

ABSTRACTS

BIOCHEMICAL ACTIVITY OF SOIL UNDER INCREASING RATES OF MINERAL FERTILISERS

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The data on fractional structure of nitrogen compounds, enzyme activity of carbamide-amide hydrolase and asparagine-amide hydrolase in the light-textured Spodosol under increasing rates of mineral fertilisers in a seven-field crop rotation are presented in the paper. The amount of N in such nitrogen compounds as ammonium, hexosamines, and aminoacids were measured in the soil during a growing season in a field experiment. The data on the total N content as well as on hydrolyzed and not hydrolyzed forms of nitrogen in the soil are also presented. The temperature factor of the carbamide-amide hydrolase reaction and its dynamics is given in the paper for the field with barley as an example.

Keywords: fractional structure of nitrogen compounds, carbamide-amide hydrolase, asparagine-amide hydrolase, temperature factor of enzymic reaction, fertilizer rates.

THE PROBLEM OF ENVIRONMENT LIMITING FACTORS INTERACTIONS WHEN THE PRODUCTIVE PROPERTIES OF PLANTS ARE BEING FORMED. WHO IS RIGHTS – JUSTUS LIEBIG OR RONALD FISHER?

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The problems of interaction between the environment limiting factors „cutting“ plant productivity and yields, the importance of identification of the environment limiting factors in agrophytocoenoses as well as of the frequency these factors change at different plant development phases and during the day are being discussed in the paper. The necessity in finding the dynamics of the main a-biotic environment limiting factors for typical years for different regions of cereal production as well as in assessing optimal intervals for plant growth and development at different stages of ontogenesis and day growth is shown.

The outline of the fundamental research project for stable, from year to year, cereal yield growth is given.

Keywords: limiting factors, autostabilisation, changes of limiting factors, limiting factor identification, the ways to remove limiting factors.

METHODICAL WAYS FOR SIDE-SPECIFIC NITROGEN FERTILIZER APPLICATION FOR SPRING WHEAT

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Optimization of mineral fertilizer application in general, and N-fertilisers in particular, combined with the necessity to reduce the ecological load on agricultural landscapes should result in finding new methods for mineral fertilizer use in agriculture. The paper presents methodical ways of side-specific N-fertiliser application during the growing period. The methods are based on optical characteristics of crop fields. The effects of different ways of N-fertilizer application on the spring wheat yield formation and grain quality are described.

Keywords: precision agriculture, spring wheat, mineral N-fertilisers.

STOCHASTIC MODELING AND OPTIMAL DECISIONS WHEN LIMING SOILS

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A new approach based on scholastic models and methods for making a decision of the optimum lime rate for soil liming is presented. The optimum decision corresponds to a distribution quantile of optimum lime rate which can be effectively used by the soil – crop system. Generally the optimum decision can be found from the solution of nonlinear

equation with a numerical method application. For a number of distributions, for example for normal distribution, the decision is found from statistical tables under condition of an unknown parameter being preliminary estimated. The procedure of risk analysis of possible economic losses has been conducted.

Keywords: soil liming, biologically-proved lime rate, stochastic modeling, optimum decision, distribution function.

THE STRUCTURE OF INFORMATION SUPPORT FOR CROP-PRODUCTION MODEL

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The usage of the crop production model encounters the significant difficulties connected with absence or incompleteness of the initial information. The results of this article allow expanding considerably a scope of this model because missing data are being estimated by means of accessible experimental data. The presented approaches make it possible to initialize model, i.e. to transform the information containing at a stationary database and to save the full data set, which is necessary for implementing the computing experiment, to an operative database.

Keywords: simulating dynamics of agroecological system, databases, information support.

DEMONSTRATIONAL EXPERIMENT IN THE SYSTEM OF A TEST CASE METHODS

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This paper represents a historical overview of the demonstrational experiment development as a research method and shows its place in the classification of experimental methods. The demonstration experiment can be identified as an independent method, which can be used in field and laboratory experiments as well as in experiments in managed or regulated agro-ecosystems (RAES).

The objectives of a demonstration experiment include promotion of innovations and their introduction into practice, training in new technologies, technical tools and so on, helping to acquire the new knowledge by visual comparison with what is already being used in agricultural production. The demonstration experiment is the last link in the chain between generation of the idea and its implementation into production. Transfer of innovation model in the «innovative development – manufacture» system can be changed and transformed into «an innovative development – work experiment – production», «innovative development – manufacturing experiment – demonstration experiment – production» models. This allows to inform a wide range of potential consumers of innovative developments about their qualities and potential benefits.

Determination of the place, conditions and requirements for a demonstration experiment: 1) the number of the experiment's variants can vary from two to several dozen, depending on which factors are studied in the experiment; 2) only one repetition of the experiment can provide a comparison of researched variants; 3) the area under study is determined by the factor which is studied by the experiment and can vary from 1 m² to several hectares; 4) the area under study should be rectangular in shape, and the ratio of width and length of its sides we can choose not to consider; 5) the experiment may be performed within one year, its repetition over time is not necessary. The method of the demonstration experiment presented in this paper, allows not only to unify the experiments which demonstrate effectiveness of innovation, but also to formalize them as one of the methods of experimental work.

Keywords: demonstrational experiment, field experiments, innovative works, adoption to practical agriculture.