

ABSTRACTS

DIRECT NITROUS OXIDE EMISSIONS FROM PASTURES OF NORTH-WESTERN PART OF RUSSIAN FEDERATION

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Two pastures – one in St. Petersburg region and the other in Karelia – with areas of high, medium and low grazing impact were studied to evaluate the effect of cow grazing on direct N₂O fluxes. All the measurements were conducted during the grazing period (May – September) of 2010, which was very dry. N₂O cumulative fluxes increased with increasing grazing impact. The highest N₂O cumulative fluxes for the grazing period were measured from the areas with high (0,9 and 2,7 kg N₂O-N ha⁻¹ for St. Petersburg and Karelia pastures, respectively) and medium (0,4 and 0,7 kg N₂O-N ha⁻¹ for St. Petersburg and Karelia pastures, respectively) grazing impact, while the areas with low grazing impact emitted only about 0.2 kg N₂O-N ha⁻¹. The N₂O fluxes were affected by such soil properties as soil moisture content, bulk density and available N content. For the areas with high grazing impact all these soil parameters were much higher than for the other areas.

Key words: Nitrous oxide, grazing impact, weather conditions, soil bulk density

IDENTIFICATION OF EMPTY AND PLUMP SEEDS OF SPRUCE FIR BY X-RAY AND GAS DISCHARGE VISUALIZATION METHODS

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The comparative study of spruce fir (*Picea abies* L.) seeds' quality was carried out using X-Ray and gas discharge visualization methods. The obtained data indicated that the empty seeds investigated by the gas discharge visualization method do not show gas discharge glow in contrast to the plump seeds. The empty seeds investigated by X-Ray method show lower level of brightness compared to plump ones. The results indicated that both X-Ray and gas discharge visualization methods can be applied as reliable tools for identification of empty and plump seeds of spruce fir.

Keywords: X-Ray, gas discharge visualization, seeds, spruce fir, *Picea abies* L.

SPATIAL VARIABILITY OF HYDROPHYSICAL SOIL PROPERTIES IN PLANT PRODUCTION PROCESS MODELLING

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The approach to taking into account the spatial variability of soil properties during decision making in adaptive landscape farming technologies has been presented. The approach is based on the quantitative indicators of plant production process (wheat crop), obtained by using a dynamic model of the production process of agricultural plants called "AGROTOOL". The studies were conducted in an environment of a special software package that is based on the integration of the dynamic model "AGROTOOL" and GIS. A scheme of the proposed approaches for the decision-making information support of the production management process has been presented. Computer simulations data are presented that allow identifying the conditions under which the existing variability of hydro-physical characteristics affects the plant production process or when this effect disappears.

Keywords: GIS, the dynamic model of the plant production process, hydro-physical properties of soil.

MODELING THE MAIN DRYING AND WETTING BRANCHES FOR HYSTERESIS LOOP OF SOIL WATER RETENTION

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The mathematical model of main drying and wetting branches for hysteresis loop of soil water retention is developed. Model parameters are interpreted using the concepts of soil being a capillary-porous medium. It has been suggested to use the lognormal distribution of effective pore radii and factors of physical soil properties for model parameters' adequate assessment.

Keywords: differential soil water capacity, soil water retention curve, capillarity, hysteresis loop, lognormal distribution of effective pore radii.

CORRECTIONS OF THE LARGE-SCALE MAP OF THE MENKOVO EXPERIMENTAL STATION OF THE AGROPHYSICAL RESEARCH INSTITUTE

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The large-scale soil map of Menkovo Experimental station, compiled in 1976, was corrected in 2011 and 2012. The changes to the map were necessary as a very detailed map was needed to be used at the station for adaptive land use planning and for precision agriculture. These activities depend on the availability of reliable, detailed soil survey information which may indicate what a discrete area of land contains. The new map shows the distribution and areas of soil units in scale 1:10000. The general description of the surveyed area, physical features of the area, main factors affecting soil development and main soil physical and physicochemical properties are described in the soil database.

Keywords: Menkovo Experimental station, large-scale soil map; soil database.

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