

Symposium on Genetics and Plant Breeding in Cereals: 100th Birth Anniversary of Academician Slavko Borojević (1919-2019)



BOOK OF ABSTRACTS

Novi Sad, Serbia, 13-15th November 2019, organized by the Serbian Academy of Sciences and Arts – Branch in Novi Sad, Faculty of Agriculture of the University of Novi Sad, and Institute of Field and Vegetable Crops in Novi Sad



Symposium on Genetics and Plant Breeding in Cereals: 100th Birth Anniversary of
Academician Slavko Borojević (1919-2019)

Held in Novi Sad, Serbia, on 13-15th November 2019

Organized by the Serbian Academy of Sciences and Arts – Branch in Novi Sad,
Faculty of Agriculture of the University of Novi Sad, and Institute of Field and
Vegetable Crops in Novi Sad

Published by:
Institute of Field and Vegetable Crops, Novi Sad

Editor-in-chief:
Dr. Ana Marjanović Jeromela

Editors:
academician Dragan Škorić, Serbian Academy of Sciences
and Arts, Branch in Novi Sad

Prof. Dr. Miodrag Dimitrijević,
Faculty of Agriculture of the University of Novi Sad

Dr. Radivoje Jevtić,
Institute of Field and Vegetable Crops in Novi Sad

Technical editor:
Tanja Vunjak

ISBN 978-86-80417-83-7
Novi Sad, 2019

This Symposium was financially supported by Provincial Secretariat for Higher
Education and Scientific Research

COMMITTEES OF THE SYMPOSIUM

Scientific Committee

Prof. dr Miodrag Dimitrijević, chairman, Faculty of Agriculture, University of Novi Sad

Prof. dr Srbislav Denčić, Institute of Field and Vegetable Crops, Novi Sad

Prof. dr Novo Pržulj, Faculty of Agriculture, University of Banja Luka

Dr Milutin Bede, Osijek

Prof. dr Jan Bočanski, Faculty of Agriculture, University of Novi Sad

Prof. dr Sofija Petrović, Faculty of Agriculture, University of Novi Sad

Dr Ankica Kondić Špika, Institute of Field and Vegetable Crops, Novi Sad

Dr Milan Miroslavić, Institute of Field and Vegetable Crops, Novi Sad

Organizing Committee

Academician Dragan Škorić, chairman, SANU, Beograd

Dr Radivoje Jevtić, vice chairman, Institute of Field and Vegetable Crops, Novi Sad

Dr Ana Marjanović Jeromela, Institute of Field and Vegetable Crops, Novi Sad

Dr Sanja Mikić, Institute of Field and Vegetable Crops, Novi Sad

Doc. dr Borislav Banjac, Faculty of Agriculture, University of Novi Sad

Doc. dr Velimir Mladenov, Faculty of Agriculture, University of Novi Sad

Dr Bojan Jocković, Institute of Field and Vegetable Crops, Novi Sad

Honorary Committee

Academician Stevan Pilipović, chairman, SANU, Belgrade

Emeritus prof. Marija Kraljević Balalić, vice chairman, Faculty of Agriculture, University of Novi Sad

Prof. dr Nedeljko Tica, Dean of the Faculty of Agriculture, University of Novi Sad

Dr Svetlana Balešević Tubić, Director of the Institute of Field and Vegetable Crops, Novi Sad

Prof. dr Dejan Jakšić, Rector of the University of Novi Sad

Mladen Šarčević, Minister of Education, Science and Technological Development of the Republic of Serbia

Prof. dr Zoran Milošević, Provincial Secretary for Higher Education and Research

Dr Vuk Radojević, Provincial Secretary for Agriculture, Forestry and Water Management

Dr Novica Mladenov, Institute of Field and Vegetable Crops, Novi Sad

Prof. dr Miroslav Malešević, Institute of Field and Vegetable Crops, Novi Sad

Dr Đorđe Jocković, Institute of Field and Vegetable Crops, Novi Sad

Prof. dr Jelena Bošković, University Business Academy in Novi Sad, Faculty of Economics and Engineering Management (FIMEK), Novi Sad

Dr Ksenija Borojević, University of Massachusetts Boston, Boston

PROGRAM

Wednesday, November 13

17.00-18.00	Registration and Welcome Reception (The Serbian Academy of Sciences and Arts, Branch in Novi Sad, address Nikole Pašića 6)
from 18.00	Tour of Sremski Karlovci, Wine Tasting and Dinner

Thursday, November 14

9.15 - 10.00	Opening ceremony and welcome speeches by the organizers and special guests	
10.00 - 10.30	Coffee break	
	<i>Chairpersons: Prof. Dr. Miodrag Dimitrijević, academician Dragan Škorić, academician Teodor Atanacković</i>	
10.30-11.00	Opening lecture: From Cold Spring Harbour to the Novi Sad School of Genetics	Prof. Dr. Miodrag Dimitrijević, University of Novi Sad, Faculty of Agriculture
11.00-11.30	Plenary lecture: World Food Supply Present and Future - Problems and Prospects	Prof. Dr. Perry Gustafson, Adjunct Professor of Plant Sciences, College of Agriculture, Food and Natural Resources, University of Missouri, USA and retired geneticist of the Agricultural Research Service, USDA
11.30-12.00	Plenary lecture: Gene Manipulation In Wheat Improvement	
12.00-12.30	Plenary lecture: Селекция мягкой пшеницы в Национальном Центре зерна имени П. П. Лукьяненко: традиционные и биотехнологические методы	Davojan Rumik Oganessovič, Research Institute of Agriculture named after P.P. Lukyanenko, Krasnodar, Russia
12.30-12.45	Changes in Senescence Pattern Related With Breeding Progress in Winter Wheat	Dr. Milan Mirosavljević, Institute of Field and Vegetable Crops, Novi Sad
12.45-13.00	Improvement of Spike-Stem-Tillers (SST) Complex is a Challenge In Wheat Breeding	Prof. Dr. Ivan Panayotov, Agricultural Experimental Station - Dunav, Bulgaria
13.00-13.15	Polymorphisms and Flow of Gliadin Alleles in Wheat	Prof. Dr. Desimir Knežević, University of Priština, Faculty of Agriculture in Lešak
13.15-13.30	Discussion	
13.30-14.00	Poster Viewing Session	
from 14.00	Lunch and Closing Ceremony	

INTRODUCTORY NOTE

The greatness and wealth of a nation are not in numbers, area and material resources. The size and wealth of the nation are in people, ideas, achievements and moral values that this nation has created, reached and established.

Prof. Dr. Slavko Borojević, a geneticist, breeder, agronomist, professor, academician, built himself and his work into the greatness and wealth of his people, the state, and much wider than that - in the heritage of humanity.

The aspiration for freedom, the primordial, eternal struggle to achieve it, marked the life and deed of Professor Borojević. Firstly, he fought this battle as a warrior on the battlefield, then as a fighter against hunger, for food security, for liberty and independence through seed and food production self-sufficiency, creating our domestic, varieties of bread grain. It is this constant struggle that has helped to build the scientific thought of genetics at the Faculty of Agriculture in Novi Sad on the right foundation and to create the "Novi Sad School of Genetics", which, by the means of wheat breeding and through thousands of young people attending this school, has been introduced to the world, recognized and respected, like its father - professor Slavko Borojević.

The symposium "100th Birth Anniversary of Academician Slavko Borojević (1919-2019)" is devoted to remembrance of our great people, their work and legacy. In order to wisely go into the future, we need to know who we are, what we are and where we come from. We who are carrying all our ancestors in our genes, we do have the obligation to remember those who have indebted the Fatherland and preserve their work. This Symposium should bring us together around the scientific results of modern genetics and breeding, which were realized on the basis of the work and science of prof. Borojević. With this gathering, we recollect the great scientific and educational work that is possible, when the right people are in the right places and when there is concern for science and education. Professor Borojević created a highly valuable environment around him, but this environment created such a great person, as well. In these times, the Symposium "100th Birth Anniversary of Academician Slavko Borojević" should remind us that we are free, great and rich nation, especially with great achievements in agronomic science. By properly genotype by environment interaction, we could be richer for many new "borojevics", which would not leave for abroad in search for happiness, but remain here and work for the wellbeing of the Fatherland, as Slavko Borojević, a university professor, world known geneticist and wheat breeder honourably did, walking high and tall.

Prof. Dr. Miodrag Dimitrijević
University of Novi Sad
Faculty of Agriculture

ABSTRACTS

Opening lecture

1. From Cold Spring Harbour to the Novi Sad School of Genetics / Miodrag Dimitrijević, Sofija Petrović, Borislav Banjac (Serbia)

Past and Future of Cereal Improvement

2. Changes in senescence pattern related with breeding progress in winter wheat / Milan Mirosavljević, Vojislava Momčilović, Sanja Mikić, Vladimir Aćin, Verica Takač, Srbislav Denčić (Serbia)
3. Improvement of spike-stem-tillers (SST) complex is a challenge in wheat breeding / Ivan Panayotov (Bulgaria)
4. Grain yield changes in historical set of Pannonian winter wheat varieties / Bojan Jocković, Velimir Mladenov, Radivoje Jevtić, Sonja Ilin, Vladimir Aćin, Milan Mirosavljević, Dragan Živančev (Serbia)
5. Utilisation of sodium dodecyl sulphate sedimentation test for quality prediction of wheat cultivars in Serbia / Dragan Živančev, Milan Mirosavljević, Bojan Jocković, Vojislava Momčilović, Radivoje Jevtić, Vladimir Aćin, Slaviša Štatkić, Sanja Mikić (Serbia)
6. Variations of ecological factors in plant production – Frames of living activities of cultivated plants / Ljubica Šarčević-Todosijević, Vera Popović, Sara Has, Ljubiša Živanović (Serbia)

Biodiversity and Utilization of Genetic Resources in Cereals

7. Characterisation of small grains resources at IFVCNS with UPOV descriptors / Sanja Mikić, Verica Takač, Milan Mirosavljević, Dragana Trkulja, Vojislava Momčilović, Ankica Kondić Špika, Ljiljana Brbaklić (Serbia)
8. Estimation of genetic diversity and population structure of IFVCNS wheat collection using molecular markers and pedigrees / Ljiljana Brbaklić, Dragana Trkulja, Sanja Mikić (Serbia)
9. Analysis of chlorophyll content in a bread wheat collection and its correlations with flowering time and grain yield / Verica Takač, Sanja Mikić, Milan Mirosavljević, Vojislava Momčilović, Dragana Trkulja, Ljiljana Brbaklić, Ankica Kondić Špika (Serbia)
10. Improvement of buckwheat production / Vera Popović, Ljubiša Kolarić, Branka Žarković, Ljubiša Živanović, Ljubica Šarčević Todosijević, Jelena Golijan, Jela Ikanović (Serbia)

Cereals Genetics and Genomics

11. Polymorphisms and flow of gliadin alleles in wheat / Desimir Knežević (Serbia)
12. Genomic technology identification of varieties and hybrids of perennial grass crops / Kondratskaya I. P., Yuknimuk A. N., Chizhik O. V., Reshetnikov V. N., Stolepchenko V. A., Vasko P. P. (Belarus)

Cereals Breeding in a light of Climatic Changes - Biotic and Abiotic Stress Resistance

13. Obtaining of genetically changed wheat plants (*Triticum aestivum* L.) with increased resistance to drought / Mykhals'ka S.I., Komisarenko A.G., Pryadkina G.O. (Ukraine)
14. Evaluation of wheat (*Triticum aestivum* L.) response to different abiotic stresses using modern phenotyping platforms / Ankica Kondić-Špika, Sanja Mikić, Dragana Trkulja, Milan Mirosavljević, Ljiljana Brbaklić, Vesna Župunski, Imre Vass, Janos Pauk, Carl-Otto Ottosen (Serbia, Hungary, Denmark)
15. Stem store ability of winter wheat under natural drought conditions / V. V. Morgun, G. A. Pryadkina, O. V. Zborivska (Ukraine)
16. Photosynthetic traits of transgenic maize plants with dsRNA suppressor of proline dehydrogenase gene / O. O. Stasik, D. A. Kiriziy, O. G. Sokolovska-Sergiienko, G. O. Pryadkina, S. I. Mykhalska (Ukraine)

Grain Yield Changes in Historical Set of Pannonian Winter Wheat Varieties

Bojan Jocković*¹, Velimir Mladenov², Radivoje Jevtić¹, Sonja Ilin¹,
Vladimir Aćin¹, Milan Miroslavjević¹, Dragan Živančev¹

¹Institute of Field and Vegetable Crops, Novi Sad, Serbia

²University of Novi Sad, Faculty of Agriculture, Novi Sad, Serbia

e-mail: bojan.jockovic@ifvcns.ns.ac.rs

Improvement of winter wheat grain yield represents one of the major breeding objectives worldwide, due to increase in human population and rapid decrease in the cropping areas. In general, grain yield changes have mainly been related to the changes of grain number per unit area, while changes in grain weight have been less pronounced. However, under less favourable environmental conditions, grain yield is often related to grain weight. Therefore, knowledge of the changes in the main traits associated with improvement of grain yield is important for future impact on wheat breeding programs. The objective of this study was to analyse the changes in grain yield and related traits in the set of winter wheat varieties widely grown in the southern Pannonian region in the past 50 years. For this study, historical set of 20 winter wheat varieties were chosen to analyse the changes in grain yield, 1000 grain weight and grain number per unit area. The trial was conducted during two growing seasons at the Experimental Field of the Institute of Field and Vegetable Crops, Serbia (typical Pannonian location). Study showed that examined traits were positively related with year of variety release. Changes in grain yield displayed average improvement of 43 kg ha⁻¹ per year. On average, 1000 grain weight varied between 39.1 and 47.7 g, where improvement of 0.20 g per year could be mostly ascribed to newer varieties which had higher values of this trait. Moreover, modern wheat varieties had higher grain number per unit area compared to the older predecessors. In conclusion, study demonstrated that there were significant changes in grain yield during the examined period. Therefore, further grain yield improvement should be related in changes of both main grain yield determinants - 1000 grain weight and grain number per unit area.

Key words: wheat, yield, grain number