

**RESULTS OF FIELD TESTS OF A MACHINE FOR SOIL PREPARATION FOR
SOWING MELONS AND GOURDS WITH SIMULTANEOUS LAYING OF FILM**

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Abstract: The article presents the structure and principle of operation of the developed machine, as well as the results of its field tests. The developed machine reliably performed the specified technological process of work, and its operating indicators fully comply with agrotechnical requirements and technical specifications.

1.Introduction

Navadays, the preparation of fields for sowing melons, consisting of plowing, harrowing and cutting of irrigation furrows, is carried out by separate units, which in turn leads to the loss of soil moisture, delaying the sowing period and increasing operating costs [1-8].

In the Republic of Uzbekistan, research on the creation of machines for soil preparation for sowing melons, substantiation and improvement of technological processes and parameters of their working bodies was carried out by A.D. Em, V.N. Zhukov, F.M. Mamatov, A. Tukhtakuziev, S.A. Kunduzov, B.S. Mirzaev, D. Chuyanov, A.E. Kadyrov, I.G. Khaidarov, B.K. Utepbergenov, Kh. Ravshanov, G.Kh. Ergashev, I.I. Ismailov and others [1-8].

2.Methods and results

On the basis of theoretical and experimental studies, a machine has been developed for soil preparation for sowing melons, for film and drip irrigation. The machine for soil preparation for sowing melons and gourds for film and drip irrigation has a total working width of 1.4 m and consists of two support wheels, two vertical arrow-shaped racks, four inclined rack working tools, one leveler-compactator working through a pressure spring. The machine also includes two furrow cutters operating on its basis, rolls for unwinding a roll of film with a width of 140 cm and two rows of drip irrigation hoses, two opposite flat discs, two rubber wheels with pressure springs and two opposite spherical discs.

The machine is aggregated with tractors of 3 and 4 classes. During the operation of the machine, the arrow-shaped foot loosens the soil along the row intended for planting melons, and cuts the roots of weeds. The tilting ripper chisel located in the left and right sections enters the arable layer and crushes the soil into fine fractions. The cracks formed in this case spread over the surface of the soil.



Fig.1 The car from the front



Fig. 2. The car from the side

The soil, separated by a chisel, rises along its surface and falls on the knife. At the same time, the lump of soil bends and stretches in longitudinal and cross-sections, which leads to its intensive destruction. As a result, the soil on the working width of the machine is loosened to the level of agronomic requirements. Then the leveler-compactor levels and compacts the treated soil, creating favorable conditions for planting melons and laying the film. In the process, the leveling compactor with knives cuts furrows in its base for laying drip irrigation hoses. Drip spray hoses are placed in furrows formed in the direction of movement of the machine. Flat discs on the right and left sides of the leveler-compactor process the soil treated with the inclined column screed and cut furrows for the laying of transparent film. The transparent film fed from the shaft installed in the upper part of the frame, in the direction of movement of the machine, is laid through the shaft installed in the lower part into the furrow formed by the flat disc. The work process is then completed by sealing the transparent film using opposite spherical discs and rubber wheels with pressure springs.

The types of machines for soil preparation for sowing melons and gourds for film and drip irrigation are presented.

During the tests of the machine (Fig. 4), the following indicators were determined: processing depth; the quality of soil crumbling; unevenness of the field surface, cm; Preservation of plant residues on the field surface, %.

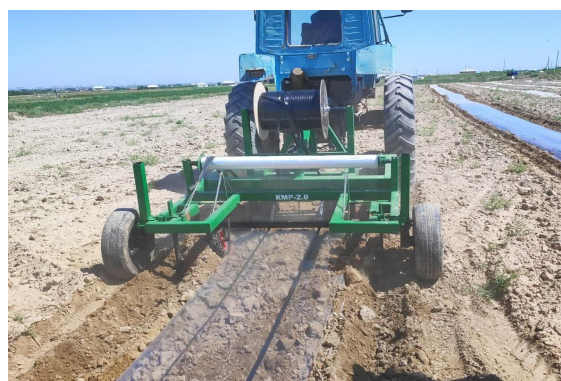


Fig. 3. View of the aggregated machine with the MTZ-80 tractor from the side. **Fig. 4. View of the machine in operation.**

The specified quality indicators of the machine were determined in accordance with Tst 63.04:2001 "Tests of agricultural machinery. Machines and tools for surface tillage. Program and Test Methods" [9; pP. 1-23] and Tst 63.03:2001 "Tests of Agricultural Machinery. Methods of Energy Evaluation of Machines" [10; pp. 1-59].

Table 1.

Machine Test Conditions

№	Name of indicators	The importance of indicators
1	2	3
1	Test Time	20.01-12.02.2024 year

2	Test Location	Farm fields in Kukdala district
3	Background	Field freed from crops in autumn
4	Microrelief	Even
5	Soil type	Light gray
6	Mechanical composition	Medium loamy
7	Height of plant stems, cm	-
8	Average mass of plant residues on the field surface, kg/m ²	-

Before the tests, the hardness, density and moisture of the soil were determined in the layers of 0-10, 10-20, 20-30, 30-40 and 40-50 cm. Hardness, density and moisture of the soil in the test field were determined according to existing methods [10; pp. 1-59].

Table 2.
Machine Test Results

№	Name of indicators	According to agrotechnical requirements	Based on the test results
1	Operating speed, km/h	4-6	5,4
3	Depth of planting area (pits), cm: M_{ave} . $\pm\sigma$, see v , %	from 32 cm to 34 cm ± 2 <10	32,7 1,4 6,12
4	The amount of the following size fractions in the soil of the area treated by the pits, % > 50 mm 50-25mm < 25 mm	< 10 - > 80	7,4 4,7 87,1
5	Fuel consumption, kg/ha	no information	14,8

The processing depth of the machine was determined after each pass of the unit using a special depth gauge [10; pp. 54]. After each pass of the machine, measurements were taken 50 times. The measurement error was 0.5 cm. The quality of soil crumbling and the depth of cultivation during cultivation were determined in accordance with UzDSt 3412:2019 "Tests of agricultural

machinery. Machines and tools for surface tillage. Program and Test Methods" [10; pp. 52, 3; pp. 14-17].

According to the analysis of the results obtained during the tests, the proposed machine provided high-quality tillage. When treated with it, the amount of fractions smaller than 25 mm was 87.1%, and the number of fractions larger than 50 mm was 4.7%. In field tests, the developed machine reliably performed the specified technological processes when sowing melons under the film, and its shortcomings were not observed.

Conclusions

1. The proposed machine for soil preparation for sowing melons and gourds under film and drip irrigation provides high-quality tillage: the number of fractions less than 25 mm is 87.1 %, and the number of fractions more than 50 mm is 4.7 %.
2. The machine developed on the basis of the research for soil preparation for sowing melons and gourds for film and drip irrigation has reliably performed the specified technological process of work, and its performance indicators fully comply with agrotechnical requirements and terms of reference.

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