



A COMBINED MACHINE THAT PREPARES THE SOIL FOR SOWING WITHOUT TURNOVERING FOR SOWING REPEATED CROPS

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Annotation. This article presents information about the general structure, operating principle, and technological process of a combined machine that prepares the soil for planting in one pass without turning it over for planting repeat crops in areas cleared of grain crops, as well as the economic benefits achieved when using the machine.

Keywords: *combined machine, repeated cropping, soil, tillage without a tiller, technology, weeder.*

In our country, more than 900 thousand hectares of land freed from grain are replanted annually. It should be noted that planting such main vegetable crops as potatoes, cabbage, and carrots on the land freed from the mentioned grains and vegetables allows expanding their area by 2-3 times, increasing the yield, and providing the population and processing enterprises with raw materials on a regular and continuous basis [1].

The first step in preparing the land for repeated planting is to clear the land of previous crop residues. In this case, the crop residues are removed from the field using a KPS-5 grade harrow or harrow, or in small areas manually, then the necessary organic and mineral fertilizers are spread on the field based on the recommendations, and when the soil moisture is at the desired level, the land is plowed to a depth of 25–28 cm using a PD-3-35 grade plow, then loosened to a depth

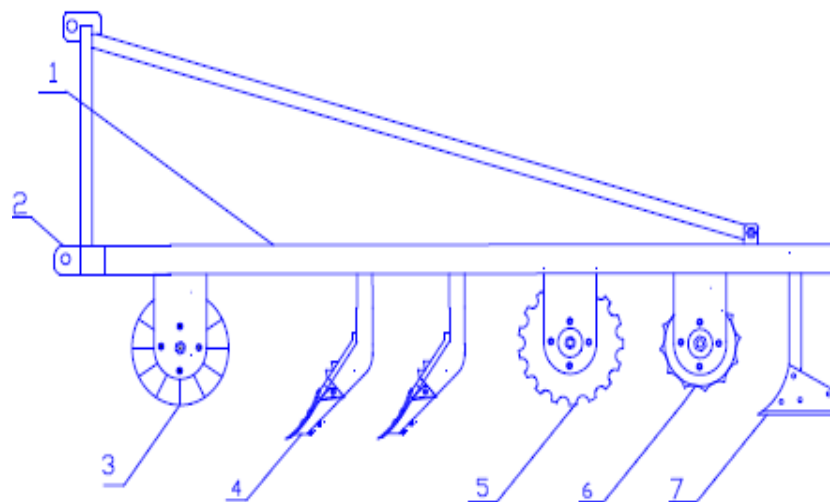


of 10–12 cm with a harrow, and irrigation ditches are dug depending on the type of crop planned to be planted [2, 3].

The implementation of these measures, in turn, leads to an increase in the time until planting crops and loss of moisture in the soil.

This combined machine, in addition to eliminating the above-mentioned shortcomings, will allow for the short-term sowing of early-maturing varieties of food crops as a repeated crop in areas freed from grain crops, the timely and high-quality implementation of agrotechnical measures, and the effective use of available irrigated land and additional income for our farmers [4].

The peculiarity of the technology implemented by the machine is that it simultaneously prepares the soil for sowing in one pass without turning it over. In the proposed technology, the following operations are performed in one pass of the machine: first, after harvesting the grain crops, the plant stems remaining on the field surface are cut in a vertical plane using ribbed discs. Then, a 25-27 cm thick soil layer is loosened by the ridge-shaped working bodies without turning it over, and the middle part of the treated layer is intensively loosened using the chopper blades installed on them. Batteries with cut spherical discs additionally grind the soil and mix the upper layer of the soil and create a mulch layer from plant residues, while the roller levels and compacts the soil surface.



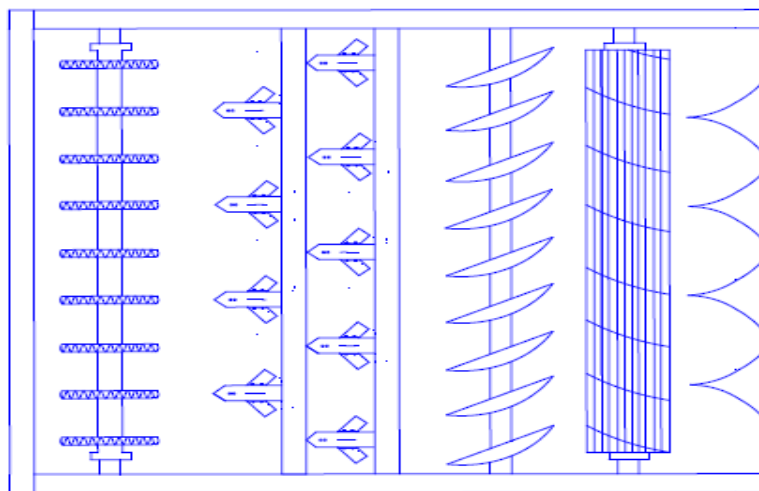


Fig 1. Structural diagram of the combined machine.

1-frame, 2-suspension device, 3-ribbed disc, 4-chisel-shaped working body, 5-cut spherical disc battery, 6-roller, 7-shear

Then, adjustable furrows form furrows of the required size, and the soil becomes completely ready for planting repeated crops [5].

According to preliminary results, the implementation of the above technological processes in one pass of a combined machine preserves the soil moisture of the area where repeated crops are sown, improves aeration and infiltration processes, eliminates the development of soil erosion, prevents soil compaction and sharply reduces the time for its preparation for planting, saves material and energy resources in pre-sowing soil cultivation and preparation for planting, i.e., minimal soil cultivation is ensured due to the reduction in the number of passes of the aggregates over the field [6]. To implement the proposed technology, a structural scheme of a combined machine for pre-sowing soil cultivation without turning over was developed. The combined machine for pre-sowing soil cultivation without turning over the soil in one pass, based on the technology of preparing the soil for planting repeated crops, cultivates a field 3.0 m wide without turning over and prepares it for planting [7].



Parameters of working bodies of a combined machine for tilling the developed soil without turning it over

№ t/r	Name of indicators	Definition	Value
1	2	3	4
1.	Diameter of the ribbed disk, m	d_q	0,55
2.	Chisel-shaped working body inclination, degrees	α	25°
3.	The angle of installation of the chisel-shaped working body relative to the direction of movement, degrees	γ	42°
6.	Height of chisel-shaped working body, m	N	0,75
7.	Number of grinder blades, pcs.	p_m	18
8.	Length of the shredder blade, m	l_p	0,10
9.	Height of the shredder blade, m	h_p	0,15
10.	Angle of installation of the grinder blade relative to the horizontal, degrees	α_p	30°
11.	Angle of installation of the grinder blade relative to the direction of movement, degrees	θ_p	10°
12.	Diameter of the truncated spherical disk, m	D_{sd}	0,66
13.	Transverse distance between truncated spherical disks in one battery, m	l_{do}	0,23
14.	Radius of curvature of the disk working surface, m	R	0,71
15.	The width of the roller shutter, m	V_g	3,0
16.	Diameter of the roller, m	D_g	0,40
17.	Number of planks of the mill, pcs.	n_p	11
18.	Height of the Galtakmola plank, m	h_p	0,05
19.	Angle of installation of the roller shutter, degrees	γ_{pl}	32°
20.	Height of the drain, cm	N_b	32
21.	Length of the drain, cm	l_b	37
22.	Opening angle of the damper blade, degrees	γ_b	42°
23.	The angle of entry of the front edge of the auger into the soil, degrees	α_b	50°

Harvesting of grain crops coincides with the onset of hot days in our republic,



which causes rapid loss of moisture in the soil. In areas cleared of grain crops, up to 12-14% moisture is retained in the soil due to the shade of plant stems. If it is possible to sow seeds of repeated crops within 4-5 days after harvesting, the seeds will quickly germinate thanks to the moisture retained in the soil. This will prepare the ground for the crop to ripen at least 15-20 days earlier, before the hot days pass [8].

To ensure high-quality preparation of fields for sowing and energy-resource saving, when using a combined machine that simultaneously prepares the soil for sowing repeated crops in one pass without turning it over, the fuel and lubricants consumed per 1 hectare of land are reduced by 29.4%, labor costs by 38.2%, and operating costs by 41.3%. Direct (operating) costs per 1 hectare of land are reduced by 53.48% [9]. Currently, our Republic does not produce a combined machine that prepares the soil for sowing repeated crops in one pass. The cost of combined machines produced abroad is very expensive. If the proposed machine is mass-produced, the price will be 50-60% cheaper than machines imported from abroad.

References:

1. Irgashev, D. B., Kurbanov, S. B., Mamatov, F. M., Temirov, I. G., & Mamatov, S. F. (2023, December). High softening performance indicators of plug-softener. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1284, No. 1, p. 012032). IOP Publishing.
2. Ergashev I.T. Механико-технологические основы технологии и технических средств для гладкой безбороздной вспашки. Diss.... dok. techn. nauk. – Yangiyul, 2003. – 319 s.
3. Ravshanov H., Maiviatov F. M., Kurbanov S. Improvement of housing with knives crushers for non-tillage technology //E3S Web of Conferences. – EDP Sciences, 2023. – T. 390.



4. Baxtiyorovich K. S. Development Of A Front Plow For Smooth Furrowless Plowing With Corners //American Journal of Engineering, Mechanics and Architecture (2993-2637). – 2023. – Т. 1. – №. 9. – S. 71-74.

5. Kurbanov S., Temirov I., Babajanov L. Technological basis of rotation of body with polygon //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 401. – S. 04050.

6. Mamatov, F. M., Yergashev, I. T., Mirzaxodjaev, S. S., Xoliyarov, Y. B., & Qurbanov, S. B. (2018). Plow for smooth plowing with combined working bodies. *European Science Review*, (3-4), 264-266.

7. Murtozevich, M. F., Toshkentovich, Ye. I., Shoxruxovich, M. S., Berdiqulovich, X. Y., & Baxtiyorovich, Q. S. (2018). Plow for smooth plowing with combined working bodies. *European science review*, (3-4), 264-266.

8. Umurzakov U., Mamatov F., Mirzayev B., Kurbanov Sh., Badalov S., Raxmonov J. Front-mounted plow for smooth, non-furrow plowing with offsets // E3S Web of Conferences 304, 03013(2021) ICECAE 2021 doi.org/10.1051/e3sconf/202130403013

9. Aldoshin N., Kurbanov Sh, Abdullaev A., Khujayev A., Choriyeva D. Parameters of the angle-lift of the front plow for smooth, rowless plowing // E3S Web of Conferences 264, 04042 (2021) doi.org/10.1051/e3sconf/202126404042