

Energy-Resource-Saving Technology and Combined Machine for Poly Crops

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Abstract: The article presents the results of research on the development of an energy-resource-efficient technology and a combined machine that implements it.

Keywords: field crops, technology, soil, tillage, technological process, combined machine, ditch opener, planting.

Introduction. Today, about 3.5 mln. hectares, including 2.7 million in Asian countries. per hectare of land, polisis products are grown, which is 77% of the total cultivated area [1]. It is important to use advanced land cultivation technologies and modern equipment while maintaining soil fertility in order to obtain a high yield in the cultivation of rice crops.

It is known that at present, the preparation of fields for planting rice crops consists of agrotechnical activities such as fertilizing the land with separate aggregates, plowing, leveling the unevenness caused by plowing, harrowing, harrowing, grinding and opening ditches. It is recommended to plant the seeds of polys crops only after these technological processes have been carried out. Repeated tilling of the soil from the field leads to increased labor, energy and fuel consumption, structural damage and over-densification. In addition, it increases the type and number of agricultural machines, prolongs the time of preparing the soil for planting, which causes a decrease in productivity in agriculture [2 - 5].

Therefore, at present, it is an urgent scientific issue to prepare the soil for the planting of cash crops in one pass of the aggregate, and to develop the technology of planting, as well as the introduction of a combined machine that implements this technology, to protect the soil, and to reduce the consumption of energy and materials.

Materials and methods. Based on the analysis of the literature and the results of the conducted research, a technology was developed for the preparation of the land for the planting of cash crops and the minimal tillage of the soil during planting [6]. The proposed technology and machine are protected by UzR No. IAP 05360 and UzR No. FAP 01125 patent [6,7].

In the development of this technology, the following were taken into account: fertilization, basic soil processing and its preparation for planting polys crops, and timing of sowing seeds; the need to prepare the soil for planting rice crops in a short period of time; availability of powerful tractors for aggregating a combined machine; the possibility of carrying out all processes simultaneously with the help of working bodies.

On the basis of the conducted researches, an experimental copy of the combined machine for growing sugar crops (conditional brand PKTV-3,6) was prepared at JSC "BMKB-Agromash" and tests were conducted in the fields of farms of Qamashi district of Kashkadarya region. In tests, the car was combined with a TS-130 tractor.

Performance indicators of the combined unit Tst 63.04:2001 “Испытания сельскохозяйственной техники. Машины и орудия для поверхностной обработки почвы. Программа и методы испытаний” and Tst 63.02:2001 “Испытания сельскохозяйственной техники. Машины и орудия для глубокой обработки почвы. Программа и методы испытаний” .

Results and discussion. The proposed technology is carried out as follows (Fig. 1): the distance between adjacent planting areas is softened, then the surface part of the planting area, that is, the surface area with winter wheat stalks and weeds, is divided into two and cut and laid on the sides appropriately, then the soil of the planting area the pit is softened and at the same time an irrigation ditch is formed and local fertilizer is applied. The soil on both sides of the seedbed, that is, the irrigation ditch, is crushed, leveled and compacted, and then the seed is planted.

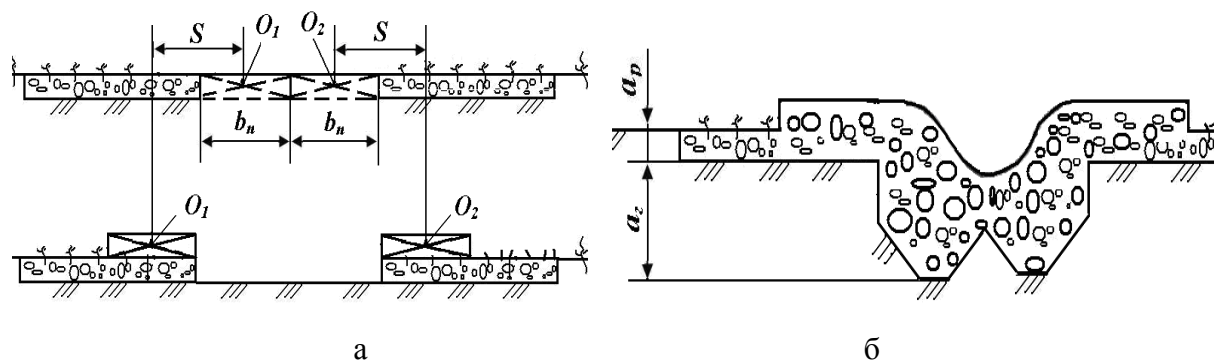


Figure 1. Scheme of the new technological process of preparing the fields for planting rice crops: a – cross-section profile of the field after the surface is softened between the planting areas and the plows are turned to the right and left; b - the cross-sectional profile of the field after the seed is planted, after the rows are deeply smoothed, the irrigation ditches are opened

This technology is implemented by a combined machine that cultivates and prepares the soil for planting, applies fertilizers and plants poly crops in one pass [7].

Combined machine frame 1, suspension device 2, disc blade 3, body of the left and right overturning lister type mounted on the axis of symmetry of the unit 4, softeners (flat) 5, deep softeners with tilting handle 7, fertilizer delivery device 8, softener-leveler roller 9, planting device 10 and support wheel 6 are included. The reel 9 and the planting device 10 are hingedly attached to the frame (Fig. 2).

The combined machine is mainly used to prepare the fields freed from winter wheat for planting polys crops (Fig. 3). The technological operation of the combined machine is carried out as follows: softeners installed in a row soften the field on the side of the planting zone, i.e. the field between adjacent rows to a depth of 12-15 cm and cut the roots of weeds, the overturning bodies equipped with sliding plates in the form of a lister 4, the stalked plows in the planting area 8 After cutting at a depth of 10 cm, it is rolled over the softened field to the right and left, and then the planting area is deeply softened with the sloped handle softeners, and at the same time, fertilizers are applied to a certain place along the seeding line. With the help of the softener roller 9, the soil of the row interval is softened and compacted and prepared for sowing, and the seed is sown with the sowing device.

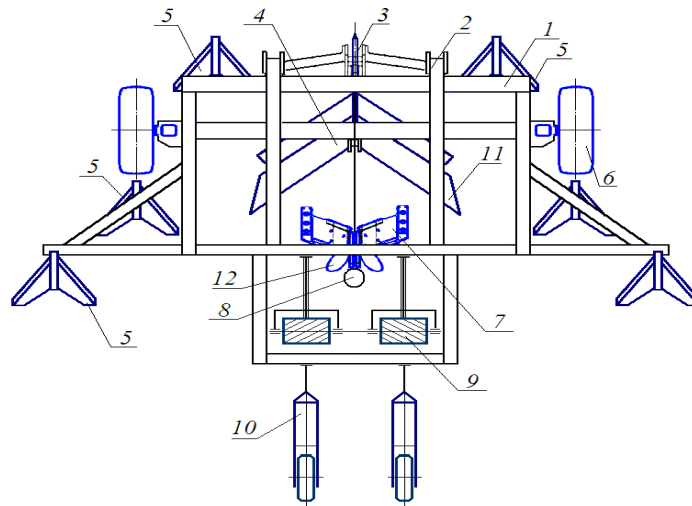


Figure 2. The structural scheme of the combined machine: 1 – frame; 2 – suspension device; 3 – disk-shaped knife; 4 - a double case with a guide plate in the form of a lister; 5 – flat cutter; 6 – support wheel; 7 – deep softener; 8 – fertiliser; 9 – reel; 10 – planting device; 11 – guide plate; 12 – slimmer

It was determined that the quality of soil preparation and planting processes for planting rice crops with a combined machine depends on the mutual location of work bodies and their parameters [8, 9, 10].



Figure 3. A view of the working process of a combine harvester in a wheat-free field

In the tests, the cultivation depth of the area where seeds are planted was determined as 30 cm, and in practice, its average value was 30.6 cm. The average amount of fractions smaller than 50 mm was 76.2 percent, the unevenness of the treated field surface was 7.8 cm, the width of the upper part of the irrigation ditch was 58.4 cm, and the depth of the irrigation ditch was 21.8 cm. This makes it possible to sow the seeds of rice crops in two rows in the upper part of the ditch, with a distance of 60, 70 or 90 cm between the main rows.

From these data, it can be seen that the performance of the combined unit meets the requirements of agrotechnics. The developed combined machine reliably performed the specified technological processes.

Combining tillage with and without tillage, as well as deep loosening of the soil with strips, simultaneously forming irrigation ditches and sowing the seeds of field crops, leads to a sharp

reduction in energy consumption and prevents water and wind erosion. Applying fertilizer to a specific place in two layers increases the efficiency of using mineral fertilizers and productivity.

Conclusion. The use of a combined machine that implements energy-resource-saving technology for the cultivation of field crops ensures high-quality preparation of the soil for planting and planting of field crops in short periods, protects the soil from erosion and over-densification, reduces the cost of labor and money, and increases the yield of field crops.

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