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ANALYSIS OF TECHNIQUES AND TECHNOLOGIES FOR INTRA SOIL APPLICATION OF ORGANIC FERTILIZERS PREPARATION OF SOIL FOR SOWING

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ABSTRACT

The article provides an analysis of techniques and technologies for the application of organic fertilizers in the preparation of field melons for planting.

Keywords: *Organic Fertilizers, Soil, Techniques, Technologies*

I. Intorduction

Our country is a leader in the cultivation and export of melons, including watermelons and melons. Therefore, improving the quality and volume of melon cultivation is a topical issue today.

Due to the lack of nitrogen in melons, the plant stops growing and the stalk becomes thinner. Therefore, the most optimal way to increase the quality and volume of cultivation of melons is to increase soil fertility.

An important condition for increasing soil fertility is the use of organic fertilizers that regulate not only the nutrient regime of plants, but also the intensity and volume of the small biological energy cycle in agroecosystems. Academician D.N. Pryanishnikov noted that "no matter how large the production of mineral fertilizers, manure never loses its value as one of the most important fertilizers in agriculture" [1].

Today, the problem of obtaining high quality agricultural products and rising prices for mineral fertilizers is growing worldwide. Therefore, there is a growing interest in organic fertilizers.

It is known that, unlike mineral fertilizers, organic fertilizers increase productivity over several years and do not harm the environment. Today, there are two methods of fertilizing agricultural crops: mass and local [2].

In order to get a good harvest from melons, organic fertilizers are sprayed on the field surface in the amount of 30-40 tons per hectare before plowing. This method is widely used due to its simplicity. The disadvantage is that a large amount of manure is required, and if the sprayed manure remains in the open air, its effectiveness will decrease. At the same time, the fact that the main part of the manure does not fall into the developing layer of plant roots leads to incomplete assimilation by plants.

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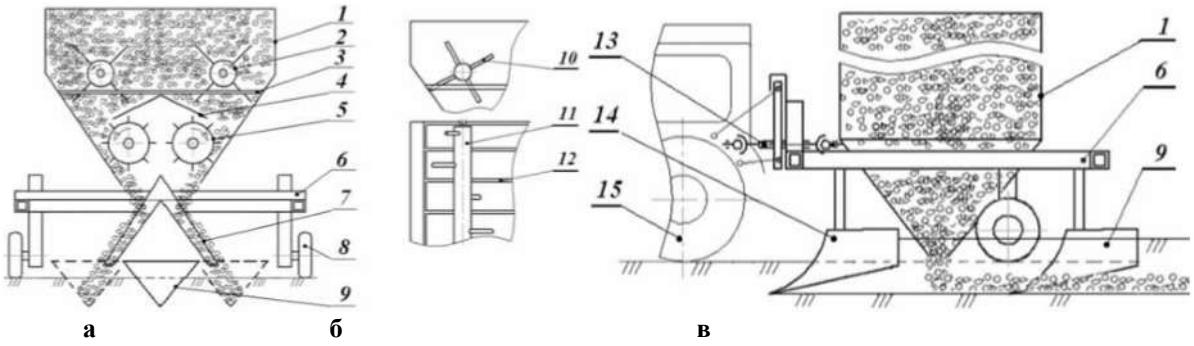
II. Method

Studies have shown that the yield increases from 14 to 20% when the manure is applied in the same proportion to the "local" method of spraying [3]. In addition, a small amount of fertilizer is required when using this method.

In order to overcome the above-mentioned shortcomings and increase the efficiency of fertilizer applied to the soil, in accordance with agro-technical requirements, it was necessary to develop local burial technology and new techniques for its implementation by tying manure to the soil layer where plant roots develop [4]. A number of techniques and technologies have been developed to do this.

In IMEA, a device was developed for local application of organic fertilizers to the soil in preparation for planting melons in the field [5].

Organic Fertilizer (Fig. 1) Bunker 1, two-leaf drum 5 placed at the bottom of the bunker (for two-row organic fertilizer), Separator 4 mounted on the drum and ribs 12, Large step grid-shaped cutter 3 two-finger threshers 2 (there is a small gap between the thresher shaft 11 and the grille-type cutter, and the thumb fingers 10 pass between the cutter ribs), direct the manure installed under the blade drum into rows along the two streams the drive shaft 7 consists of a base wheel 8 frame 6, all the mechanisms of the device are assembled, three slot openers 9 and 14 (two of which are located on the front beam) attached to the frame. Groove openers are designed to open grooves when applying manure locally. The third furrow opener is attached to the rear beam and is designed to open the irrigation furrows at the same time as the soil is pulled over the manure furrows. The device is mounted on a tractor 15. The rotating mechanisms of the device receive movement from the tractor power take-off shaft through the cardan shaft 13. The amount of fertilizer is adjusted by changing the number of revolutions of the blade drum and the length of its active part.

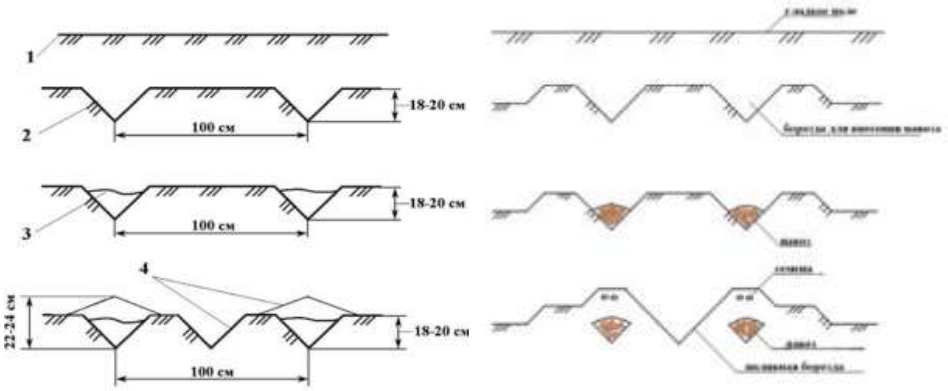


a - rear view; b is a finger-tapping scheme with a grid-shaped cutter; v - side view;
1 - bunker; 2 - beater; 3 - cutter; 4 - separation device; 5 - parrakli drum; 6 - frame;
7 - reference tarnov; 8 - base wheel; 9 - rear groove opener; 10 - thumb; 11 - vibrating shaft;
12 - cutting ribs; 13 - cardan shaft; 14 - front groove opener; 15 – tractor
Figure 1. Technological schemes of device operation:

The technology of the device workflow is as follows. Once the organic fertilizer is loaded into the hopper, the small pieces pass between the cutter ribs and fill the space on the bristle drum, while the large fractions of the fertilizer remain on the grill-shaped cutter. The vibrating fingers grind large particles as they pass between the

ribs of the grate. The crushed particles fall into the cavity on the blade drum. The drum drums rotate the fertilizer, partially crush it, and transfer it to a guide trough at the bottom of the bunker.

The front furrow openers open two furrows and fertilizer is poured through the furrows leading to the formed furrows. The third furrow at the back buryes the manure furrows at the same time as opening the irrigation ditch between the furrows formed.



1-flat field; 2-grooves for fertilizing; 3-locally applied fertilizer;
4-Open the irrigation ditch along with burying the organic fertilizer.
Figure 2. Technology of local application of organic fertilizers to the soil

The device can also apply non-specially prepared organic fertilizers to the soil with high moisture content, not crushed and crushed. This will reduce the cost of fertilizing the soil and increase the efficiency of fertilizer use. But this device and technology gives its effect in the fields plowed and leveled in the fall. The disadvantage of this technology is that the operations are performed with separate aggregates. As a result, energy and fuel consumption increase.

The technology proposed by SAIME scientists D.Sh.Chuyanov and A.Kh.Khadjiev is as follows: on the plowed and leveled field surface the manure is poured in three rows and the spilled manure is buried in the soil at the optimal depth using the proposed aggregate. Hence, this technology is implemented in two passes with manure spreaders and manure burying aggregates.

The manure spreader unit (Fig. 3) consists of a series manure spreader ROU-6 1, a removable cover 4 with three distribution rods 5, adjusting caps 6 and markers 8, and a device 7 for the plant feeding part mounted on the frame [6].

The technological process of manure spreader operation is as follows. The fertilizer falls from the aggregate body 1 to the crushing bit 3 with the conveyor 2 and is spread through the coating 4 by three rows of strips along the guide groove 5. A flat spread of fertilizer along the row is achieved with an adjusting cover 6.

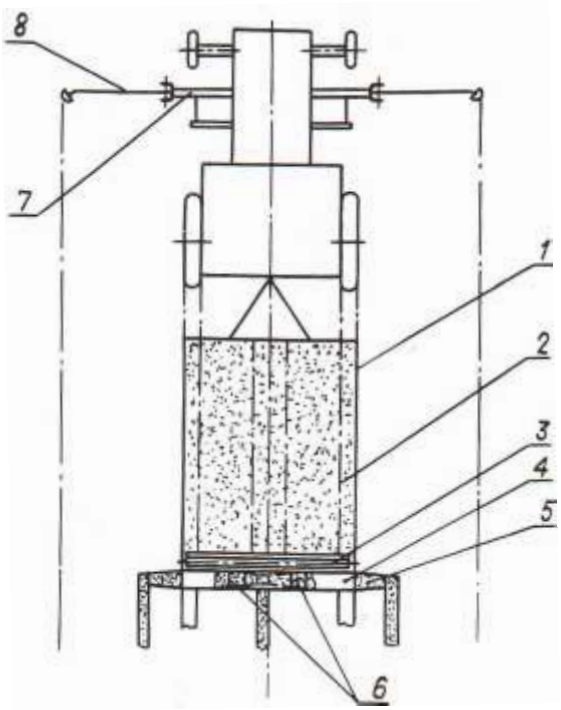


Figure 3. Technological scheme of manure spreading unit

The compost burying unit consists of frames 1, compactors 2, composters 3, levelers 4, support wheels and trench openers 5.

During the operation of the unit, the harrow cutter cuts and lifts 2 layers of soil from the bottom, creating long holes that put striped manure 6 on the surface of the field. The manure extractor 3 drops the manure into the formed cracks. After the passage of the working bodies, the crack is covered with soil. The back-adjusting leveler completely flattens the 4 filled grooves. In the final pass of the unit, the groove openers form 5 grooves.

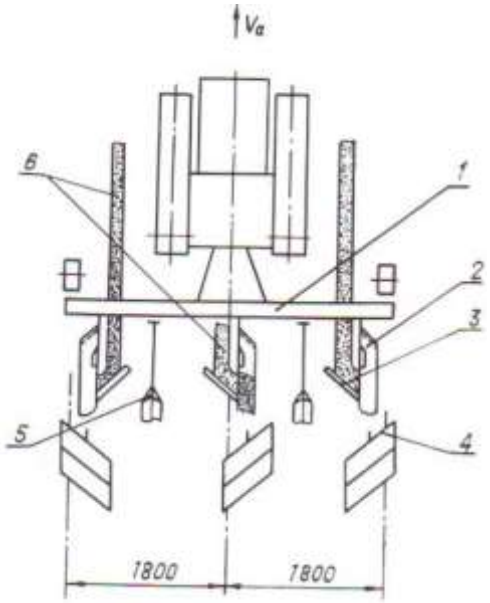


Figure 4. Technological scheme of aggregate work burying manure in the soil

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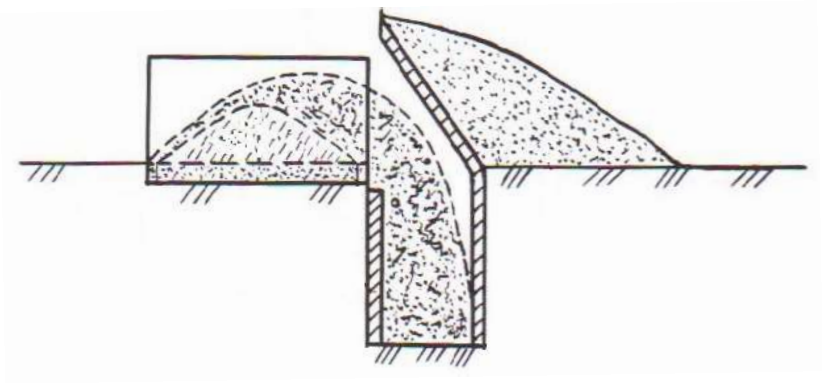

Figure 5. Scheme of soil fertilization technology

With the help of the proposed techniques and technologies, the manure is applied to the soil in three rows in one pass and at an optimal depth. In turn, in the implementation of this technology, its main drawback is the fact that the operations of overturning, leveling, spraying of fertilizers and application to the soil with separate units. This leads to an increase in costs.

Scientists of the Russian Academy of Agricultural Sciences E.V.Gerasimov and V.H.Maliev also developed a machine for local application of organic fertilizers into the soil. The machine consists of ROU-6M organic fertilizer spreader and parts that bury the fertilizer in the soil. These, in turn, consist of the following parts: frame 1, body 2, dividers 3, rafters 4, hydraulic cylinders 5, shutters 6, groove openers 7, support wheels 8, conveyors 9, cardan gear 10, reducer 11 [7].

Aggregate movement time groove openers form 7 grooves. The organic fertilizer is conveyed by conveyors 9 and the dividers 3 divide the fertilizer into two and pour it into the furrows formed by the furrows 4. The manure-filled furrows are closed with the help of zagortachs 6 and piles are formed.

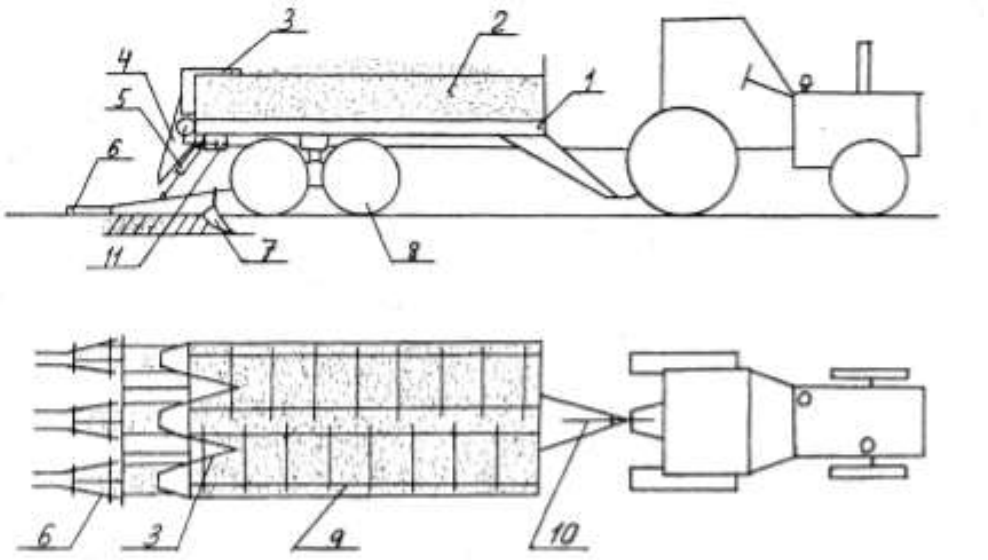

Figure 6 Soil organic fertilizer machine

With the help of this unit it is possible to increase the productivity by applying organic fertilizer in three rows in one pass at a depth of 14 ... 16 cm, at intervals of 70 cm. The disadvantage of the unit is that it is designed to work in plowed and leveled fields, and the optimal depth is not achieved when fertilizing.

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Thus, it is clear from the above technical developments that there are shortcomings in the techniques and technologies of application of organic fertilizers in preparation for field planting.

In order to overcome these shortcomings, it is expedient to develop and apply the technology of minimal tillage and combined aggregates that implement it.

Scientists of ChSAU Y.A. Kochinov and A.I. Lubimov developed a unit for tillage and simultaneous application of liquid organic fertilizers in the soil [8]. The tillage device includes a frame, tilting handles, a roller, a circular knife and support wheels.

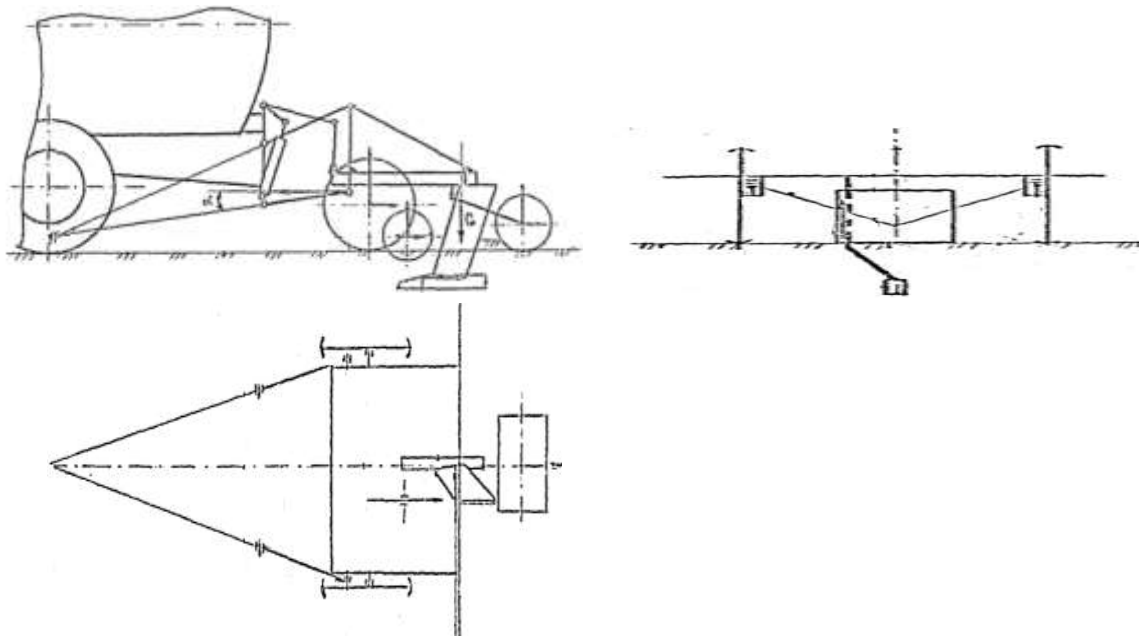

Figure 7. Aggregate scheme for minimal tillage

The coverage width of the device for applying liquid organic fertilizers to the soil is 3.0 ... 4.0 m when aggregated with high-powered tractors. Using this device, liquid organic fertilizers can be applied to the soil to a depth of 15 ... 20 cm. The distance between the main working body of the device, the pitchers with a sloping handle, is as follows: 0.4 ... 0.5 m when liquid organic fertilizers are spread evenly across the field surface, and 0.8 ... 1.0 m when applied in a strip.

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