The effect of tillage with various tools on its agrophysical and agrochemical properties

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The effect of tillage with various tools on its agrophysical and agrochemical properties

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Abstract. When analyzing agricultural equipment for tillage and technology, it is observed that despite the introduction of conservation farming technologies (zero, ridge, strip and other methods of tillage), the mechanical method remains prevailing, taking into account the diversity of soil conditions in various soils. - climatic zones of the Russian Federation, the presence of plain, slope and contour farming, the need to combat erosion and preserve its agrophysical and agrochemical properties.

Plowing with dumps is a radical tool in the fight against weeds, pests and diseases and the basis of environmentally safe technologies that reduce the use of chemicals, optimize agrophysical and agrochemical processes in the soil.

Illiterate application of the methods of primary tillage can lead to bogging of crop rotation fields, reduced yields due to waterlogging, insufficient development of the root system of cultivated plants, disturbed gas exchange, reduced microbiota, etc. Deep soil tillage is also necessary on fallow lands. Requirements to the quality of field processing led to the spread of the technology of smooth plowing and a sharp increase in the production of circulating plows, which are designed for smooth plowing without dump ridges and open furrows. Plowing the fields is done in the shuttle mode without splitting the field into pins, which significantly reduces the cost of FCM.

Foreign and domestic firms produce mounted reversible plows (2-6 cases), semi-mounted plows on one support wheel (4-9 cases) and semi-mounted plows on a trolley (7-17 cases) [1].

Gregoire Besson (France) produces a wide range of semi-mounted reversible plows of the original design with a different number of pairs of bodies and the ability to work in the unit with other implements.

Multicase semi-mounted plows consist of two frames (front and rear), pivotally interconnected, which allows you to copy the field relief more smoothly.

In the transport position, the rotary frame of the plow with bodies is fixed in a horizontal position. The hinged front of the plows ensures 110 ° rotation. The toothed rack and pinion mechanism for wrapping the plow is driven by two hydraulic cylinders and ensures work with a constant effort and without jerks during the cycle of transfer of the plow from one working position to another. Plows can be equipped with different types of plow bodies, 11 types of dumps and 6 types of skimmers adapted to all types of soil and vegetation cover.

Kvemeland (Norway) presented mounted, semi-mounted and trailed reversible plows for smooth plowing with a different number of bodies (up to 14 pairs) and a series of plows for driven plowing

with a number of bodies from 2 to 12. As a rule, the plows are equipped with devices (rollers, harrows, etc.) for additional crumbling of the soil and leveling the field surface.

On all models of plows manufactured by this company, the hulls are equipped with safety devices (most often spring-backs), which allows them to be used in fields littered with stones. All plows have the ability to change the width of the grip (the width of the grip of one case can vary from 35 to 50 cm).

Depending on the model, the plows of this company can be equipped with a variety of additional equipment: skimmers, saws, knives, rippers, support wheels, plowshares and plow bodies, as well as be equipped with a system that allows you to adjust and adjust the plow in an automatic or semi-automatic mode.

The plants of the Russian Federation produce about 30 models of reversible plows, aggregated with tractors of traction classes 0.9; 1.4; 2; 3; 5 and 6 with the number of buildings from 2 to 7 and a capacity of from 0.2 to 3.7 ha / h [2].

In recent years, in many countries of the world, including the Russian Federation, various methods of soil tillage have been developed and tested in practice. The usual plows are replaced by chisel plows and cultivators. They contribute to the better conservation and accumulation of moisture in the soil, positively affect the physical properties and biological activity of soil microorganisms, prevent the development of water and wind erosion, do not leave developmental furrows and land ridges

After arable land is treated with such aggregates, a stubble remains on the soil surface, which helps to reduce deflating, increase snow accumulation and reduce soil freezing as a result of maximally moistening arable land, reducing the negative impact of water and wind erosions on the soil, and also destroying the “plow sole”. and chisel plows are used to deepen the arable layer in combination with the introduction of higher doses of organic and mineral fertilizers. Sewing treatment, widely used in conditions of insufficient moisture, in steppe areas prone to wind erosion and on sloping lands, loosens the soil (while its most fertile part remains on the surface), cutting weeds and preserving up to 90% of stubble on the surface of arable land. straw [3,4,5].

Subsoiler, if necessary (or on request) can be equipped with compact rollers, mulch disks, tooth harrows, cutters, etc. Along with the main tillage-free tillage, deep-rippers are equipped with mechanical or pneumatic driven bunkers for introducing subsoil and depth mineral tukov[6,7].

In the Russian Federation, more than 30% of cultivated acreage is in arid steppe and forest-steppe areas, and almost all cultivated land in these areas is subject to erosion. The lack of soil moisture is caused not only by a small amount of precipitation, but also by losses to runoff, evaporation, snow blowing, high transpiration of moisture by weeds[8,9,10].

In recent years, disk tools have been recognized in the Russian Federation and some foreign countries, whose working bodies are mounted on individual racks placed on the cross beams of the frame of an agricultural machine or tool[11,12,13,14]. Such working machines are called diskators, discocats, diskators, front disc harrows, and so on. In the Russian Federation, the production of machines of this type is widely spread, they are produced by more than fifty companies and organizations located in various fields.

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