

# Co-operation between

Faculty of Agriculture, Forestry and Natural Environment,  
Aristotle University of Thessaloniki

&

Agrarian Technology Institute,  
Peoples' Friendship University of Russia

## 3rd Students Conference

### Organic Farming

### Remote Sensing of Environment



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# ABSTRACTS

### **Plant genetics and genomics in organic farming**

**Kezimana Parfait**, Romanova E.V., Shemlkova E. O.  
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The concept of working 'with and for nature' instead of against it gives a plus to organic farming; but despite that, its lower productivity compared to conventional farming, makes organic farming less practiced. The ideal goal is to reduce to the maximum that gap in productivity between conventional and organic farming. In this paper, we are reviewing what plant genetics and genomics can contribute in organic farming in order to reduce that difference in yield. We looked at the impact that genetic diversity and genome manipulation can have on organic farming by reintroducing some of characteristics or traits from wild relatives, thus moving towards closing that productivity gap.

### **Effect of UV-B radiation on egg hatchability of predator mites (Phytoseiidae)**

**Anastasia Terzidou**, Takeshi Suzuki, Anastasia Kokkari, George Floros, Petros Damos,  
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Egg hatchability of four predatory mites—*Phytoseiulus persimilis* Athias-Henriot, *Iphiseius [Amblyseius] degenerans* Berlese, *Amblyseius swirskii* Athias-Henriot, and *Euseius finlandicus* Oudemans (Acari: Phytoseiidae)—and the spider mite *Tetranychus urticae* Koch (Acari: Tetranychidae) was determined under various UV-B doses either in constant darkness (DD) or with simultaneous irradiation using white light. Under UV-B irradiation and DD or simultaneous irradiation with white light, the predator's eggs hatched in significantly lower percentages than in the control non-exposed eggs, which indicates deleterious effects of UV-B on embryonic development. In addition, higher hatchability percentages were observed under UV-B irradiation and DD in eggs of the predatory mites than in eggs of *T. urticae*. This might be caused by a higher involvement of an antioxidant system, shield effects by pigments or a mere shorter duration of embryonic development in predatory mites than in *T. urticae*, thus avoiding accumulative effects of UV-B. Although no eggs of *T. urticae* hatched under UV-B irradiation and DD, variable hatchability percentages were observed under simultaneous irradiation with white light, which suggests the involvement of a photoreactivation system that reduces UV-B damages. Among predators variation regarding the tolerance to UV-B effects was observed, with eggs of *P. persimilis* and *I. degenerans* being more tolerant to UV-B radiation than eggs of *A. swirskii* and *E. finlandicus*. The interspecific variation in UV-B tolerance among the predatory mites found in our work may be useful for selecting the high UV-B-tolerant, predator mite species for use in biological control.

## **Organic tea production in the subtropical zone of the Krasnodar region in Russia**

**Sedelnikova O.V.**, Gresis V.O.

Agricultural and Technological Institute RUDN, Moscow

Organic tea production is a successful sector in agriculture because tea is the second most consumed drink after water and there is growing interest in organic farming. The only suitable place for the cultivation of tea in Russia is in the Krasnodar region. This is because the climate there is the most favorable for tea cultivation than in any other region.

The research of the influence of organic technology on the productivity of tea plants revealed decrease of productivity on tea plantation under organic technology because there was little amount of nutrient content in the brown forest soil. This problem needs further detailed research to promote this technology of tea cultivation to a sustainable and profitable level. It can be possible with a partial compensation of the deficit of nutrients in the soil.

## ***In vitro* and *in vivo* study of biological control traits in beneficial rhizobacteria**

**Kandylas Ioannis**, Gkioura Anna, Kamou Nathalie and Anastasia Lagopodi

Plant Pathology Laboratory, School of Agriculture

The inhibitory activity of 7 beneficial rhizobacteria on the sclerotia germination of the phytopathogenic fungus *Sclerotium rolfsii* was studied *in vitro*. Strains *Pseudomonas chlororaphis* ToZα7, *Serratia rubidaea* S55 and S49, *Serratia marcescens* PiHa-5II, S47 and S52, and *Bacillus cereus* S76 caused inhibition of sclerotia germination, after 72 hours' incubation in bacterial liquid cultures. The highest inhibition (83.33%) was observed in *S. marcescens* PiHa-5II and *S. rubidaea* S55, while the lowest (32%) was observed in *B. cereus* S76. Furthermore, the effect of *S. marcescens* PiHa-5II on growth of tomato root was studied, after application of bacteria on seeds. Compared to the control, root weight was increased by 45.45%. In addition, the colonization pattern of *P. chlororaphis* ToZα7 on tomato roots was studied. The strain was transformed with the green fluorescent protein gene via bacterial conjugation. Colonization was examined under a confocal laser scanning microscope, after inoculating the transformed strain on germinated tomato seeds. Six days after inoculation the bacterium had colonized root hairs and root surface cells, exhibiting endophytic behavior.

## **Features of wheat production using organic farming**

**Larichkina I. S.**

Agricultural and Technological Institute RUDN, Moscow

In this paper we studying features of wheat production in organic farming. Based on the main objective of organic farming, there are a set of measures and conditions, that can be created to protect crops from pests and disease outbreaks. However, the experiment shows that in organic farming yields are lower than in traditional farming, and the special problems in organic wheat are related to the protection from pests and diseases. In conclusion, besides the problems met, growing wheat organically has a primary advantage of getting pure product while also protecting the environment.

## **Evaluation of Recombinant Lines in Tomato for cultivation under Low Input conditions**

**Rafail Tagiakas<sup>1</sup>, Athanasios Mavromatis<sup>1</sup>**

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In the framework of this research, 20 tomato recombinant lines (RLs) derived from F1 commercial hybrids (Formula, Elpida, Iron και Sahara) after application of Classical Reverse Breeding, where evaluated for their productivity and adaptation to low input farming condition. Randomized Complete Block Design with 3 replications was applied, using recombinant lines in comparison to F1 hybrids and landrace Macedonia to compare according to yield components and physicochemical characteristics.

The experiment was performed at the farm of Aristotle University of Thessaloniki, during the growing season (2015-2016), at open field conditions. The plant material included 20 recombinant lines in advanced generations, which were derived after: (a) pedigree selection (F5) in to hybrids Formula and Elpida (b) recurrent selection (HS6) in two hybrids Iron and Sahara.

The experimental measurements and observations were applied for early harvesting and for total production, which referred to yield components (earliness, total yield, total fruit number per plant, total fruit weight). In addition, the quality characteristics (total soluble solids, dry matter, shape of fruit, etc.) and the nutritional value (lycopene, total antioxidant capacity), were estimated.

The results of our research indicated that 14 recombinant lines, were selected which had high adaptation to low input cultivation and are considered suitable for organic farming. Furthermore, these lines in many cases were characterized by equal or over yield to commercial tomato hybrids and high fruit quality according to physiochemical and nutritional characteristics.

## **Food forest: Innovation in edible landscaping**

**Mizrukhina Ya.V.**

Agricultural and Technological Institute RUDN, Moscow

Food forest is a designed agronomic system based on fruit and nut trees, bushes, herbs, vines and perennial vegetables. The idea is to create an agroforestry system based on woodland ecosystems, utilizing multiple layers and making the most of both horizontal and vertical spaces. All the plants in food forest are chosen and arranged so that they complement and support each other. In this way a food forest provides a low-maintenance sustainable food production.

## **Residual effect of sewage sludge stabilized with steel making slag on certain soil properties**

**Athanasios Balidakis** and Theodora Mats

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Aristotle University of Thessaloniki, 54124, Thessaloniki, Greece

The residual effect of sewage sludge stabilized with steel making slag on certain soil properties was evaluated, after a pot experiment with winter wheat (*Triticum aestivum* L.).

Dewatered sewage sludge [75 % (wet weight basis)] stabilized with steelmaking slag (25 %) was added to three soils with different pH (acid, neutral and alkaline). The treatments which were applied to the three soils were: 1) addition of 3 % sludge ( $\approx 120 \text{ Mg ha}^{-1}$ , rate equivalent to the common inorganic N fertilization for wheat, based on sludge's water soluble  $\text{NO}_3\text{-N}$ ), 2) addition of 1 % sludge ( $\approx 40 \text{ Mg ha}^{-1}$ , rate equivalent to the common inorganic N fertilization for wheat, based on sludge's Kjeldahl-N), 3) addition of the common inorganic N fertilization for wheat ( $120 \text{ kg N ha}^{-1}$ ) as  $\text{NH}_4\text{NO}_3$ , 4) no fertilization (control). Wheat was grown in the soils in pots and harvested twice. At the end of the pot experiment, the treated and untreated soils were air dried, passed through a 2-mm sieve and were used and analyzed in the context of the current study. For each soil property, determined within the same soil, ANOVA was conducted using the statistical package SPSS, version 22 and the LSD test, at  $p \leq 0.05$ , was used for mean comparisons.

As it was evidenced from soil analysis conducted prior to the pot experiment, total concentrations of the seven heavy metals, which regulate the agronomic use of sewage sludge according to the Greek and European legislation, ranged from non detectable to lower than the respective permissible levels. After the pot experiment, the soil pH,  $\text{EC}_{\text{se}}$  and available  $\text{NO}_3\text{-N}$  and P remained significantly increased in both sludge's treatments in comparison to the other two treatments. In all cases, pH did not exceed the critical value of 8.5, whereas  $\text{EC}_{\text{se}}$ , although it did not reach the salinization limit of  $4 \text{ dS m}^{-1}$ , remained above the value of  $2 \text{ dS m}^{-1}$  at the sludge application rate of 3 %.

Although various trends in the concentrations of the available metal micronutrients were evidenced upon the stabilized sludge application to soils, at the end of the pot experiment, in all cases the concentrations of Cu and Zn ranged at levels similar to, whereas the concentrations of Fe and Mn were higher than the critical levels reported in the literature. As far as the available B is concerned, it remained significantly increased at the sludge's application rate of 3 % in all soils. Although in all cases B ranged at levels similar to the critical levels, the doubling or even tripling, in certain cases, of the initial B concentration with just one application of sludge at the aforementioned rate is somewhat concerning, since B deficiency-sufficiency-toxicity ranges are too close to each other.

Combining the results of the present study with those of a previous study regarding the pot experiment with wheat, it was concluded that crop's N needs and sewage sludge's Kjeldahl-N concentration seem to determine the most appropriate application rate of sewage sludge to soil, in respect to the improvement of both soil fertility and crop's growth, with all drawbacks to be excluded.

**Keywords:** nitrogen, sewage sludge, soil fertility, soil salinity, steelmaking slag, wheat

### ***In vitro* regeneration, rooting and acclimatization in tomato**

**V.S. Titeli, I. Nianiou-Obeidat\***

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Tomato is one of the most important economical vegetable crops in the Solanaceae family grown throughout the world. Moreover, it has been grown in a wide range of environmental conditions due to many biotic and abiotic stresses. In the present study, attempts have been made to develop an efficient protocol for regeneration of two Greek tomato cultivars 'Macedonia' and 'Areti'. Development of protocols for *in vitro* regeneration can provide new advances for the production of high quality mass propagation material via tissue culture. The frequency of shoot formation was influenced by the type, age and concentration of phytohormones used. Significant differences were observed between the cultivars in the mean number of the regenerated shoots produced from the different explants. The *in vitro* rooted plants were transferred to environmental conditions for acclimatization. A good *in vitro* plant regeneration system may also assist in further improvement of the commercially important tomato varieties.

### **Effect of host plant on the predatory mite *Phytoseiulus persimilis***

**Stella Kontzidou**, Georgia Brachou, Anastasia Kokkari, George Floros, Nikolaos Kouloussis  
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Host plant chemicals and architecture may influence predator development and reproduction, by affecting both the predator and the prey. We studied the effects of bean and tomato leaves on the pre-imaginal (immature) development, longevity and reproduction of two populations (a Greek and an imported one) of the predatory mite, *Phytoseiulus persimilis* Athias-Henriot (Acari: Phytoseiidae). Eggs of the plant feeding mite *Tetranychus urticae* Koch (Acari: Tetranychidae) were offered as prey on the surface of the leaves. The developmental period from egg to adult of the predatory mite varied depending on the host plant, being significantly longer on tomato than on bean plants. In addition, predator egg production was significantly higher on bean than on tomato leaves. Moreover, on both bean and tomato leaves, predator females of the Greek population lived longer than the females of the imported population. Our results suggest that plant characteristics should be considered, along with other factors such as the origin of population, in biological control programs.

### **GIS applications in agricultural economics**

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Geographical information systems (GIS) are important tools for all the fields of agricultural sciences. Except from the production sector, the agricultural sciences include the fields of agricultural development, planning and economics. Especially in agricultural economics where decision making is crucial, the GIS are incredibly helpful as decision support tool, both in economic research and sociology but also in marketing and agricultural policy issues. The aim of this paper is to present the main GIS applications in the field of agricultural economics through a literature survey. A number of GIS applications in agricultural economics were analysed and classified according to their use. The results show the importance of the GIS in agricultural economics and the continuous evolution of their uses.

**Keywords:** Geographical Information Systems (GIS), agricultural economics, classification.

## **The creating agrochemical cartograms of the land**

**Barinova A. A.**

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As you know, it is necessary to construct the traverse system with one nodal point in order to create the geodetic control of the farm. This work is based on transitional system of measuring angles for constructing tacheometr traverse, which is used to prevent reduction and centering errors. The obtained data was composed after cameral processing for further laboratory analysis. The results will be used to create the system of rectangular coordinate of centers of squares. This coordinates allow taking necessary samples soil to research about the concentration of mobile phosphorus, potassium, nitrogen and acidity. Finally, we are able to calculate the amount of fertilizer required for each elementary cell of a field depending on the cultivated crops.

## **Evaluation of spatial interpolation methods for mapping the degraded soils of Xanthi (Greece)**

**Evdokia Karastogianni<sup>1</sup>, George Bilas<sup>2</sup>, and Thomas Alexandridis<sup>1</sup>**

<sup>1</sup> Lab of Remote Sensing and GIS, Faculty of Agriculture, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece

<sup>2</sup> Lab of Applied Soil Science, Faculty of Agriculture, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece

Soil surveys employ interpolation of point measurements that provides spatial distribution of information for the full study area. However, no specific interpolation method is determined for each soil parameter. The aim of this thesis was to identify the optimum interpolation method and its parameterization to improve mapping of degraded soils of Xanthi agricultural land. Electrical conductivity (EC), exchangeable sodium percentage (ESP), cation exchange capacity (CEC) and pH measurements from 598 soil samples were used. Inverse distance weighted (IDW) and spline interpolation, as well as the power of IDW were evaluated. IDW with power 3 was proved as the most accurate method. Using thresholding, we identified the spatial distribution of saline, sodic, and acidic soils of the study area. Furthermore, degradation sources were identified, including parent material and inappropriate fertilization for acid soils and irrigation with saline water for alkaline soils. The results enabled us to propose amelioration measures and agricultural practices, according to degradation types and levels. The data were provided by the project "Soil Map of Eastern Macedonia and Thrace".

## **The estimation of accuracy for ortophoto, obtained from an unmanned aerial with a wide-angle camera**

**Volikhina A. A.**

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My research is dedicated to unmanned aerial vehicle, more precisely about the errors that may occur. The aim of my work is the study an unmanned aerial vehicle and in which land categories it can be used. This research is held in the terrestrial survey area of RUDN University. In the research I used electronic total station Leica TS09 plus and unmanned aerial vehicle DJI phantom 2 vision plus. In my work I used the program complex CREDO – CREDO\_DAT 3.0. and Agisoft Photoscan. The resultat of my study shows that it is possible to use the unmanned aerial vehicle DJI phantom 2 vision plus in different lands, such as agricultural lands and others.

## **Harmonization of Forest Management Data**

**Dimosthenis Grigoroudis\*1**, Dimitris Iatropoulos<sup>1</sup>, Christos Kalogeropoulos<sup>1</sup>, Thomas Katagis<sup>1</sup>, Ioannis Z. Gitas<sup>1</sup>

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The main aim of this study is the creation of a homogenized digital database which incorporates geographic and descriptive data derived from all available forest management plans, within the administrative boundaries of Lagadas and Chalkidiki Forest Services. The main objectives were the collection, pre-processing and preparation of the raw data.

The work was based mainly on the use of G.I.S tools and techniques. More specifically, a methodology for the classification and harmonization of the collected data was developed. The methodology aimed in the harmonization of both the data format (for example, from AutoCad or Geotiff to Shapefile) and the descriptive data (creation of common characteristics and attributes).

The final product will be integrated in the WebGIS application of the National Observatory of Forests, a project which delivers an inventory of all available forest management plans of Greece, and that ensures accessibility of the digital forest data through web-based services.

*Keywords:* G.I.S., forest management, WebGIS.

## **The analysis of time series for deformations of the local satellite geodetic network**

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Our research is an attempt to identify a relationship between external events and changes in parameters of a satellite geodetic network.

For this analysis satellite observations were received using SOPAC IGS International Service from four stations of the present network for 2015. With the time series of seismic activity, solar activity, temperature and pressure graphs were constructed. These graphs are a comparison between dilatation changes and changes of the aforementioned parameters.

Based on the results of our analysis we can conclude that the strongest seismic events (including remote ones) and meteorological parameters have an effect on the results of satellite geodetic measurements.

## **Evaluation of spectral indices efficiency in burned area mapping using Object-Based Image Analysis**

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Forest fires are an integral part of Mediterranean ecosystems and a key factor in forest fire management. Accurate information regarding the spatial extent of burned areas is essential for the quantification of the environmental impact of forest fires while at long term such information could be used in improving existing forest fire management plans.

The aim of this study is to evaluate the efficiency of several spectral indices in burned area mapping using object based image analysis (OBIA) and medium (Landsat5 TM - 30m) and very high (IKONOS pansharpened - 1m) resolution satellite imagery. In the case of the pansharpened IKONOS the Soil Adjusted Vegetation Index (SAVI), the modified Soil Adjusted Vegetation Index (mSAVI2) and the Normalized Difference Vegetation Index (NDVI) were used, while in the case of Landsat 5 TM the Char Soil Index (CSI) and the Normalized Burn Index (NBR) were additionally employed. The multiresolution segmentation algorithm was selected and applied to all layers generated from the computation of the aforementioned spectral indices. Training samples were defined based on the multispectral pansharpened IKONOS image and used in the classification process in all different cases. Results are statistically and spatially compared with the official burned area perimeter provided by the National Forest Service.

*Keywords:* remote sensing, forest fire management, burnt area mapping, object-based image analysis (OBIA)

## **Interpretation of planar soil erosion according to the data obtained with the use of uav**

**Li K. A.<sup>1</sup>, Vernyuk Yu. U.<sup>2</sup>, D. Parpura<sup>1</sup>**

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<sup>2</sup> Soil Institute. V.V. Dokuchaeva

The purpose of this research is to determine the optimal altitude of the UAV shooting for the purpose of eroded arable soils' interpretation. The results of the search concerning the optimal altitude of unmanned aerial vehicle shooting for the planar erosion of arable chernozem soils interpretation in the key area of the Tula region by using the ILWIS 3.3 software, are presented. Shooting from an altitude of 183-195 meters above the field surface is identified as optimal for the research area.

## **Object-Based Image Analysis of Ikonos-2 imagery for the composition of Land Cover and Land Use Maps of Spatial Planning Interest**

**Doundoulakis, D. Kaimaris**

Main objective of this project is the usage of intelligent Object-Based Image Analysis software, to effectively identify and extract land cover/usage information in a semi-automated manner, constructing a multi-level LCLU cartographic background to be used in spatial planning.

The core of the presentation includes an introduction to the OBIA concept, general capabilities of the used software (e-cognition<sup>®</sup>), elaboration on the method and general tactic used, and a demonstration of results produced on a subset of the west metropolitan area of Thessaloniki. This application takes place within the thesis of the Spatial Planning and Development School's student Mr. I. Doundoulakis, under the Assistant Professor Dr. D. Kaimaris' supervision.

Attention will be given to the multi-level design, which is necessary in spatial planning maps of regional range, to its achievement using the OBIA approach, and to effective isolation methods of demanding classes, such as the "Urban Fabric" and its composition.

## **The application of new technologies in Remote Sensing and the use of Augmented Reality (AR) method, resulting in the digital 3D navigation in the municipality of Thessaloniki**

**Giaples Georgios, Kaimaris Dimitrios**

The presented project was conducted by Mr. Giaples Georgios, undergraduate student of spatial planning and development department of AUTH, under the supervision of the assistant teacher Mr. Kaimaris Dimitrios. It discusses the applications of New Technologies in the science of Remote Sensing and introduces Augmented Reality (AR) which was used in order to convert static 2-dimension maps into 3-dimensional digitized models that will allow the navigation of the user in every part and building of the municipality of Thessaloniki. To complete the above project, the following digital programs were used; Erdas Imagine, for the production of Orthophotographs and 2D map, Arc GIS for the analysis and allocation of the data (altitude of floors and outline of buildings), Arc Scene for the creation of the 3D map based on the above data, Blender for the conversion of the produced model in archive (obj) suitable for Unity platform and finally, use of the Unity platform for the creation of maps in AR format that will be used for the production of an application that is going to be compatible with Android and iOS devices. The presented attempt resulted in the successful creation of 3D maps of the municipality that will be used for the production of mobile applications that are expected to receive great correspondence in the fields of Topography, Spatial Planning and Civil Engineering.