

ABSTRACTS

MEASUREMENT OF SOIL TOTAL ORGANIC CARBON CONTENT WITH OXIDATION METHOD AND BY REGISTERING THE AMOUNT OF CARBON DIOXIDE RELEASED

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The soil total organic carbon content was measured by using the wet oxidation method (Tjurin's method) and by registering the amount of carbon dioxide released. Several agricultural soils as well as native soils were studied. The soil samples were collected in Belogorka (Leningrad region) and Borki (Novgorod region). Twenty six soil pits with soils under different land use were described: arable soils, and soils from allotments, greenhouses, leas, grasslands and forests. Based on the results of the measurements the level of inter-molecule oxidation of the soil organic matter was calculated. It was shown that the results received for the same soil by the two methods could differ quite a lot. The difference was explained by the level of inter-molecule oxidation of the soil organic matter in the studied soils. The results demonstrated that down the soil profile together with increasing level of inter-molecule oxidation of the soil organic matter the amount of soil total organic carbon was decreasing. The level of inter-molecule oxidation of the soil organic matter was affected by such parameters as soil texture, soil mineralogical composition, plant residue composition and climate parameters.

Keywords: Spodosols, soil total organic matter, oxidation method, carbon dioxide release, level of soil organic matter inter-molecule oxidation.

LARGE-SCALE SOIL MAP OF MENKOVO RESEARCH STATION OF THE AGROPHYSICAL RESEARCH INSTITUTE

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The results of large-scale soil survey of the Menkovo Research Station of the Agrophysical Research Institute are being presented in the paper. The "profile-genetic" classification of Russian soils was used for the soil description and classification.

The large-scale map has been produced with soil and sub-soil genetic types and sub-types for the whole area of the Menkovo Research Station. The scale of the map is 1:7500. The paper also presents the main steps for the large-scale soil mapping.

Keywords: large-scale soil mapping, soil map, soil types and sub-types.

DYNAMIOC REACTION OF *STEVIA REBAUDIANA BERTONI* (L.) ON THE CHANGES IN PHOTOPERIOD AND SOIL MOISTURE

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New plant – *Stevia rebaudiana Bertoni* (L.) – is being used to produce sugar-substitutes for food production. The reaction of this plant on changes in photoperiod and soil moisture was studied by classical method of phytomonitoring in controlled conditions. To characterize the plant physiological condition the complex of water exchange parameters, including the dynamics of leaf turgor, was analyzed. The results have shown that there was the plant dynamic adaptation to the changes in the periods of light and darkness, which was identified by the in-advance changes in the leaf thickness. Changes in the photoperiod result in the changes in the regular daily leaf turgor curve which was formed before the changes started. It was shown that the plant had low draught resistance and would keep a high level of transpiration even when the soil moisture was at low level.

Keywords: phytomonitoring, plant water exchange, controlled agroecosystem, photoperiod, Stevia.

STRATEGICAL LEVEL IN PRECISION AGRICULTURE MANAGEMENT

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Based on the classical control theory of stochastic dynamic systems the problem of the chemical state of soils management in crop rotations was formulated and solved. The management is the optimal strategy for mineral fertilizer application for all the years of a crop rotation and a correctiv management for the first year of crop rotation (which takes into account the spatial inhomogeneity of the soil chemical properties). The novelty of the mathematical solution of the problem is application of the methodology and technology of precision farming, which allows to apply the results in practical agriculture.

Keywords: chemical state of the soil, chemical fertilizers and ameliorants, mathematical models of crop losses, the model dynamics of the state, the average risk optimality criterion, the strategy of chemical fertilizer application, management.

EFFICIENT COMPENSATIVE LAND DEVELOPMENT INSTEAD OF REMOVAL FROM AGRICULTURAL USE

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The paper provides the information on the methods for determining the ecological and economic efficiency of compensative land development instead of land removal from agricultural use. The principles of ecological and economic evaluation of the compensative land development are proposed. The indicators and performance criteria of innovative reproduction of soil fertility are identified.

Keywords: ecological and economic evaluation, soil fertility, ecological safety, agricultural production, natural resources, sustainable development.