DSSAT localization experience for modeling the production process of winter wheat on Arable Sod-Podzolic soils of the Central region of Russia

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Introduction. The study describes the preparation of information required for the adaptation of the DSSAT v 4.5 CSM when creating the agroecological model of the production process of winter wheat on arable sod-podzolic soils of the Central region of Russia.

Objects and methods. The minimum required to create the model input data were obtained as a result of agro-ecological monitoring of winter wheat crops in 2016-2017 at the Precision Farming Experimental Field of the Russian Timiryazev State Agricultural University (RTSAU: 55°50"14'N, 37°33"52'E) situated in Moscow, Russia. The experimental site has a temperate and continental climate and situated in south taiga zone with arable sod-podzolic soils (Albeluvisols Umbric) that had around 1% of SOC, pH 5.4(KCl) and NPK medium-enhanced.
Data included detailed information on soil properties, agrotechnological activities, the system of fertilizers application and climatic parameters, including diurnal temperature dynamics, PAR, etc. – obtained during the growing season at automated station operating according to the Eddy Covariance method.
To estimate the parameters of growth and development of winter wheat measurements were made at 24 fixed points according to the phases of plant development. The plants height and density, as well as LAI were measured. The coordinates of all sampling points were recorded using the GNSS. The data were analyzed both for specific points where the measurements were made, and for plots and fields as a whole.
In the latter case, the results were obtained by interpolation based on images obtained with a Canon camera mounted on the custom-made UAV from 100m height.

Results. As a result of the carried-out research, the so-called "genetic coefficients» were estimated for the "L1" type of winter wheat. The development of winter wheat plants from the tillering phase to the flowering phase was of linear character and was described by linear regression equations (R^2 = 0.98-0.99), and depended on the type of treatment: with the no-till technology, plant development occurred faster than with till technology. The structure of the yield was analyzed.
The weight of grain from thirty spikes and the weight of 1000 grains were greater on the no-till technology as compared with the till technology: the averages are 37.5 g and 45.9 g, as well as 30.4 g and 41.3 g, respectively.

Conclusions. As a result of field studies in 2016-2017 the interval parameter estimates were obtained for the agroecological model of the production process of winter wheat on sod-podzolic soils in the conditions of Central Russia.