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# APPROVAL OF THE PARAMETERS OF THE DEVICE FOR LOCAL APPLICATION OF ORGANIC FERTILIZERS

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**A.A.Ibragimov [1], B.B.Ramazanov [2], B.N.Ramazanov [3].**

*[1] Scientific-Research Institute for Agricultural Mechanization, Republic of Uzbekistan, Yangiyul district, Samarkand city 41.*

*[2] Scientific-Research Institute for Agricultural Mechanization, Republic of Uzbekistan, Yangiyul district, Samarkand city 41.*

*[3] Institute of Agriculture and agrotechnologies of Karakalpakstan, Department of mechanization of Agriculture, Nukus City of the Republic of Karakalpakstan, Abdambetov home unnumbered.*

**Abstract**

*The article presents the results of the optimal parameters of the disk harrows of the device for local application of organic fertilizers to the fields planted with field crops.*

**Key words**

*Organic fertilizer, disc harrow, parameter, research, angle of installation relative to the direction of movement, angle of installation relative to the vertical, longitudinal distance, traction resistance.*

Research work is underway around the world aimed at development of new scientific and technical foundations of resource-saving technologies and technical means for the local application of organic fertilizers to fields for melons and melons. In this direction, in particular, one of the important tasks is the development of effective technical means for the local application of organic fertilizers in fields intended for growing melons, with their simultaneous incorporation into the soil and the formation of seed ridges and irrigation furrows, with justification of technological processes of working bodies and ensuring resource conservation when interacting with soil and fertilizer. In this regard, it is considered in demand to create a compact and convenient device that ensures the implementation of technological processes in one pass: cutting furrows, dosing organic fertilizers and local application of them into these furrows, as well as sealing these furrows with soil while simultaneously cutting an irrigation furrow and forming seed ridges for growing melons [1,2,3,4].

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The value of organic fertilizers is that they contain a number of nutrients (nitrogen, phosphorus, potassium, calcium, magnesium, iron, cobalt) necessary for the development of plants. Therefore, when organic fertilizers are applied, the reserve of nutrients in the soil expands. This serves to improve the circulation of macro and micronutrients in the soil-plant system. As a result, the Scientific Research Institute of Agricultural Mechanization of Uzbekistan (KHMITI) has created a device for local application of organic fertilizers to the fields where crops are planted (Fig. 1) [5,6].

The combined aggregate is intended for the creation of planting beds and opening of irrigation ditches at the same time as burying organic fertilizers (mainly cattle manure) on the land areas where the crops are planted in autumn or spring 10-15 days before planting.

The technological process of the unit works as follows: non-moving discs attached to the frame are used for organic fertilization.

The driving wheel moves to the reducer through the chain drive, and the gear of the reducer transmits the movement through the external gear to the ball crusher-crusher and shovel drum located in the bunker.

The shredder fingers lower the organic fertilizer and grind it using a counter knife. The crushed organic fertilizer is delivered by the drum to the open area of the fertilizer distributor. The rotator attached to the ram frame is used for watering and forming the planting beds at the same time as the organic fertilizer is added.

In this article, the optimal values of the parameters of the combined aggregate disc drive shafts studied in theoretical and single-factor experiments were determined using the method of mathematical planning of multi-factor experiments [7,8,9].

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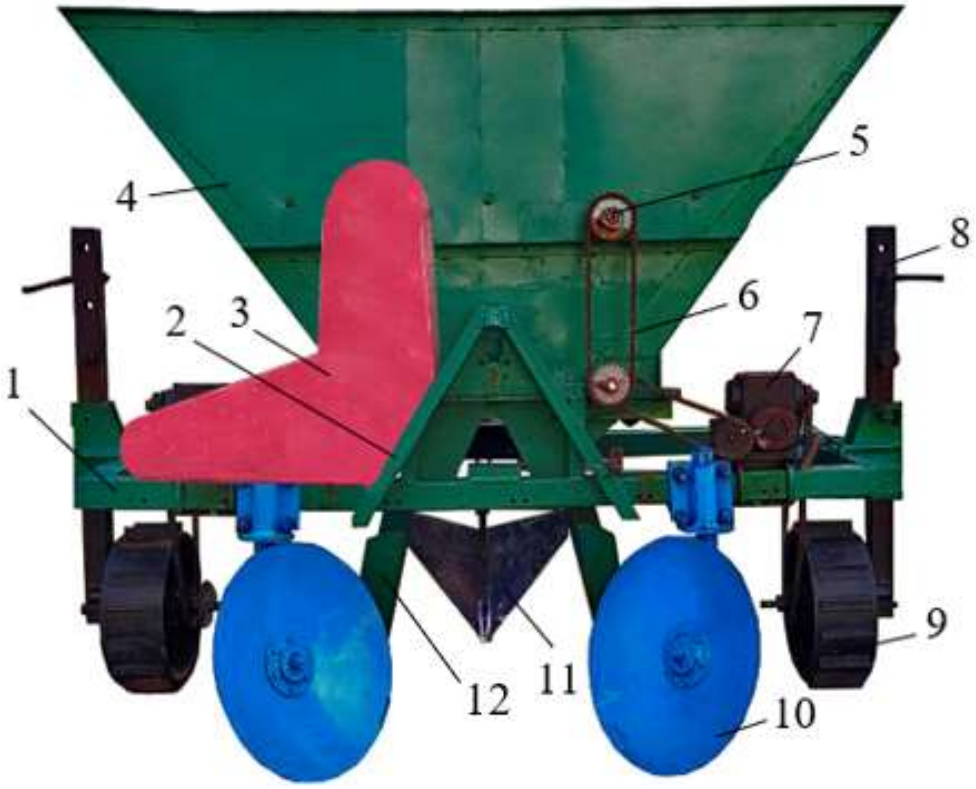


1-rama; 2-suspension device; 3-kujokh; 4-bunker; 5-toothed shesternia; 6-chain transmission; 7-reducer; 8-driving support wheel; 9-soil biter; 10-spherical disk bearing; 11-flip-up handle; 12-fertilizer diverter

**Figure 1. The appearance of the combined unit**

In this case, it is considered that the influence of the factors on the evaluation criteria is fully explained by the second-order polynomial, and the experiments were conducted according to the Hartley-4 plan [10; pp. 241-243].

The studied factors, their designations, change ranges and levels are presented in Table 1.

When conducting multi-factor experiments, the egate depth (Y1, cm) and the tensile strength of the working body (Y2, kN) were accepted as evaluation criteria.

Regression equations were obtained for the data obtained in the experiments using the "PLANEXP" program, developed in the experimental testing department of the Agricultural Mechanization Research Institute:

**Table 1**

**Factors, their definition, change intervals and levels**

| Factors and their units of measurement | Conditional designation | Change intervals | Levels | | |
|---|---|---|---|---|---|
| | | | lower (-1) | primary (0) | High (+1) |

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| | | | | | |
|---|---|---|---|---|---|
| The installation angle of the disk drive shafts in relation to the direction of movement, α,° | $X_1$ | 5 | 25 | 30 | 35 |
| The angle of installation of the disk drive shafts relative to the vertical, β,° | $X_2$ | 5 | 5 | 10 | 15 |
| Longitudinal distance between the disc and tilting axles, cm, | $X_3$ | 10 | 100 | 110 | 120 |
| Aggregate movement speed, km/h | $X_4$ | 1,5 | 5,0 | 6,5 | 8,0 |

- by the depth of the egate (cm):

$$Y_1 = 18{,}927+0{,}759X_1-0{,}375X_2+0{,}623X_3-0{,}373X_4-0{,}333X_1^2-$$
$$-0{,}075X_1X_2-0{,}225X_1X_3+0{,}300X_1X_4-0{,}328X_2^2+0{,}147X_2X_3-$$
$$-0{,}226X_2X_4-0{,}459X_3^2+0{,}225X_3X_4+0{,}271X_4^2; \quad (1)$$

- according to the tensile strength of the working body, kN:

$$Y_2=2{,}545+0{,}312X_1-0{,}377X_2-0{,}438X_3+0{,}323X_4-0{,}129X_1^2+$$
$$0{,}008X_1X_3-0{,}099X_2^2+0{,}025X_2X_3-0{,}028X_2X_4+$$
$$0{,}106X_3^2-0{,}023X_3X_4+0{,}265X_4^2. \quad (2)$$

The regression equations (1) - (2) were solved under the conditions that the criterion "Y1" should be in the range of 19-21 cm, and the criterion "Y2" should have a minimum value, and the following values of the factors ensuring the fulfillment of these conditions were determined (Table 2).

**Table 2**

**Optimal values of the working body of the irrigation disk**

| x4 | | x1 | | x2 | | x3 | |
|---|---|---|---|---|---|---|---|
| code | result | coe | result | code | result | code | result |
| -1 | 5,4 | -0,5692 | 27,1542 | 0,9810 | 14,9048 | 0,5672 | 115,6715 |
| 0 | 6,4 | 0,2602 | 31,3008 | 0,5061 | 12,5307 | 0,7268 | 117,2680 |
| 1 | 7,6 | 0,8809 | 34,4046 | 0,8604 | 14,3020 | 0,8318 | 118,3180 |

**SUMMARY**

Thus, from the results of multi-factor experiments, the following conclusion can be drawn: when the installation angle of the disk-shaped blades of the device for local application of organic fertilizers is 30°, the installation angle is 10° in relation to the vertical, and the longitudinal distance between the blades is 120 cm, the blades consume less energy and work at the required level. provides.

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