

## ABSTRACTS

### ANALYSES OF SOIL HUMUS DINAMICS BY FRACTAL METHODS

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Fractal methods were used to analyse the experimental data on soil organic matter. Using these methods the predictions were made for the development of soil organic matter status in the studied soils.

**Key words:** biophysics, soil, humus, fractal analyses, methods.

### MODELLING THE WATER-RETENTION CURVE BASED ON THE CONCEPT OF CAPILLARY HYSTERESIS AND LOGNORMAL PORE-SIZE DISTRIBUTION OF SOIL: THEORY

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The mathematical model of the soil hysteretic water-retention capacity is offered. The model describes the main and scanning curves of the soil wetting and drying as well as the reversal points. As a theoretical basis of the model a concept is used, according to which the function of differential soil moisture capacity at every point on any of the hysteresis curve takes only two values that correspond to the sorption and desorption equilibria of the water in the soil. This concept is in harmony with the ideas about the form of the curves forming the hysteresis loop of the water-retention capacity of the soil and does not create the undesirable "pumping effect". The model parameters are physically interpreted within the concepts of capillarity and lognormal distribution of the effective pore radii in the soil.

**Key words:** differential soil water capacity, soil water retention curve, capillarity, hysteresis loop, isotherm of soil water thermodynamic state, lognormal distribution of effective pore radii, air entry pressure, water entry pressure.

### DISTRIBUTION OF SOIL AGGREGATE DENSITY

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Based on the experimental data on the porosity of different soil aggregates layers and using the theory of fractals the distribution of aggregate density was studied for aggregates 4-6,3 mm and 6,3-9,5 mm in size for two different soil types.

**Key words:** density of soil aggregates, fractal model, density distribution.

## **DYNAMICS OF DISSOLVED ORGANIC MATTER AND ITS DISTRIBUTION IN SOIL PROFILES OF LOAMY–SAND SPODOSOL WITH DIFFERENT FERTILITY LEVELS**

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Dynamics of the total organic matter and dissolved organic matter in the topsoil of loamy-sand Spodosol with low end high levels of soil fertility were studied during one growing season. The distribution of water-dissolved organic matter was also studied within soil profiles of the same soils. It was shown that the content of the dissolved organic matter in the soil increased with increasing level of soil fertility.

**Key words:** Spodosol, dissolved organic matter, soil fertility, topsoil, soil profile.

## **THE EFFECT OF NUTRIENT SOLUTION COMPOSITION ON TOMATO PLANT PRODUCTIVITY IN THE LOW-VOLUME CULTIVATION IN CONTROLLED AGROECOSYSTEM**

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The effect of nutrient solution composition on tomato plants growth and productivity was studied in the low-volume cultivation experiment in controlled agroecosystem. Several nutrient solutions were studied. It was shown that between most of the compared solutions there was no difference in tomato yields but the combination of two nutrient solutions developed by the authors was statistically better than all the others and resulted in higher tomato yields.

**Key words:** low-volume technology, tomatoes, nutrient solution, productivity, controlled agroecosystem.

## **PHOTOMETRIC DEVICE TO STUDY OPTICAL PARAMETERS OF DIFFERENT TECHNICAL AND BIOLOGICAL OBJECTS**

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The article describes the photometric device allowing registration of electric signals to describe optical parameters of different technical and biological objects. The effect of direct light with different wave lengths on the studied objects is being measured. The specially developed computer program allows registration of all the measured signals.

**Key words:** photometer, object parameters, light reflection and absorption.

## **ABOUT SOIL AMELIORATION IN ARCHANGEL REGION**

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The article contains historical information on soil amelioration in Archangel Region. The analysis of the present status of the soils in the area is also given. It is stated that 36% of the ameliorated land is not being used in the present agriculture, 33% are reverting to wetlands and 22% are overgrown with bushes.

**Key words:** soil amelioration, agriculture, wetlands, monitoring.