

INFLUENCE OF INTENSIVE AGRICULTURAL TECHNOLOGIES ON SOME AGROBIOLOGICAL AND AGROPHYSICAL PROPERTIES OF CHERNOZEM SOILS IN THE WEST SIBERIAN FOREST-STEPPE

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The study was conducted in a long-term stationary experiment (established in 1973) within a grain-fallow crop rotation (clean fallow – wheat – wheat – wheat – barley) at the Omsk Agricultural Scientific Center. The research aim was to determine the influence of intensive agricultural technologies on the fertility and agrophysical properties of chernozem soil in the West Siberian forest-steppe. The soil of the experimental plot is slightly leached, medium-humus, medium-thick, heavy loamy chernozem. A two-factor experiment included: Factor A – soil tillage system (moldboard plowing to 20–22 cm, shallow non-moldboard tillage to 10–12 cm, «zero» tillage – direct seeding without mechanical cultivation, replaced by herbicide application), Factor B – agrochemicals (control without any agrochemicals (control K) – extensive level; application of fertilizers, herbicides, insecticides, and fungicides (FHIP) – intensive level). Over the research years from 1974 to 2024, 9 years were dry, 4 years were moderately moist, 4 years were normally moist, and the rest were medium-dry. It was determined that under intensive technology, the humus content in the upper (0–20 cm) layer exceeded the extensive level by 0.31%, the soil structure coefficient in the 0–10 cm layer increased 1.5 times, the content of water-stable soil aggregates increased 1.1 times, and soil fractions > 0.25 mm – increased up to 69.2%. It was found that minimization of soil tillage, unlike moldboard plowing, contributes to increased soil resistance to deflation; soil erodibility decreases with shallow non-moldboard tillage 1.7 times and with "zero" tillage – 2.3 times. Systematic application of intensive agricultural technologies positively affects the cellulolytic activity of the soil, with the indicator growth relative to the extensive background being 33%. Wheat yield under the extensive technology level varied from 1.06 to 2.08 t ha⁻¹, while under the use of intensive technology, it ranged from 2.56 t ha⁻¹ for wheat as the third crop after fallow to 4.09 t ha⁻¹ for wheat after fallow; the wheat grain yield increase amounted to 1.77 t ha⁻¹.

Keywords: agricultural technology, fertility, density, structure, humus, aggregate composition, water consumption, yield, quality.