointly organized by EUCARPIA Cereal Section

November 6–9, 2017 • Budapest, Hungary

BOOK OF ABSTRACTS

GUEST EDITORS

Andreas Börner

Gábor Galiba

András Bálint

AKJournals

AKCongress

CONTENTS

T1: Plant genetic resources 1
Invited 1
Oral presentations 3
Poster presentations 12

T2: New plant genome editing technologies 23
Invited 23
Oral presentations 25
Poster presentations 28

T3: Breeding informatics 30
Invited 30
Oral presentations 31
Poster presentations 35

T4: Phenotyping & Phenomics 37
Invited 37
Oral presentations 38

T5: Breeding for intensive and semi intensive cereal production 41
Invited 41
Oral presentations 44

T6: Breeding for organic and low input food systems 50
Oral presentations 50
Poster presentations 53

T7: Plant adaptation and resilience 56
Invited 56
Oral presentations 58
Poster presentations 70

T8: Food safety and quality 105
Oral presentations 105
Poster presentations 109

medium to high yield, and spelt typical characteristics, e.g. long, narrow and sharp-edged grains, culm coloring during ripening.

Without doubt spelt wheat needs genetic improvement to cope with changes in growing conditions due to global warming. However, it must be considered that despite the increased interest in ancient wheats, the market is highly volatile and sensible, and new varieties will be accepted by processors and consumers only if breeding will not change the typical morphology, taste, and product quality. Therefore, crosses with bread wheat should be minimized or avoided. Within the project new crosses were carried out especially with donors for yellow rust and common bunt resistance, lodging tolerance and winter hardness.

Acknowledgments
The research leading to these results has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 613609.

Performance and selection of winter durum wheat genotypes in different European conventional and organic fields

Péter Mikó[1], Gyula Vida[1], Marianna Rakszegi[1], Julia Lafferty[2], Bruno Lorentz[3], Carl Friedrich Horst Longin[4] and Mária Megyeri[1]*

[1]Centre for Agricultural Research, Hungarian Academy of Sciences, Martonvásár, Hungary
[2]Saatzucht Donau GmbH & Co KG, Probstdorf, Austria
[3]INRA, UMR Diversity and Genome of Cultivated Plants, Mauguio, France
[4]State Breeding Institute, University of Hohenheim, Stuttgart, Germany
[*]E-mail: miko.peter@agrar.mta.hu

Keywords: durum wheat, GGE biplot, grain quality, low input agriculture, organic breeding, variety performance

Sustainability is a key factor for the future of agriculture. 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 agro-ecosystem-based holistic production systems the prerequisite of successful farming is the availability of crop genotypes that perform well. However, selection of winter durum wheat for sub-optimal growing conditions is still mainly neglected, and the organic seed market also lacks of information on credibly tested winter durum varieties suitable for organic agriculture.

Quality and agronomic performance of 14 diverse winter durum wheat genotypes were examined in Austria, France and Hungary for three years. 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 (conventional and organic). Therefore, breeding for these traits could result in specifically adapted genotypes

for organic agriculture in different countries. Based on strong or moderately significant correlations between 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. In general, varieties that had the highest performance in a given mega-environment originated from that mega-environment (except for yellow index). This finding provides evidence for the influence of the selection environment, whether it is the management system or the growing region. As the French site fell into a distinct mega-environment, it should be handled separately. The Hungarian site was found to be an ideal test environment for selecting genotypes with high adaptability for most of the quality traits, while the Austrian site could be used in selecting agronomic traits. This was also reflected in the breeding origin of the best winter durum genotypes for each trait. Based on these findings, a partly separate winter durum selection program is recommended for organic and low input agriculture in each country. Knowledge gained from durum wheat will be used to design efficient cultivar testing strategies for organic farming of other cereals 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.

Acknowledgments
This research received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under Grant Agreement No. 245058-SOLIBAM (supplementary Hungarian project EU_BONUS_12-1-2012-0032) and from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727230 (LIVESEED). The information contained in this communication only reflects the author's view. The Research Executive Agency is not responsible for any use that may be made of the information provided.