

COST 859

**PHYTOTECHNOLOGIES TO PROMOTE SUSTAINABLE LAND USE
AND IMPROVE FOOD SAFETY**

WG1 & WG3 Workshop

Nutrient Biofortification and Exclusion of Pollutants in Food Plants



**Ben-Gurion University of the Negev
Jacob Blaustein Institutes for Desert Research
Sede-Boqer Campus, Israel
October 23-25, 2007**



משרד המדע התרבות והספורט
Israel Ministry of Science Culture & Sport
وزارة العلوم والثقافة والرياضة



Lecture session IV: Crop quality and human health in polluted environments	69
OF KWASHIORKOR, CANCERS, AND CRETINISM: POTENTIAL BIOTECHNOLOGICAL SOLUTIONS TO TROPICAL MYCOTOXIN AND NATURAL CONTAMINATIONS	
Jonathan Gressel	71
CADMIUM IN FOOD CROPS AND IMPACT ON HUMAN HEALTH	
G. Arapis, N. Grytsyuk and K. Karkalis	72
PRELIMINARY ASSESSMENT OF POTENTIAL PHYTOREMEDIATION IN VIETNAM	
Hoang Thi Thanh Thuy, Huynh Thi Minh Hang, Le Phi Nga	73
SAFETY AND QUALITY OF FOOD PRODUCTS FROM PLANTS GROWN IN SOIL CONTAMINATED WITH PETROLEUM HYDROCARBONS	
Anu Balasubramaniam, M Preis, P. Rebollo, D. Rees, J.E. Orchard, PJ Harvey	74
INFLUENCE OF SOME AGROCHEMICAL MEASURES ON THE RADIONUCLIDES ROOT UPTAKE	
Nataliya Grytsyuk, Gerassimos Arapis and Olga Kosarchuk	75
CONSTRUCTED WETLANDS WITH <i>SALICORNIA</i> AS AN ENVIRONMENTALLY FRIENDLY BIOFILTER AND A VALUABLE BY-PRODUCT	
Muki Shpigel, Moshe Sagi and Yvonne Ventura	76
Poster Sessions III and IV.....	77
P33 - STUDY OF STRESS RESPONSE FOR FOUR HERBICIDES ON THE GROWTH AND PHYSIOLOGICAL RESPONSES ON ALGAE AND AQUATIC PLANTS (LEMNACEAE)	
Foudoulakis Manousos, Libiakis George, Sirbas George, Kristopoulos Nikos and Arapis Gerassimos	79
P34 - DISTRIBUTION OF MACRO- AND MICROELEMENTS IN BRASSICA JUNCEA AND B. NAPUS AS AFFECTED BY HEAVY METALS IN INDUCED PHYTOEXTRACTION FIELD EXPERIMENTS	
László Erdei, Bernadett Bartha, Ágnes Vashegyi, Andrea Farsang, Viktória Cser, Károly Barta, Gábor Mezősi, Ágnes Dergez, Imre Mecs, Ferenc Foglein	80
P35 - ULTRASTRUCTURAL DEVELOPEMENT OF APOPLASTIC BARRIERS CONTROLLING NUTRIENTS AND POLLUTANTS TRANSLOCATION	
Martinka, M., Lux, A., Pernas-Ochoa, M. and Dolan, L.	81
P36 - METALLICOLOUS AND NONMETALLICOLOUS PLANT RESPONSES TO INCREASING CU EXPOSURE	
Mench Michel, Gaste Hélène, Aulen Maurice, Taberly Julie	82
P37 - PRACTICAL APPROACHES TO INCREASE SELENIUM AS ESSENTIAL METALLOID IN HUMAN DIET	
Hassan Azaizeh	83
P38 - PHYTO-SOIL MANAGEMENT STRATEGY MAINTAIN AND IMPROVE THE QUALITY OF FARM PRODUCTS IN CONTAMINATED FIELDS	
Satish Gupta	84
P39 - TRANSFER OF THE CRY3AM GENE AS A PROSPECTIVE METHOD FOR INSECT PEST MANAGEMENT OF CROP PLANTS	
Iauhenia Isayenko, Neda Mirakhorli, Inna Abdeeva, Irina Goldenkova-Pavlova, Nikolai Kartel	85
P40 - SAFE CROP CULTIVATIONS IN A MERCURY MINING AREA?	
Rocio Millan, Ramón Carpena, María-José Sierra, Elvira Esteban, Sandra Carrasco, Thomas Schmid	86
P41 - EIADES RESEARCH PROGRAM: ENVIRONMENTAL IMPACT AND SOIL REMEDIATION IN MADRID CONTAMINATED AREAS	
M. Carmen Lobo, Rocio Millán, Ramón Carpena, M. Dolores Fernández, Luis Gómez, Ana-Jesús Hernández, Margarita Martín, Jesús Pastor	87
P42 - MOLECULAR GENETICS AND AGRONOMIC PRACTICES TO IMPROVE Zn CONCENTRATION IN WHEAT GRAIN	
Hikmet Budak, Tzion Fahima, Yehoshua Saranga, Zvi Peleg, Ismail Cakmak	88

STUDY OF STRESS RESPONSE FOR FOUR HERBICIDES ON THE GROWTH AND PHYSIOLOGICAL RESPONSES ON ALGAE AND AQUATIC PLANTS (LEMNACEAE)

Foudoulakis Manousos, Libiakis George, Sirbas George, Xristopoulos Nikos and Arapis Gerassimos

Laboratory of Ecology and Environmental Sciences
Agricultural University of Athens, Hellas
manousosf@yahoo.gr, Tel +30 2105294464-5, Fax: +30 2105294462

Agriculture in Greece is characterised by small scale and great variety of crops. Large volumes of pesticide are applied every year to support the financial profit of agronomy with herbicides covering the largest proportion among them. They are also applied almost throughout the year and they are the most persistent among pesticides as many of them may accumulate in the soil reaching a plateau after some years. Through other routes of exposure (spray drift, run off, leaching) they can also reach the surface and groundwater. To estimate a possibility of phytoremediation application for cleaning soils or water polluted with pesticides, it is required to check their phytotoxicity first.

Among the test plants selected for such screening are the fast growing duckweed plants (*Lemna minor*, *Spirodela polyrhiza*) and various algae species well known as "Nature's pollution fighters". This study was designed to standardize the tolerance of these species as high phytotoxicity is the limiting factor for growing of cultural plants for phytoremediation reasons.

The experimental approach involved exposure of *Lemna minor* or/and *Spirodela polyrhiza* and various algae species under standard laboratory conditions to four herbicides with different mode of action (chlorsulfuron, oxyfluorfen, glufosinate ammonium and pendimethalin). *S. polyrhiza*, *L. minor* and the algae species were grown in liquid nutrient medium under controlled conditions of photoperiod, humidity and temperature. Test solutions were water preparations of the four herbicides at various concentrations. For the aquatic plants the evaluation of results was made by recording the numbers of fronds and other symptoms such as discoloration. For the algae species the assessment of phytotoxicity was made daily by taking measurements (optical density from a spectrophotometer with a filter at 670 nm and a cell holder of 10cm path-length) in order to calculate the growth rate and the biomass.

A differentiate response of species tested was observed related not only as the type of symptoms but also as the time of symptoms development. The severity of symptoms was proportionally related to the concentration of the chemical used.

The NOEC and EC₅₀ values were also estimated indicating large differences in sensitivity among the herbicides tested.

Key words: Algae, herbicides, *Lemna minor*, phytoremediation, *Spirodela polyrhiza*