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ECOLOGICAL AND HYDROLOGICAL STATE AND PRODUCTIVITY OF DRAINED SOILS IN THE AGRICULTURAL LANDSCAPE OF THE SAMBIAN PLAIN

O. A. Antsiferova, D. N. Safonova

Kaliningrad State Technical University, 1, Sovetskiy pr., Kaliningrad, 236022

The study was conducted in 2017–2020 in the agrolandscape of the hilly-morainic plain (western part of the Kaliningrad region). The porosity of aeration and the redox potential of the arable horizon of the drained soils were determined on various relief elements in autumn (during the initial phases of growth of winter crops) and in spring (during the resumption of winter crops vegetation and the sowing of spring crops). Gleyic Cambisols (Aric, Loamic, Drainic) on hilltops are characterized by a favorable redox environment and optimal aeration conditions in the arable layer. The biological yield on autonomous relief positions was 5.64 t ha^{-1} in grain units on average over four years of the research. A decrease in crop yields by 6% in years with favorable weather conditions and up to 34% in years with extremely wet weather conditions (by 15.4% on average for 2017–2020) was noted on the Gleyic Cambisols due to erosive losses of nutrients and the influence of perched waters. Gleysols (Aric, Siltic, Drainic) of open depressions are characterized by a slightly unfavorable redox environment and insufficient aeration in the arable layer during the beginning of the growing season of agricultural crops. The yield level of crops grown on these soils was most unstable and depended on the variation in the amount of precipitation in autumn. The decrease in productivity was on average 24.7% per crop rotation compared to Cambisols on hilltops. Closed depressions are centers of systematic death of agricultural crops at the seedling stage due to unfavorable environmental and reclamation conditions in the arable horizon (recovery environment, aeration porosity below 10%, periodic flooding). The gross productivity of the field depends on the geomorphological conditions, the proportion of soils of varying hydromorphism degrees in the composition of the soil cover, and the reclamation state of the drained soils. The obtained results can be used to predict crop losses due to waterlogging under conditions of contrasting soil cover and heterogeneous relief.

Key words: air porosity, red-ox potential, drained soils, soil diversity, yield.