

INFLUENCE OF FERTILIZATION WITH GREEN MANURE AND TREATMENT ON YIELD, ECONOMIC AND ENERGY EFFICIENCY OF SPRING BARLEY

Karabach K.S.,

ORC ID <https://orcid.org/0000-0002-7706-231X>

E-mail: karabach_ks@ukr.net

Berezhniak E.M.

ORC ID <https://orcid.org/0000-0001-5945-1285>

E-mail: genybereg1980@gmail.com

National University of Life and Environmental Sciences of Ukraine

The influence of the application of fertilizers with green manure and soil treatment on the yield, economic and energy efficiency of spring barley has been studied. The aim of the work was to identify the impact of the implemented tillage systems with elements of minimization and fertilization with elements of biologization on the productivity and economic performance of spring barley.

It is established that in the conditions of the Right-Bank Forest-Steppe of Ukraine the aftereffect of application of high norms of organic and mineral fertilizers on typical chernozem has a positive effect on spring barley yield, increasing it, compared to control, by 0.55–1.10 t/ha per plowing, by 0, 65–1.35 t/ha for deep tillage and 0.55–1.30 t/ha for shallow tillage.

It was found that the highest crop yield (3.85 t/ha) was obtained against after shallow tillage and aftereffects of fertilizer application with manure. The use of fertilizers helped to increase the protein content in the grain of spring barley. The influence of tillage systems on the protein content of barley was reliably noted only in the variant of fertilizers with straw & green manure. The use of shallow tillage with organic manure and fertilizer provides a decrease of 142.9 UAH/t of the cost of production, an increase of 886 UAH/ha of net profit and a 21.2% reduction in energy consumption compared to plowing.

In our research, spring barley sown in stationary plots in crop rotation followed sugar beet. According to the results, we note that it makes good use of the aftereffects of high rates of organic and mineral fertilizers. Barley yields depended significantly on soil fertilization systems. The most effective option was (manure 12 t / ha + N₅₅P₄₅K₄₅). Under plowing conditions, the barley yield was 3.45 t / ha, which is 46.8% more than in the control variant (without fertilizer application). The use of alternative fertilizer systems for plowing (straw (2.4 t / ha) + N₅₅P₄₅K₄₅) and (straw (1.2 t / ha) + N₁₂ + green manure + N₅₅P₄₅K₄₅) were significantly lower, where their efficiency was 14.9–23.4%.

Comparison of different treatments for barley showed that on alternative fertilizer systems using straw and green manure the most effective option was to cultivate with flat-cut tools to a depth of 10–12 cm, where the yield increase was 0.55–1.00 t / ha or 21.6– 39.2%, compared with the control.

The largest net profit from the application of fertilizers under plowing conditions was obtained on the variant of manure 12 t / ha + N₅₅P₄₅K₄₅, which amounted to UAH 2,895. With the use of flat-cut tillage, the economic effect was significantly higher and amounted to 3572 and 3781 UAH / ha, respectively. Energy consumption per 1 ton of barley grain cultivation increased from 3396 mJ / ha on the control without fertilizers to 5009–6277 mJ with the use of various organo-mineral fertilizer systems. The highest energy yield of 88642 mJ / ha was obtained on the manure fertilizer variant (12 t / ha) + N₅₅P₄₅K₄₅ with shallow flat cultivation.

Systematic application of resource-saving technologies for growing crops with minimization of tillage with the use of alternative fertilization systems with elements of biologization contributed to increasing the yield of spring barley and improving grain quality, reduced energy costs for growing products and, consequently, increased cost.

The use of organic manure and fertilizers helped to increase the protein content in the grain of spring barley. Since this variety of barley is used in brewing, the protein content in it on fertilized agrophones was also relatively low (11.0-12.5%).

A significant effect of tillage on protein content was found by fertilizing the soil with mineral fertilizers with straw and green manure.