

# HELIA

## **MANAGING EDITOR**

Dragan Škorić, *Serbia*

## **EDITOR**

Zvonimir Sakač, *Serbia*

## **EDITORIAL BOARD**

Yakov Demurin, *Russia*

Jose Fernández-Martinez, *Spain*

Wolfgang Friedt, *Germany*

Thomas Gulya, *USA*

Antonio Hall, *Argentina*

Yalcin Kaya, *Turkey*

Viktor V. Kirichenko, *Ukraine*

Maria Pacureanu-Joita, *Romania*

Monica Poverene, *Argentina*

Herve Serieys, *France*

Mulpuri Sujatha, *India*

Gian Paolo Vannozzi, *Italy*

Kirichenko Victor Vasylyovich, *Ukraine*

Felicity Vear, *France*

Abelardo de la Vega, *Argentina*

Ferenc Viranyi, *Hungary*

Jun Zhao, *China*

**DE GRUYTER**

HELIA is published by the Serbian Academy of Sciences and Arts (SASA), Branch in Novi Sad in cooperation with De Gruyter. HELIA publishes original theoretical, experimental and technical contributions arising from the scientific study of sunflower crops and farming systems. The subject fields covered include crop agronomy; sunflower genetic resources; sunflower improvement and breeding; phytopathology and plant protection; sunflower physiology, biochemistry, metabolism, structure, genetics, at diverse levels of integration; ecology; soil, water and mineral nutrition management and farming systems.

**ABSTRACTED/INDEXED IN** Celdes, CNKI Scholar (China National Knowledge Infrastructure), CN-PIEC, EBSCO Discovery Service, Elsevier - SCOPUS, Google Scholar, J-Gate, Naviga (Softweco), Primo Central (ExLibris), SCImago (SJR), Summon (Serials Solutions/ProQuest), TDOne (TDNet), WorldCat (OCLC).

ISSN 1018-1806 · e-ISSN 2197-0483

All information regarding notes for contributors, subscriptions, Open Access, back volumes and orders is available online at <http://www.degruyter.com/journals/helia>.

**MANGING EDITOR** Prof. Dr. Dragan Škorić, Serbian Academy of Sciences and Arts (SASA), Branch in Novi Sad, Nikole Pašića 6, 21000 Novi Sad, Serbia, Email: [draganskoric@sbb.rs](mailto:draganskoric@sbb.rs)

**JOURNAL MANAGER** Friederike Winter, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany, Tel.: +49 (0)30 260 05-376, Fax: +49 (0)30 260 05-250, Email: [friederike.winter@degruyter.com](mailto:friederike.winter@degruyter.com)

**RESPONSIBLE FOR ADVERTISEMENTS** Heiko Schulze, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany. Tel.: +49 (0)30.260 05-358, Fax: +49 (0) 30.260 05-264, Email: [anzeigen@degruyter.com](mailto:anzeigen@degruyter.com)

**TYPESETTING** Integra Software Service Pvt. Ltd, Pondicherry, India

© 2015 Walter de Gruyter GmbH, Berlin/Boston and SASA, Branch in Novi Sad, Serbia.

**PRINTING** Franz X. Stückle Druck und Verlag e.K., Ettenheim  
Printed in Germany



## Contents

Ferenc Viranyi, Thomas J. Gulya and Denis Labrouhe Tourvieille  
**Recent Changes in the Pathogenic Variability of *Plasmopara Halstedii*  
(Sunflower Downy Mildew) Populations from Different Continents — 149**

José Alberto Salvador Escalante Estrada, María Teresa Rodríguez González and  
Yolanda Isabel Escalante Estrada  
**Root System, Phenology and Yield of Sunflower in Relation to Nitrogen and  
Phosphorus — 163**

Natalija Markova Ruzdik, Ilija Karov, Sasa Mitrev, Biljana Gjorgjieva,  
Biljana Kovacevik and Emilija Kostadinovska  
**Evaluation of Sunflower (*Helianthus annuus* L.) Hybrids Using Multivariate  
Statistical Analysis — 175**

Milan Jocković, Siniša Jocić, Ana Marjanović-Jeromela, Mihajlo Ćirić,  
Petar Čanak, Vladimir Miklič and Sandra Cvejić  
**Biomorphological Association and Path Analysis in Sunflower (*Helianthus  
annuus* L.) — 189**

Biljana Gjorgjieva, Ilija Karov, Sasa Mitrev, Natalija Markova Ruzdik,  
Emilija Kostadinovska and Biljana Kovacevik  
**Correlation and Path Analysis in Sun flower (*Helianthus annuus* L.) — 201**

I. V. Totsky and V. A. Lyakh  
**Pollen Selection for Drought Tolerance in Sunflower — 211**

L. Hlisnikovský, E. Kunzová, M. Hejcman, P. Škarpa, H. Zikalová and  
L. Menšík  
**The Effect of Climate, Nitrogen and Micronutrients Application on Oiliness  
and Fatty Acid Composition of Sunflower Achenes — 221**

S. Lekić, I. Draganić, M. Milivojević and G. Todorović

**Germination and Seedling Growth Response on Sunflower Seeds to Priming and Temperature Stress — 241**

S. L. Patil, P. K. Mishra, M. N. Ramesha and S. K. N. Math

**Response of Sunflower to Rainwater Conservation and Nutrient Management in Semi-arid Conditions — 253**