

AGROECONOMIC AND ENERGY EFFICIENCY OF THE HYDROGELS APPLICATION IN THE FIELD CROP ROTATION

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Applying advanced technologies to maintain and retain soil moisture is critical to increasing crop productivity. This work analyzes the agronomic, economic and energy efficiency of domestically produced hydrogels application in a field crop rotation. It was found, that the effect of hydrogels on the crop productivity in the crop rotation was most effective in the second and third years after application. The highest payback of 1 kg of hydrogel due to an increase in the crop yield in the crop rotation was noted on perennial grasses of the 1st year (with rates of HG_{Na}-100; HG_{Na}-200; HG_K-300) and the 2nd year (with higher rates of HG_{Na}-300 and HG_K-300). Calculations of the economic efficiency of the hydrogels use in the field crop rotation showed that in the first year of application, hydrogels did not provide a conditional net income on barley crop with over-sown perennial grasses. This is due to the high cost of the hydrogel and very significant costs for its application in the first year of use. The maximum notional net income from the use of both hydrogels with an application rate of 300 kg ha⁻¹ was obtained in the third year after application. The profitability level was 207.0–304.8%. The aftereffect of hydrogels was also manifested in the fifth year after application. Conditional net income was obtained in the treatments with sodium-based hydrogel (with application rates of 100 kg ha⁻¹; 200 kg ha⁻¹; 300 kg ha⁻¹), the level of profitability was 110.6–141.5%. The bioenergy coefficient in almost all crop rotation treatments exceeded 1.0 and even reached 6–9 on perennial grasses of the 1st and 2nd year, which indicates the effective use of hydrogels water. It can be concluded, that the system of using hydrogels in the field crop rotation is energetically justified.

Key words: polymer gels, agricultural technology, crop productivity, conditional net income, profitability.