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Influence of the soil penetration resistance, bulk density and moisture on some components of winter wheat yield

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abstract The influence of bulk density, penetration resistance and moisture content in the upper layers of soil profile (0-25 cm) on variability of yield components of four winter wheat cultivars was studied. Experiments were carried out on soil of good rye complex. Analyzed were following features of the yield structure: height of plants, number of ears on a square meter, number and weight of grains in an ear, length of ear and weight of 1000 grains. Variable temperature and precipitation during the vegetation period were found to have brought about considerable differences in variability of physical soil features analyzed. Analysis of multiple regression proved that the wheat yield was most dependent on the weight of grains in an ear. Less influence was of 1000 grains weight, number of ears on a square meter and number of grains in an ear. Partial correlation coefficients of penetration resistance and moisture pointed to negative relationship between physical soil features and the wheat yields. The analysis of canonical correlation showed that variability in the yield components studied depended up to 47% on three basic physical parameters of soil. The greatest influence on variability of the yield components was exerted by moisture and then by penetration resistance of soil. Decreased soil moisture brought about mainly a reduction in the number of ears on a unit of area.

keywords penetration resistance, moisture, soil bulk density, yield components