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BOOK OF ABSTRACTS



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PREFACE

A Word from the Editor

Agriculture has played a key role in the development of human civilization. Agriculture is also central in the current debate on sustainable development. In fact, agriculture development is essential for the achievement of many Sustainable Development Goals (SDGs) in the context of the 2030 Agenda for Sustainable Development.

Development and diffusion of agricultural techniques in the last century (cf. Green revolution) has steadily increased agricultural productivity with positive impacts in terms of food security and rural development. A remarkable shift in agricultural practices – and consequently agricultural/farming systems as well as food systems – has occurred in response to introduction of new technologies. The last century has seen the intensification, concentration and specialization of agriculture; agriculture increasingly depends on new technologies and inputs such as chemicals (e.g. fertilizers, pesticides), mechanization, irrigation and plant breeding (hybrids and GMOs).

The agricultural sector is called nowadays to adapt to climate change while increasing efficiency and reducing negative externalities (e.g. water pollution). Therefore, there is a transition towards sustainability in agriculture to address concerns related to socio-economic justice, resources conservation, environment protection, etc. Science and innovation are crucial to address these new sustainability challenges. Recent trends would indicate that the incorporation of scientific knowledge (e.g. principles of ecosystem management and agro-ecology) into farming practices can enhance productivity and allow achieving ‘sustainable intensification’ in all agriculture subsectors (crop production, animal production, forestry, fisheries).

In your hands is the Book of Abstracts of the 9th International Scientific Agricultural Symposium "AGROSYM 2018", which I hope you will find useful in your research, education and professional activities. Symposium themes cover all branches of agriculture and are divided into seven sections: 1) Plant production, 2) Plant protection and food safety, 3) Organic agriculture, 4) Environmental protection and natural resources management, 5) Animal Husbandry, 6) Rural Development and Agro-economy, and 7) Forestry and agroforestry.

The aim of AGROSYM 2018 is to make an important contribution to agriculture science and practice in the Balkan region and beyond. This Book of Abstracts encompasses 1206 contributions from about 1200 participants representing 85 countries. Full texts of the submitted communications will be available in electronic form (CD and web: <http://agrosym.ues.rs.ba>).

AGROSYM 2018 was made possible through the commitment and contributions of a wide range of partners and sponsors. Many thanks to all the authors, reviewers and colleagues for their help in editing this Book of Abstracts. Special thanks go to all co-organizers for their unselfish collaboration and comprehensive support.

East Sarajevo, 1st October 2018

Prof. Dušan Kovačević, PhD

Editor in Chief



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OPTIMIZATION AND COMPARISON OF MACERATION AND ULTRASOUND ASSISTED EXTRACTION SYSTEMS FOR THE PRODUCTION OF A COLORANT EXTRACT FROM *HIBISCUS SABDARIFFA* L. FLOWERS

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Abstract

Hibiscus sabdariffa L. is an herbaceous medicinal plant used as infusion for the treatment of several disorders, namely, fever and high blood pressure, gastrointestinal and hepatic diseases. In addition to those health benefits, the calyces area potential source of natural pigments, due to its high content in anthocyanins. This work aimed to optimize the experimental conditions of anthocyanins' extraction from dried calyces of *H. sabdariffa*, comparing two methodologies, maceration and ultrasound assisted extraction, in order to develop a natural colorant. To obtain the conditions that maximize anthocyanins' extraction, a response surface methodology (RSM) was applied using the circumscribed central composite design of three variables with five levels. Time, temperature and ethanol - water proportion - in the case of maceration, were the relevant independent variables, while for ultrasound assisted extraction, the ultrasonic power was used instead of temperature which was kept constant. Two anthocyanin compounds were identified by HPLC-DAD-ESI/MS: delphinidin-3-sambubioside and cyanidin-3-sambubioside. The responses used as criteria were the quantification of the identified anthocyanins and the extraction yield of the final residue. Ultrasound assisted extraction proved to be the most effective method: 43 min, 390 W and 46 % of ethanol. At these optimal conditions, the extraction yield was 61.2%, with a total anthocyanins' content of 23.1 mg/g dried plant, and 47.5 mg/g extract. Additionally, the response values were slightly improved by studying the solid/liquid ratio effect using the optimal conditions in dose-response format (5 to 200 g/L), showing continuously decreasing values as the solid/liquid ratio increases. Overall, the obtained results showed the possibility of using *H. sabdariffa* flowers as a source of anthocyanin compounds for industrial applications.

Keywords: *Hibiscus sabdariffa* L. flowers, Anthocyanins, Heat and Ultrasound assisted extractions, Response Surface Methodology.

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