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## **POTATO PLANTER WITH DISCS**

**Abstract:** To simplify the design and reduce the metal capacity of the machine, as well as improve the reliability of the technological process, a potato planting machine with disk operating elements is proposed. It is established that the potato planter with disk working organs provides a density of planting of 30 thousand pieces per hectare with a row spacing of 75 cm, while its performance corresponds to agrotechnical requirements.

Keywords: potato, potato plant, disk working body, soil, dosing unit, planting.

## Introduction

In Uzbekistan, potatoes are grown in "dehkan" households (77.7%), farms (21.4%) and others (0.9%) mainly on land surfaces with an area of 0.3–5 hectares. As a rule, in these categories, manual labor predominates in the production of potatoes.

Among the technological operations for growing potatoes, the potato planting operation occupies an important place, which predetermines the future harvest.

The existing designs of potato planters are complex and metal-bearing [1, 36–72; 2, 43–82, 3, 12–21]. In addition, in Uzbekistan, the use of modern high-performance potato planters is hampered by the fact that they do not give the proper effect when using them in low-flow areas with specific mechanical and technological properties of soils.

**Objects and methodology of research.** The object of research is a potato planting machine with disk operating elements and the technological process that it implements.

The agrotechnical evaluation of the potato planter was determined according to TS00861251–020: 2014 "Combined aggregate for pre-plant soil preparation with simultaneous potato planting. Programs and methods of testing. "

The discussion of the results. At the Tashkent Institute of Agricultural Irrigation and Mechanization, the authors developed a new design for a potato planting machine with disc working bodies (Fig.1), which includes a common frame 1, an attachment 2, a hopper 3 with an inclined bottom and a shutter 4, a tuber feeder with rollers 5, having a profiled groove 6, a divider 7 separating the cavity beneath the rollers on the left and right windows 8. At the bottom of the feeder, a dosing mechanism with augers 10 is disposed in the outer cylindrical casing 9 with various direction turns. The augers 10 are closed with attached to them disk type 11 dispensers that have windows 12 at the first screw turns for passage of a single tuber into the screw cavity [4, 17].



Figure 1. Scheme of the potato plant: a) - side view; b) - a view of AA

The ends of the outer casing 9 are made in the form of conical funnels connected to the jaws 13, which in turn are connected to the openers 14. Next, the machine is provided with furrow-closing discs 15 and a drive 16 of rollers and augers from the support wheel 17.

The potato planter works as follows. When the machine is moving, the planting tubers loaded into the hopper 3 when the damper 4 is opened by its own weight along the inclined surface of the bottom of the hopper enter the zone of action of the profiled rolls 5 of the feeding device by a continuous flow. Counter rotating profiled rolls 5 take tubers from the incoming stream in accordance with the size of the profiled grooves 6 thereon, and the sparger 7 distributes them to the left and right augers 10 of the dispensing mechanism, respectively. In this case, the tubers from the splitter 7 enter the left and right augers only when the windows 12 of the inner cylindrical casing 11 approach the guide windows 8 of the divider 7. Those from the windows 12 in the cavity, respectively, between the spiral turns of the left and right screws 10 and the inner cylindrical casing 11 of the tuber move horizontally and from the conical funnels of the outer cylindrical casing 9 enter the club holes 13, along which they roll down into their end part and from there enter the furrows, formed by left and right openers 14. Closure furrows planted with tubers of soil carried furrow-closing discs 15.

The drive 16 of the rollers 5 of the feeding device and the screws 10 of the dispensing mechanism is produced

from the support wheel 17 by means of chain drives, by replacing the sprockets which match the rotation speed of the rolls and screws in accordance with the inter-nest seeding distance of the tubers.

The use of the proposed potato-planting machine simplifies the design and reduces the metal capacity of the machine, increasing the reliability of the technological process of feeding the tubers to the openers.

On the basis of theoretical studies, an experimental prototype of potato-planter with disk working organs was constructed.

Experimental studies of the prototype potato planter were carried out at the training and experimental station of TashSUA (Tashkent State University of Agriculture). The soil of the fields of the training and experimental station is loamy gray with an equal relief. The moisture content of the soil at a depth of 5–25 cm was 14.8–19.7%, the soil hardness was 0.38–0.97 MPa.

During the laboratory studies, the sorted potatoes of the variety "Zarafshan" were used, with an average length of 60.1 (V = 28.4%) cm, a width of 49.0 (V = 22.6%) cm and a thickness of 37.0 (V = 28, 4%). The average weight of the tuber was 68 (V = 68.6%) grams. Basically, tubers with a mass of 51–80 grams (92%) prevailed, with a mass of 30–50 grams being 3.5%, and weighing more than 81 grams being 4.5%.

In laboratory tests, the machine was adjusted to plant potatoes with a spacing between tubers of 25 cm, and the

depth of planting was set to 10 cm. The unit operated at an average working speed of 1.3 m/s.

With the installation distance between tubers 25 cm, the potato planting machine provided an actual average distance between the tubers of 26.4 cm, the depth of planting was 12.2 cm, the uniformity of tuber distribution was 64.8%. The share of omissions and twins is within the permissible limits and amounted to 1.8%

and 1.6%, respectively. Damaged tubers consisted 1.8%. After the passage of the machine, the width of the main rows was 75.6 cm with a standard deviation of  $\pm$  1.2 cm, and a butt joint of 74.6  $\pm$  0.64 cm.

**The conclusion.** Potato planter with disc working organs provides a density of planting of 30 thousand pieces per hectare with 75-cm rows, while its performance corresponds to agrotechnical requirements.

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