



Techniques and Technologies Used in Harvesting Potato Tubers

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Annotation. The work provides an analysis of technologies for cultivating potatoes on ridges. The research was carried out to justify the choice of techniques and technical means that can be used to implement universal innovative technology.

Keywords: soil, tillage, ridges, potatoes, cultivator, harvesting, planting, planters, soil moisture, equipment, potato harvester.

INTRODUCTION

Global and local climate change is characterized by heavy rainfalls and droughts, which causes temperature and humidity stress of plants, erosion of ridges and difficulties in autumn harvesting due to waterlogging of the soil.

New approaches to the implementation of efficient land use schemes: the creation of industrial agrotechnoparks, agrobioclusters that implement the cultivation and deep processing of products, pose the task of improving field production technologies, primarily potatoes as the most energy-intensive crops.

MATERIALS AND METHODS

The tasks of modernizing technologies for growing 40-60 t/ha of potatoes are solved by selecting fields, maximizing the use of fertilizers, protective equipment, irrigation, high-precision technologies for the industrial cultivation of these crops.

Modern tractors and harvesting equipment, to reduce the specific pressure on the soil, have wheels with wide tires of 60-90 cm, which accordingly require wide row spacing of 90 cm or more. However, the optimal distance between plants is determined by biology: the size of tuber nests and plant habit [1].

RESULTS AND DISCUSSION

Numerous studies have proven that the total yield at the optimal distance between tubers during planting is determined by planting density, which for potatoes, for example, is 35-50 thousand plants/ha, or 160-240 thousand stems/ha, in depending on the purpose of the product [1]. Thus, a technical contradiction arises between the expansion of row spacing and the density of the stem stand. This can be solved using ridge technologies with planting in 2-4 rows and arranging bushes in a checkerboard pattern [2], which are especially important for artichoke, since its tuberous nests are much larger than those of potatoes, and the distance between bushes should be correspondingly



larger - depending on the variety and yield, 1.2-2.0 times. A serious problem when cultivating potatoes in ridges remains the harvesting of green mass, during which the ridges are compacted by the wheels of trucks transporting it, which complicates the subsequent digging of tubers.

For optimal development of tuberous plants, it is necessary to form and maintain certain technological parameters of the development zone of the tuberous nest and root system: optimal soil density, humidity, resistance to heavy rainfall and drought. Potatoes are "loose soil" crops. They react especially strongly to compaction, waterlogging and drought. The optimal volumetric mass for soddy-podzolic and slightly loamy soils is 1.0-1.2 g/cm³. In denser soil, the root system develops weaker, the tubers are smaller and more deformed [3].

It is advisable to carry out autumn tillage of the soil when cultivating potatoes with a reversible plow, which eliminates the formation of fall ridges and collapse furrows in the field. After plowing, the soil is treated with disc harrows. On clay soils, it is advisable to carry out disking in two tracks. Treatment should be carried out only when the soil reaches physical ripeness.

To create a fine-grained soil structure with sufficient pore volume and good contact with the lower water-retaining layers, it is necessary to carry out pre-planting tillage. It should be carried out only to the required depth, which should be 4-5 cm below the level of subsequent placement of tubers. This is done so that during harvesting, the digging plowshares of combines do not lift a layer of untreated soil onto the elevator, which is difficult, and under some conditions impossible, to separate from the tubers [1].

An effective technique is local deep loosening in the center of the ridge with local application of fertilizers and water-retaining biopolymers, destroying the submersible compaction, ensuring improvement of the water-air regime of the ridge [1]. Taking into account that the yield of potatoe is greatly influenced by moisture supply, all soil treatments should be aimed at increasing the retention of soil moisture, improving moisture-saving capacity and reducing evaporation.

Pre-planting soil treatment must be carried out in the direction of subsequent planting, which will subsequently ensure better operation of the equipment. On loamy soils, it can be carried out using vertical milling cultivators, followed by the formation of a ridge using a passive ridge former [1].

In our country, an innovative ridge technology for cultivating potatoes and potatoe has been developed [2, 4], according to which pre-planting soil cultivation is carried out to a depth of 8-12 cm with simultaneous strip subsoil cultivation at 16-25 cm for future rows plants. The results of her test showed that the potato yield on the ridges is close to the value of this indicator obtained on the ridges. The higher content of impurities in the heap when cultivated on ridges, compared to ridges, is explained by increased soil compaction by machinery during inter-row cultivation and mechanized harvesting of stems.

To create a ridge machine technology for cultivating potatoe, it is advisable to consider the possibilities of converting existing machines.

The main operation in the spring before planting potato tubers and potatoes using ridge technology is cutting the ridges with machines with milling or passive working bodies, depending on the mechanical composition of the soil. If milling machines were used during pre-planting treatment, and also on light soils, bed formers (bed formers) with passive working bodies can be used to form ridges. In terms of working width and bed formation parameters, these machines can be considered as basic for the development of a new technology machine complex.

Planting of potatoe tubers is carried out at the earliest possible times in the area where it is grown. To implement this technological process, a set of tools and devices similar to those used for potato ridge technology is suitable. Planting is carried out with a distance between tubers of 35-50 cm in a checkerboard pattern according to the schemes 110+40, 70+40+40 or 100+40+40 cm. When growing potatoe, it is important to ensure the specified plant density. The planting rate depends on the mass of the tuber and planting density; it varies from 555 to 1850 kg/ha.



Table 1. Norm for planting tubers with two planting lines on a ridge (180 cm)

Distance between plants in a row, cm	Number of bushes, thousand pcs./ha	Norm for planting tubers based on the weight of one tuber in grams, kg/ha			
		25	30	40	50
30	37,0	925	1110	1480	1850
40	27,8	695	834	1112	1390
50	22,2	555	666	888	1110

Depending on the purpose, conditions and time of sale of potato tubers, industrial harvesting technology provides three options: direct combining; harvesting with diggers, placing crops from several rows in windrows, followed by selection by combines; placing crops in unharvested rows by diggers, followed by harvesting with combines.

CONCLUSION

Thus, bed technologies are effective for growing potatoes.

The problems of technical equipment for the industrial cultivation of potato on ridges can be solved by converting equipment for growing potatoes.

The presented proposals and characteristics of the machines can form the basis for the development of technological maps for cultivating potatoes using ridge technology.

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