

FIELD TEST RESULTS OF MACHINE SOFTENERS THAT LAY FILM TOGETHER WITH SOIL PREPARATION FOR SOWING MELON CROPS

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Abstract

The article describes a new technology of soil cultivation and preparation for planting melon crops, which involves the simultaneous implementation of technological processes such as soil cultivation without a tiller, loosening the subsoil along the seeding line, and preparing the soil for planting. The structure, principle of operation, and field test results of the improved unit implementing the new technology are presented.

Keywords: melon crops, soil, body, softener, planting, film, productivity, chiseling.

Аннотация

В статье описана новая технология обработки и подготовки почвы под посадку бахчевых культур, которая предполагает одновременное выполнение таких технологических процессов, как обработка почвы без почвообрабатывающего агрегата, рыхление подпочвы по линии посева и подготовка почвы под посадку. Представлены конструкция, принцип работы и результаты полевых испытаний усовершенствованного агрегата, реализующего новую технологию.

Ключевые слова: бахчевые культуры, почва, покровная культура, разрыхлитель, посадка, пленка, урожайность, обработка почвы.

Introduction

One of the main tasks of the economy of our independent republic is to fully satisfy the population's demand for food products, including melon products. Increasing melon production and, on this basis, further improving the well-being of the people is one of the most urgent tasks facing agriculture. The weather and soil conditions of our homeland are very favorable for obtaining a rich harvest of melon crops. Therefore, it is advisable to cultivate melon products on a large scale not only to meet the needs of the population of our republic, but also for sale to other countries.

In implementing these tasks, it is important to conduct research in such areas as preparing the soil for planting melon crops, developing film-laying machine softeners, and substantiating its parameters that ensure high quality of work.

Literature review

A number of scientists in our Republic have conducted research on the creation of soil preparation machines for planting melon crops, substantiating and improving the technological processes and parameters of their working bodies.

Kh.A. Fayzullayev [2; 8-15-p.] developed the technology of soil preparation for planting melon crops under a film and the agrotechnical requirements for a soil cultivation machine, and a machine that implements it.

To implement the above technology, Kh.A. Ravshanov [3; 12-18-p.] developed a constructive scheme of a soil preparation machine for planting melon crops and based on the parameters of its working bodies. This machine cultivates a field 1.35 m wide in one pass.

Materials and methods

Based on the theoretical and experimental research, a machine was developed to prepare the soil for planting melon crops under a film. The machine, which cultivates the soil without turning over for planting melon crops under film, has a total coverage width of 1.4 m and consists of two support wheels, three vertical column conditioners, conditioner blades, and softening arrow-shaped blades.

The machine is aggregated with tractors of classes 1, 4 and 2-3.

During the operation of the improved machine, the blade of the vertical column softener enters the plow layer and divides the soil into small pieces. The cracks formed in this process spread over the soil surface.

The soil separated by the blade rises along its surface and falls onto the blade. In this case, the soil lump is bent and stretched in longitudinal and transverse sections, which leads to its rapid disintegration. As a result, the machine crushes the soil to the level of agrotechnical requirements in the width of the coverage area. It creates favorable conditions for the machine that prepares the soil for planting melon crops under the film.

The views of the machine that prepares the soil for planting melon crops under the film are shown in Figures 1 and 2.



Figure 1. From the back of your car appearance



Figure 2. Machine operation appearance in the process

The indicated quality indicators of the machine are Tst 63.04:2001 "Ispytaniya selskohozyaystvennoy tekhniki. Machines and tools for surface processing. Programma i metody ispytaniy" [4] and Tst 63.03:2001 "Ispytaniya selskohozyaystvennoy tekhniki. Metody energeticheskoy otsenki mashin" was determined according to [5].

Table 1 Conditions for conducting tests of the improved machine

№	Naming of indicators	Indicator values
1	Test time	18.02.2024
2	Test location	Farm fields of Kokdala and Chiraqchi districts
3	Background	Field intended for planting melon crops
4	Macorelief	Flat
5	Soil type	Typical gray soil
6	Mechanical composition	Medium-heavy loam

Before conducting the tests, the soil moisture, density and hardness in the layers of 0-10, 10-20, 20-30, 30-40 and 40-50 cm were determined according to existing methods [6].

The following soil parameters were determined during the tests of the improved machine: tillage depth; soil crushing quality; field surface roughness, cm; preservation of plant residues on the field surface, %.

The soil of the experimental fields is medium-heavy loam, gray soil of poor mechanical composition, with groundwater at a depth of 10-14 m. Before conducting the experiments, the soil moisture, density and hardness in the layers of 0-10, 10-20, 20-30 and 30-40 cm, as well as the height and amount of plant residues, were determined.

Table 2 Conditions for conducting tests of the combined machine

№	Naming of indicators	Indicator values
1	Soil moisture in the following layers (cm), %:	
	0-10	17,9
	10-20	17,7
	20-30	17,5
2	Soil hardness in the following layers (cm), MPa:	
	0-10	1,87
	10-20	1,19
	20-30	1,92
	30-40	2,33

The quality of soil loosening and the depth of tillage were determined according to TSt 63.04:2001 “Tests of agricultural machinery. Machines and tools for deep tillage of the soil. Program and methods of testing” [4; 21-54-p., 97; 78-85-p.].

Results and discussion. During the experiment, the soil moisture, hardness, depths of the measured layers and the depth of tillage were measured using a ruler, (shup) and a tape measure. To determine the quality of the loosening of the soil of the tilled layer, samples were taken from a plot of 0.25 m² in five repetitions according to the depth of tillage. The obtained samples were passed through sieves with a hole diameter of 100, 50, 25 and 10 mm. The mass of soil and clods remaining in each sieve and passing through the last sieve was weighed on a LIBOR “EL-600” balance [9] , and the amount (in percent) of fractions larger than 100 mm, 100-50, 50-25, 25-10 and smaller than 10 mm was determined. When sieving the soil, the procedure for switching from sieves with large holes to sieves with small holes was used. The measurement accuracy was ± 5 g for fractions.

Table 3 Results of machine tests

№	Naming of indicators	According to agrotechnical requirements	According to test results
1	Working speed, km/h	6-9	7,3
2	Processing depth: Mor, cm ±σ, cmv, %	30-35 ± 2 <10	33,4; 1,6; 6,2
3	Amount of the following size fractions, % > 50 mm 50-25 mm < 25 mm	< 10 - > 80	9,1; 9,8; 81.1
4	Fuel consumption, kg/ha	-	17,5

It can be seen from these data that the performance of the combined machine meets the agrotechnical requirements.

The combined machine developed in the tests fully and reliably performed the specified technological process, and the results obtained in the tests fully comply with the requirements set for it.

Conclusion

The machine for preparing the soil for planting melon crops under the film, developed on the basis of the conducted research, reliably performed the specified technological process, and its performance fully complies with the agrotechnical requirements and technical specifications. Therefore, the development of a new technology for preparing the soil for planting melon crops and a combined unit that implements it, as well as its introduction into production, is an urgent issue.

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