



## Тематичний напрям № 3

### Ресурсозберігаючі та екологічно безпечні технології у сільському господарстві

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#### GREENING AND RESOURCE CONSERVATION IN AGRICULTURAL PRODUCTION BASED ON THE EFFECTIVE USE OF AGRICULTURAL MACHINERY

#### ЕКОЛОГІЗАЦІЯ ТА РЕСУРСОЗБЕРЕЖЕННЯ В АГРАРНОМУ ВИРОБНИЦТВІ НА ОСНОВІ ЕФЕКТИВНОГО ВИКОРИСТАННЯ СІЛЬСЬКОГОСПОДАРСЬКОЇ ТЕХНІКИ

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Increasing the environmental efficiency of production is a place for agricultural sustainable development of the industry, especially in conditions of anthropogenic load and increasing limitations of natural resources. Modern agriculture faces numerous problems, including depletion and erosion of foundations, disturbance and drainage of water bodies, increased greenhouse gas emissions and high energy intensity of production. In connection with this, the use of resource-saving and environmentally friendly technologies in the operation of agricultural machinery is of particular importance. The rational use of machinery and tractors ensures labor productivity, allows for more accurate performance of technological operations and optimal use of material resources, thereby reducing the negative impact on the environment. Inefficient operation of equipment, on the contrary, can lead to excessive energy consumption, soil compaction, increased carbon emissions and a decrease in the state of the agro-ecosystem.

Analysis of research shows that the impact of the level of technology use on environmental efficiency is complex and involves the interaction of various factors. At the initial stages of development of the technical base, increasing the use of machines can temporarily reduce environmental efficiency due to additional resource costs, imperfection of technologies and low productivity of their application. However, after reaching a certain level of technical equipment, further improvement of the use of equipment increases productivity, reduces resource costs and improves environmental performance of production. This nature of the impact is explained by the fact that at the early stages of using the equipment, its load is insufficient, which leads to loss of energy and resource consumption, and at a higher level of development it provides an effect of scale, productivity of operations and reduces overconsumption of materials, which has a positive effect on the environmental efficiency of agricultural production.

Special attention is required by technological operations, during the use of which the machine-tractor fleet allows achieving the highest environmental effect. For example, minimal and superficial tillage, in particular Strip-Till and Verti-Till technologies, preserve the soil structure, increase its water permeability and reduce erosion processes. The use of GPS-navigation seed drills provides an accurate and uniform view of consumption, optimizes the density and depth of sowing, which reduces the need for additional operations and the efficiency of resource use. Technologies for precise application of fertilizers and plant protection products allow minimizing material consumption and reducing the risk of grounding and water. During harvesting and post-harvest processing. Optimization of the load of combines and control of machine

operating parameters will not allow loss of products and energy consumption, which also has a positive effect on environmental efficiency.

Environmental efficiency is also influenced by socio-economic factors that interact with technical ones. Access to information technologies stimulates the implementation of innovative environmental practices and achieving a level of resource conservation. The educational level of producers ensures the effective use of modern technologies and equipment, and the experience and competence of farm managers contribute to improving the management of production processes. At the same time, income growth can lead to intensification of production and greater use of resources, which requires additional control from an environmental point of view.

A high level of environmental efficiency is also achieved by taking into account natural and climatic conditions and specialization of the economy. In regions with favorable conditions for the use of technology, a higher level of resource conservation and environmental efficiency is ensured, while in difficult conditions, it is necessary to adapt technical and technological solutions to the characteristics of the terrain, which changes the interaction of factors that affect production efficiency. Thus, increasing the environmental efficiency of agricultural production is largely due to the efficiency of using machinery and tractors, optimizing technological operations and the complex interaction of technical, technological, information and organizational factors. An integrated approach allows you to minimize resource consumption, reduce the negative impact on the environment and ensure sustainable development of the agricultural sector.

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