



Macedonian Ecological Society

**5th CONGRESS OF ECOLOGISTS
OF THE REPUBLIC OF MACEDONIA
WITH INTERNATIONAL PARTICIPATION**

ABSTRACT BOOK

Ohrid, Macedonia 19th - 22nd October 2016

Издавач: **Македонско еколошко друштво**

Институт за биологија

Природно-математички факултет - Скопје

П. фах 162, 1000 Скопје

Цитирање:

Книга на апстракти, V Конгрес на еколозите на
Македонија со меѓународно учество. Охрид,
19-22.10.2016. Македонско еколошко друштво,
Скопје, 2016

Publisher: **Macedonian Ecological Society**

Institute of Biology

Faculty of Natural Sciences

P.O. Box 162, 1000 Skopje, Macedonia

Citation:

Abstract book, V Congress of Ecologists of the
Republic of Macedonia with International Participa-
tion. Ohrid, 19-22.10.2016. Macedonian Ecological
Society, Skopje, 2016

CIP - Каталогизација во публикација

Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

502/504(062)(048.3)

CONGRESS of ecologists of the Republic of Macedonia with international participation
(5 ; 2016 ; Ohrid)

Abstract book / 5th Congress of ecologists of the Republic of Macedonia with interna-
tional participation, Ohrid, Macedonia 19th - 22nd October 2016 = Книга на апстракти / [V
Конгрес на еколозите на Македонија со меѓународно учество. Охрид, 19.-22.10.2016].
- Скопје : Македонско еколошко друштво = Skopje : Macedonian Ecological Society, 2016.
- 213 стр. ; 25 см

Текст напоредно на мак. и англ. јазик

ISBN 978-9989-648-36-6

I. Конгрес на еколозите на Македонија со меѓународно учество (5 ; 2016 ; Охрид) види Con-
gress of ecologists of the Republic of Macedonia with international participation (5 ; 2016 ; Ohrid)

а) Екологија - Собири - Апстракти

COBISS.MK-ID 101812746

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Validating the FAO Aqua-Crop model for irrigated and water deficient sugar beet

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Simulation models that quantify the effects of water on yield at the farm level are valuable tools in water and irrigation management. To address this need, FAO has developed a yield-response to water model, named aqua-crop model, which simulates attainable yields of the major field and vegetable crops cultivated worldwide. Although the model is simple, it gives particular attention to the fundamental processes involved in crop productivity and in the responses to water, from a physiological and agronomic background perspective. The ease of use of the model, the low requirement of input parameters, and its sufficient degree of simulation accuracy make it a valuable tool for estimating crop productivity under rain fed conditions, supplementary and deficit irrigation, and on-farm water management strategies for improving the efficiency of water use in agriculture. In this study, aqua-crop model is parameterized and tested for sugar beet under full (100%) and deficit (75, and 50% of full) irrigation regimes. The model is able to simulate the crop water use under very high *ET* and wind conditions. Furthermore, the model performed satisfactorily for the growth of aboveground biomass, grain yield, and canopy cover in the non-water-stress treatments and mild stress conditions, but it is less satisfactory in simulating severe water-stress treatments, especially when stress occurred during senescence.

Keywords: AquaCrop Model, canopy cover, biomass accumulation, grain yield, efficiency of water use.

Current state of agri-environmental indicators of Republic of Macedonia

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Agri-environmental indicators are a useful tool for analysis of the connection between agriculture and environment and identifying developments in this intensive interaction. Such indicators should consequently help to accomplish a better understanding of the complex issues in the field of agriculture and environment, to show developments over time, and to provide quantitative information.

In order to help the improvement of environmental performance of agriculture, Organisation for Economic Co-operation and Development (OECD) has established a set of agri-environmental indicators, developed in co-operation with Eurostat and Food and Agriculture Organisation (FAO). These indicators inform policy makers and society on the state and trends in agri-environmental conditions, and can provide a valuable aid to policy analysis.

Currently, there is a deficiency of continuous monitoring of indicators connected to the impact of agriculture on the ecosystems and environment in Republic Macedonia. A development and

continuous monitoring of applicable agri-environmental indicators is a key of valuation of the impact of agriculture on environment. Therefore, this paper will give an overview of current data and state of agri-environmental indicators in Republic of Macedonia and accordingly an analysis and evaluation of the sustainable development in the country.

Keywords: agri-environmental indicators, agriculture, environment, agricultural impact, agricultural monitoring

The role of plant biotechnology methods in sustainable agriculture

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Plant biotechnology is set of different scientific approaches and methods that are utilized to improve and modify plants for human and environmental benefit. Plant biotechnology can be used to meet the increasing need for food by improving yields, improving the nutritional quality of crops and recuing the impact on the environment. Plant biotechnology can assist to creation of varieties resistant to frost, droughts and floods, pests and disease, and other abiotic and biotic stresses. Similarly, development of plant biotechnology methods is a reach source of possibilities for creation of new agricultural genotypes, thus enriching the agricultural biodiversity.

This paper presents several *in vitro* methods with successful application results and particular concern for improvement of the biodiversity of horticultural crops, important for Republic of Macedonia. Utilization of the benefits of plant biotechnology will bring “economically sustainable” and “environmentally sound” agricultural production that shall be “socially equal”. It is a straight contribution of plant biotechnology to the sustainable agriculture.

Keywords: plant biotechnology, sustainability, agriculture, in vitro methods, horticultural crops

In situ and *Ex situ* gene conservation of domestic animals in the Republic of Macedonia

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The breed structure, population trend and size of native sheep, goat and cattle breeds in the Republic of Macedonia requires further evaluation, inventarization and characterization in order to preserve and develop proper livestock biodiversity conservation strategies. Conservation of animal