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**MODERN TECHNICAL EQUIPMENT PROVIDED WITH DISTRIBUTION
OF SEEDS, FERTILIZERS AND INSECTICIDES MICROGRANULATED
FOR HOEING PLANT CULTIVATION TECHNOLOGY SETTING UP**

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***Abstract:** Inside the technological chain of agricultural crops, the sowing is a very important link which ensures the density, the uniformity and the energy of the crop. Through the research – development activity developed in a partnership between INMA Bucharest and S.C. MAT S.A. Craiova have been realized a modern technical equipment equipped with distribution devices for seeds, granulated chemical fertilizers and insecticides as micrograins for improvement the hoeing plant crops setting up. The originality towards similar technical equipments in use consists in: allows a great diversity of sowing schedules, both for crops with large distances between rows and for the ones with small distances between rows; allows working in various conditions of soil preparation; ensures the approach, simplifies and reduce stime requested for change the distribution disks and for technical interventions at seed transmissions, fertilizers and granulated insecticides, also for the support wheels; it has a simplified construction due to the new solutions which confer it an easy technological performance, safety in use, maintenance, easy adjustments by a single user (the operator).*

***Keywords:** technology, sowing, technical equipment, hoeing plants.*

1. INTRODUCTION

Modern crop establishment and hoeing plant fertilization prevent degradation of soil structure by incorporating direct solid chemical fertilizers and insecticides in the form of granules. For this purpose specialized machinery used to have in their composition and mass distribution of seeds, chemical fertilizers and insecticides solid. In accordance with the overall strategy of the company MAT SA Craiova through research and development in partnership with INMA Bucharest was developed a new machinery for sowing, hoeing plant fertilizing distributed in the form of micro insecticides. It contains new solutions in terms of seed distribution system and distribution device in the form of micro insecticides. However, it is easier, safer, low weight at a lower price which is simple and made adjustments being adapted to the needs of beneficiaries. By adopting the optimal solutions in conceptual design parameters to ensure superior quality work, safety in the mining and transport, enhanced reliability, maintenance and adjustments made simple will help increase the competitiveness of the machinery required on market.

2. DESTINATION AND DESCRIPTION OF DESIGN

Machinery (Fig. 1) for technology start-up agricultural mechanization of hoeing plants crop used to sowing of many crops hoes (grain sowing grain maize, sunflower, beans, sugar beet and forage, sorghum, cotton, etc., or in nests with 2-3 seeds from melons, cucumbers, zucchini, etc..) and allows working in a variety of schemes and sowing conditions.



Fig. 1: Equipment for sowing and fertilizing hoeing plants crops provided with sections of disk plows and equipment with distribution of insecticides in granular form

It is comprised from the following major subassemblies: framework, wheel drive left-right support, air, vacuum, Department of sowing, fertilizer box, foot bunker, foot boxes, micro, seed transmission, markers of left behind right, the shareholders tracers, micro boxes, foot parking plows fertilizers and micro, intermediate gear, transmission and micro fertilizers and cardan transmission.

Sowing section (Fig. 2) is mounted on the frame bar via a system of articulated rods and plates which are attached to a square pipe with two clamps. The sections are provided with boxes sowing seed distribution device for pneumatic, double disc coulters, compaction wheel and chain transmission.



Fig. 2: Sowing section

The **distributor of seeds** (Fig. 3) completely new skeleton is made of two rotating disc between sowing interchangeable.



Fig. 3: Seed distributor

Sowing discs are made of steel and are fitted with holes to distribute seed. Depending on the variety of seed sowing holes discs are different diameters from 2.5 to 5.5 mm. Discs can be changed easily without recourse to any utensil. To eliminate losses from seed or vacuum chamber is provided a disk lowland and gaskets. To allow working in different conditions of soil preparation for sowing stations are equipped with double disk plows (Fig.4).



Fig. 4: Double disk coulter

Hope fertilizer has prismatic form with angles of flow for all types of fertilizers. The hope is provided at the bottom, with three slots for draining-feed fertilizer distributors. Under these slots are vending fertilizer type grooved cylinder (Fig. 5).



Fig. 5: Hope fertilizer provided with fertilizer distributors type with grooved drum

2. OPERATION

In making the move to the tractor PTO, the blower, trained by shaft transmission shaft and belt type poly V, creating a depression that is transmitted through pneumatic tubes to absorb the vending of sowing divisions. Because depression, seed in food rooms are retained on disk vending outlets. The movement of technical equipment, wheel support and drive forward movement right through the transmission chain to distributors axes, revolving disk, sending seed to the channels opened by double disk shovels. Each hole of the disk set only one seed due to limited space around the hole. To eliminate the surplus of grain (which is incidentally) is a fixed scraper covering up to one third of the disc hole. To this end there is a correlation between the diameter of the hole layout on disk, the diameter of the holes and scarper position. Also, the left wheel support and drive forward movement through the transmission chain axes distributing chemical fertilizers crates and boxes of micro solid. Fertilizer distributors in the box are the type with grooved drum. They acquire and distribute fertilizers through flexible tubes to skate shares. The volume of fertilizer distribution device evacuated to a rotation of grooved cylinder is dosed with high accuracy because of the potential regulation length grooved with the aid of a tuning screw. Dispensers distributed micro grooved cylinder type insecticides in the amount set through flexible tubes to the skate shares. Adjusting the rules of fertilizer (ammonium nitrate, urea, nitrocalcar, superphosphate, complex, etc..) And micro is made according to agro-technical requirements and the type of chemical fertilizers and micro used, by appropriate choice of wheels in the transmission chain of technical equipment. The skate shares as gutter running some of sowing depth and sowing the drain side are placed fertilizers and insecticides as micro. The compacting wheels close channels and compact soil on the sides of the row sowing. Management of technical equipment in the field is made after traces of markers on the ground.

3. MAIN TECHNICAL CHARACTERISTICS

The main technical and functional characteristics are presented in Table 1.

Table 1

Characteristic	U.M.	Value
Type of technical equipment		Used
Energy Source	CP	65
Number of rows	buc.	6
The distance between rows	mm	70
Working width	m	4,2
Depth of sowing	cm	2...12
Exhaust fan type		Curved vane rotor before dark
Seed distribution device type		Vertical pneumatic drive
Shares type of sowing seeds		Double Disc
Seed box capacity	dm ³	36
Number of cases of solid chemical fertilizer	buc.	2
The ability of solid chemical fertilizer boxes	dm ³	120
Fertilizer distribution device type		Grooved cylinder
Number of boxes of micro	buc.	6
The ability of micro box	dm ³	16
Distribution device type micro		Grooved cylinder
Cutter type fertilizer / micro		Skate
Type markers from		Spherical disc
Action markers ago		The hydraulic mechanism of "scissors"

Precision machinery running sowing grain-grain the following main crops: corn, sunflower, castor, soya, beans, sorghum, sugar beet, cotton. It provides the following densities of sowing (Table 2).

Table 2

Culture	The distance between rows, cm	Thousands beans in ha	Steps adjusting the density to ha
Maize	70	40...100	From 5 to 5 thousand, the range of 40-60 thousand, and from 10 to 10 thousand in the range 60-100 thousand
Sunflower	70	50...90	From 5 to 5 thousand, the range of 50-60 thousand, and from 10 to 10 thousand in the 60-90 thousand range
Castor	70	70...100	From 10 to 10 thousand
Soybeans	70	300...800	From 25 to 25 thousand in the range of 300-500 thousand, and from 50 to 50 thousand in the range 500-800 thousand
Beans	45	300...600	From 25 to 25 thousand in the range of 300-500 thousand, and from 50 to 50 thousand in the range 500-600 thousand
Sorghum grain	70	50...450	From 25 to 25 thousand
Sugar beet	45	150...250	From 25 to 25 thousand
Cotton	50	200...300	From 25 to 25 thousand

The kinematics scheme of transmission for seed distribution is presented in figure 6.

The transmission ratios i_n for seed distribution are given by the relation:

$$i_n = i_1 \times i_2 \times i_3 \quad (1)$$

where: $i_1 = \frac{Z_2}{Z_1}$, $i_2 = \frac{Z_4}{Z_3}$ si $i_3 = \frac{Z_6}{Z_5}$

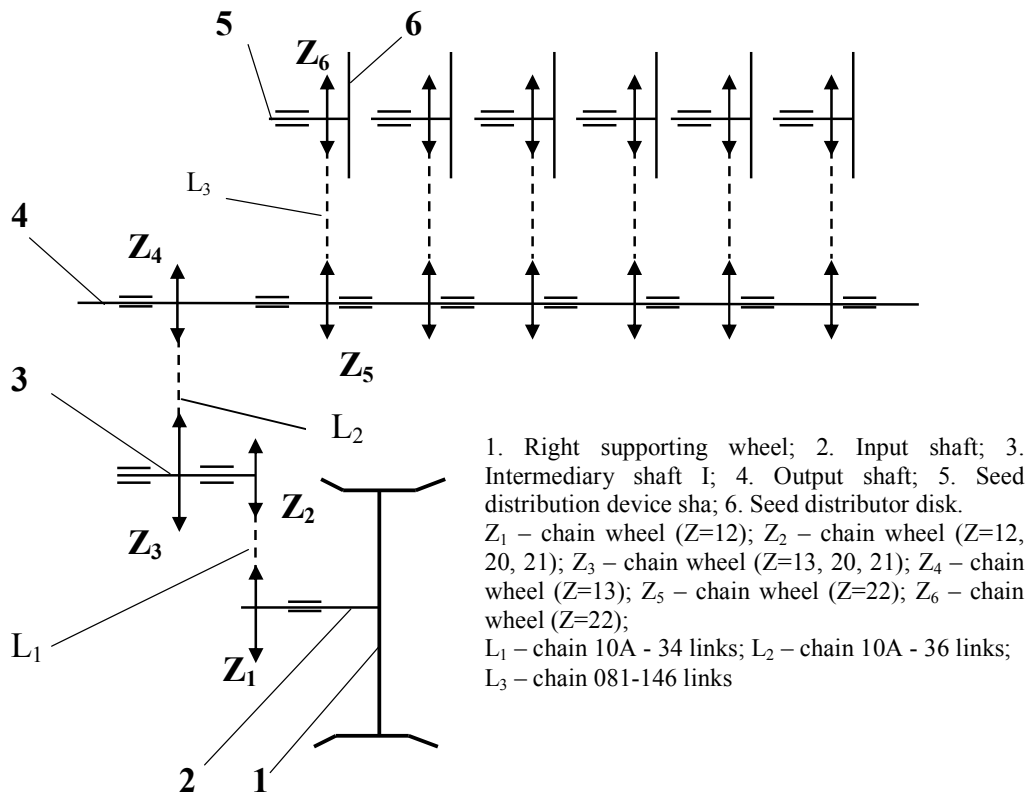


Fig. 6: Kinematics scheme of transmission for seed distribution

The kinematics scheme of transmission for granulated chemical fertilizers distribution and microgranulated insecticides is presented in figure 7.

The transmission ratios i_n for granulated chemical fertilizers distribution are given by the relation:

$$i_n = i_1 \times i_2 \times i_3 \quad (2)$$

where: $i_1 = \frac{Z_2}{Z_1}$, $i_2 = \frac{Z_4}{Z_3}$ si $i_3 = \frac{Z_6}{Z_5}$

The transmission ratios i_n for microgranulated insecticides distribution are given by the relation:

$$i_n = i_1 \times i_2 \times i_3 \times i_4 \times i_5 \times i_6 \quad (3)$$

where: $i_1 = \frac{Z_2}{Z_1}$, $i_2 = \frac{Z_4}{Z_3}$, $i_3 = \frac{Z_6}{Z_5}$, $i_4 = \frac{Z_9}{Z_8}$, $i_5 = \frac{Z_{12}}{Z_7}$ si $i_6 = \frac{Z_{13}}{Z_{11}}$

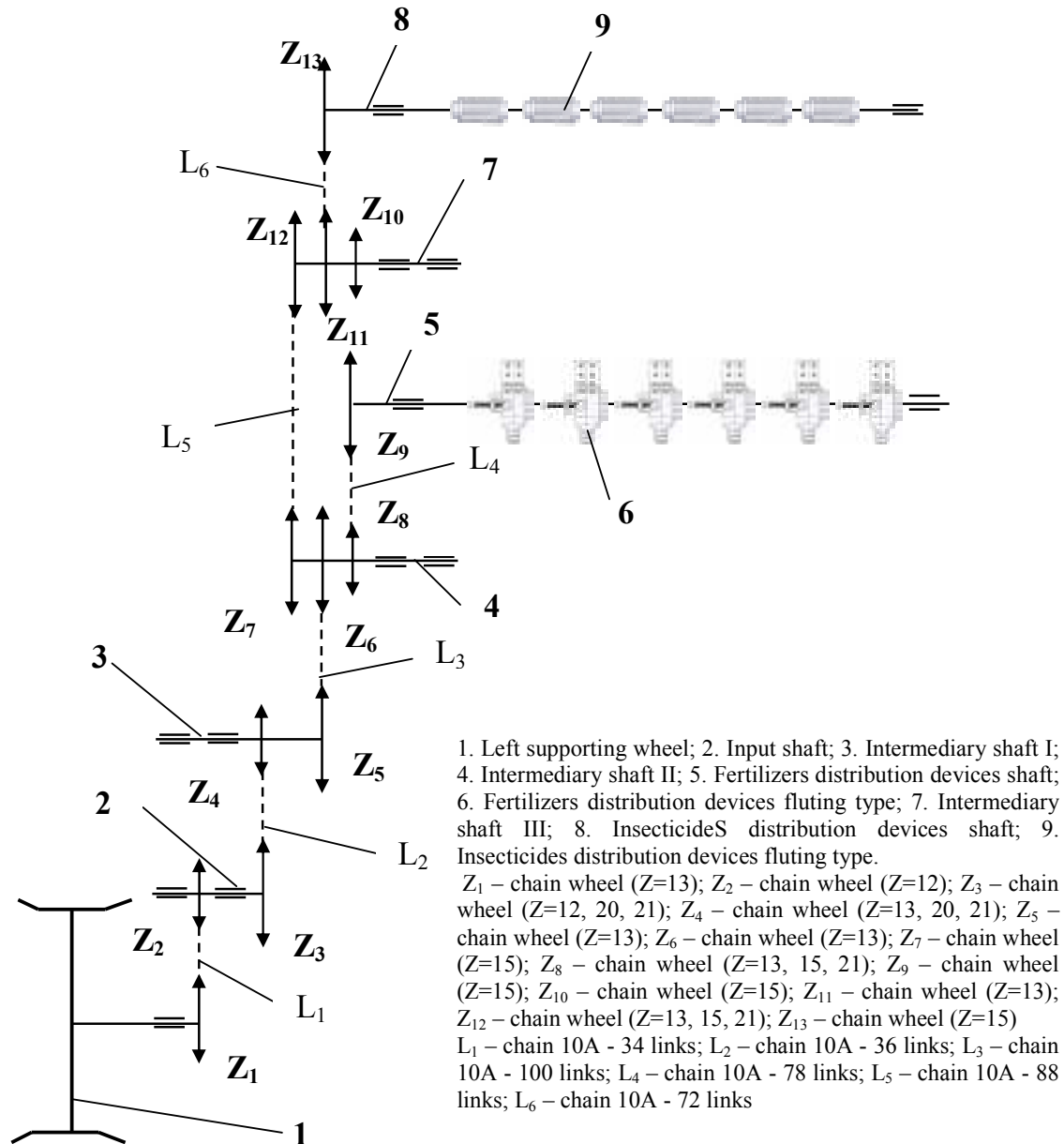


Fig. 7: Kinematics scheme of transmission for chemical fertilizers distribution

4. OPERATING INDICES

In experiments in operating conditions, conducted over an area of 52 hectares, machinery had throughout the good behavior, under these conditions the values of the coefficient of safety achieved in service between 0.984% 0.981% ...

which are plotted in Figure 11, yielding an average of 0.983% and values of the hourly work capacity during the exchange, W_{07} of between 1.4 ... 1.49 ha / h which are plotted in Figure 12, yielding an average of 1.46 ha / h.

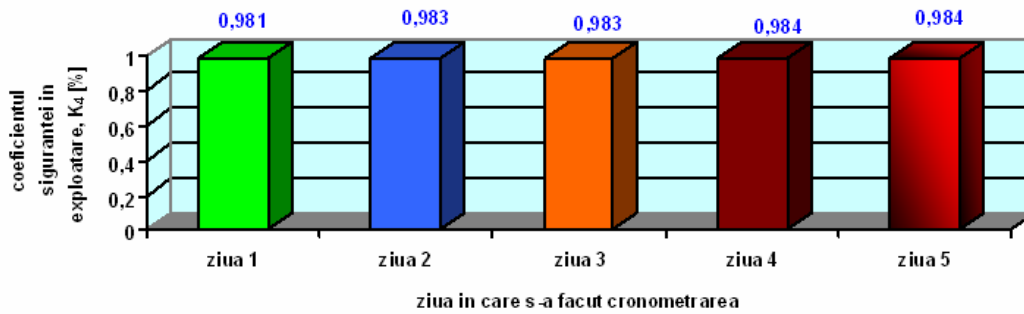


Fig. 8: Graphical representation of the coefficient of safety in operation, K_4

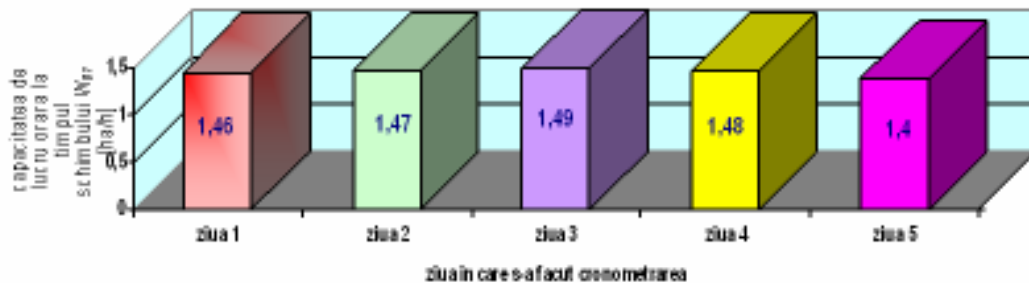


Fig. 9: Graphical representation of the hourly work capacity during exchange, W_{07}

5. CONCLUSIONS

The technical equipment for sowing hoeing plants, fertilize and insecticide distribution as micrograins has the following benefits towards the similar equipments in use:

- Ensures operator safety by meeting the essential safety requirements
- The implementation of technical equipment in the technology establishing cultures of hoeing is done to achieve international quality and environmental standards are reduced energy consumption, operating costs and maintenance.

6. REFERENCES

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