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Editor

Komarytskyy M.L.

Ph.D. in Economics, Associate Professor

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e-mail: london@sci-conf.com.ua

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ANALYSIS AND CLASSIFICATION OF CULTIVATORS

Bereza Olena

Professors of Dnipro State Agrarian and Economic University

Bondar Bohdan

Koval Valerii

Students of Dnipro State Agrarian and Economic University

Dnipro, Ukraine

A cultivator is an agricultural machine used to cultivate the soil in order to improve its structure, destroy weeds, and improve water permeability and aeration. It is used at different stages of crop cultivation, before sowing, during plant growth or after harvesting.

Main types of cultivators

There are several classifications of cultivators according to different criteria:

a) By the method of operation:

Surface cultivators: work on the surface of the soil, in particular to control weeds and aerate the soil.

Deep-tillage cultivators: perform deep tillage of the soil, in particular to improve drainage or to cultivate soils at great depths.

b) By design:

Mechanical cultivators: use moving parts, such as knives or discs, to cultivate the soil.

Hydraulic cultivators: are equipped with hydraulic systems for raising and lowering the working elements.

c) By attachment method:

Mounted cultivators: attached to the tractor using a hitch system.

Trailed cultivators: have their own frame and are attached to the tractor using a hitch mechanism.

d) By purpose:

Cultivators for pre-sowing cultivation: used to prepare the soil before sowing.

Cultivators for inter-row cultivation: used to cultivate the rows during the growing season.

Universal cultivators: designed for different types of soil cultivation.

3. Basic parameters for analyzing cultivators

When choosing a cultivator, it is important to consider a number of characteristics:

Productivity: depends on the tractor power, working width and depth of cultivation.

Cultivation depth: an important parameter that determines the efficiency of soil cultivation.

Wear resistance: cultivators must be able to withstand high mechanical loads.

Ergonomics: ease of use and maintenance, the presence of systems to reduce operator fatigue.

4. Technical innovations and development trends

Automation and electronics: modern cultivators are equipped with GPS navigation systems, which allows you to automatically adjust the depth of cultivation and direction of movement.

Robotic cultivators: the use of robotic systems for precise and efficient soil cultivation on small farms.

5. Classification by type of working bodies

Cultivators can have different types of working bodies, depending on the tasks they perform:

Disc cultivators use rotating discs to loosen and mix the soil.

Foot cultivators have feet that loosen the soil at great depths.

Roller cultivators use shafts with different elements for uniform cultivation.

6. Advantages and disadvantages of different types of cultivators

Advantages: cultivators significantly increase the efficiency of soil cultivation, improve water permeability, aeration and soil structure, help control weeds and ensure uniform distribution of fertilizers.

Disadvantages: high cost of equipment, need for constant maintenance and

replacement of working bodies, high energy consumption.

7. Impact of technological changes on cultivator systems

With the development of agricultural machinery, there is a need for new approaches to the design of cultivators. Among the main technological innovations that change cultivator systems, the following can be distinguished:

a) Intelligent control systems

Modern cultivators are increasingly equipped with automated control systems that ensure the accuracy of soil cultivation. Such systems include:

Sensors and GPS navigation: provide precise control of the cultivator's working bodies, automatically adjusting their position and depth of cultivation depending on the characteristics of the soil.

Machines with adaptive control: allow you to adjust the intensity of cultivation in real time depending on changes in soil parameters, which reduces fuel consumption and increases work efficiency.

b) Application of new materials

To increase the wear resistance of the working bodies of cultivators and reduce their weight, new materials are used, such as:

Alloy steels and alloys with increased wear resistance for shovels and discs, which reduces the need for frequent replacement of working parts.

Polymers and composites: to create lightweight structures that reduce the load on the tractor and increase work efficiency.

8. Environmental aspects of the use of cultivators

In modern conditions, an important aspect is the environmental impact of agricultural machinery. Given the significant impact on the environment, many cultivators are now being developed taking into account:

Modern cultivators have significant potential to improve the efficiency of soil cultivation, increase yields and reduce environmental impact.

The introduction of new technologies, such as automation, robotics and intelligent control systems, open up new horizons for the development of agricultural machinery and its improvement.

Conclusions

It is important to increase the technological and operational reliability of equipment through universalization, the use of improved working bodies, improving production quality, optimizing aggregation and reducing the complexity of maintenance.

It is necessary to develop highly versatile new generation machines that will have a variable, easily adaptable structure, as well as to promote the implementation of flexible multi-variant technological and production processes capable of optimizing operational performance in various natural and production conditions.

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