

## **Influence of growing white mustard under the conditions of the Southern Steppe of Ukraine**

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Receipt: 22.01.2026 Revised: 12.03.2026 Acceptance: 14.03.2026

DOI: <https://doi.org/10.53552/ijmfmap.12.1.2026.192-200>

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### **ABSTRACT**

*This research assesses the impact of white mustard (*Sinapis alba* L.) cultivation on soil characteristics and agroecosystem productivity in Ukraine's Southern Steppe. The study examined southern chernozems, evaluating the physical and chemical parameters of the soil prior to and following mustard planting. The results indicated that mustard cultivation markedly enhanced soil structure, evidenced by an increase in water-stable aggregates (56-60% versus 42-45% in the control group). It also improved water infiltration rates (3.5-3.8 mm/min compared to 2.1-2.4 mm/min), moisture retention, and decreased bulk density (1.18-1.22 g/cm<sup>3</sup> compared to 1.28-1.33 g/cm<sup>3</sup>). Furthermore, the crop elevated humus content to 3.00-3.05% and yielded 3.5-4.0 t/ha of dry organic matter, hence enhancing the soil's nutritional composition. The chemical enhancements comprised elevated concentrations of nitrogen, phosphorus, potassium, calcium, and magnesium, which are vital for facilitating plant growth. Furthermore, white mustard demonstrated a decrease in wind and water erosion losses, hence improving soil resilience. The crop exhibited competitive benefits by decreasing weed infestation by 58-62%, hence fostering more sustainable agricultural practices in the region. The findings indicate that white mustard is a viable green manure crop for promoting soil fertility, reducing erosion, and bolstering agroecosystem resilience in semi-arid areas such as the Southern Steppe. Additional investigation is advised to examine its enduring effects across various agroecological regions.*

**Keywords:** Erosion resistance, humus complexes, organic matter, soil fertility, water permeability,