THE SPEED INFLUENCE WORKING ON SOWED ACCURACY AND PRECISION SEEDING

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Abstract

Current studies and research on sowing methods and equipment are part of the new trends for the practice of precision agriculture. Among the operating parameters of precision seeders, sowing uniformity is essential to obtain high yields 50% of the crop being determined at work sowing (according to the literature).
Any disturbance of the sowing process leads to the decrease of the qualitative indices of the sowing work and finally to the decrease of the production [3]. Thus, the main direction for improving the sowing machines is their constructive improvement (including the control and measuring equipment of the sowing precision) [5]. Regarding the sowing precision, we refer to the distance between the nests and the sowing depth.

INTRODUCTION

The sowing speed is a determining factor for the observance of the qualitative indices of the work in terms of the distance between nests in a row but also the maximum sowing depth depending on the culture that is being established and which is specified for the culture technology. [3]. This aspect can sometimes be ignored or left in an inferior position compared to other links in cultivation technologies due to constraints such as: the imminence of unfavorable weather conditions, long distances between the soils to be sown, etc.
Most seeders, which have good and very good qualities, contain instructions and recommended speeds for uniform sowing, but also contain information on maximum sowing speeds, which are often taken by the mechanizer as a standard or sometimes even exceeded, ignoring -se field conditions, such as the preparation of the germination bed. In practice, speeds exceeding the recommendations for uniform sowing lead to horizontal and vertical unevenness. [2]
The idea of not respecting the depth of sowing at least for crops established in autumn (see wheat crop), came from observations made in the field where where the depth of sowing was greater than the maximum depth set at seeders the plants did not twin properly, where the sowing depth was less than the maximum depth of the plants, they were properly twinned but in some cases suffered from a lack of moisture on the soil surface during the growing season. [4]

MATERIAL AND METHOD

The material used was taken from the technical notes of several types of seed drills, each with constructive and

functional characteristics (Precision seed drills Väderstad,, Monosem NG4 +, Matermacc MS T0, Shown in the figures below.

Fig 1 Monosem NG4 plus seed drill

Fig 2 Seed drill Vaderstad Tempo F8

Fig 3 Matermacc seed drill Ms

Fig 4 Seeders SPC 6 FSU

The ARVALIS Institute has tested several such equipment's since 2012, in order to evaluate the impact of this technique on plant development. In research conducted in 2013 and 2014, it was found that the increase in working speed at a conventional seed drill is reflected by the shallower seeding (under conditions of identical depth and tension settings) Table 1:

Table 1

INFLUENCE OF WORKING SPEED OF PRECISION SEEDERS ON SOWING DEPTH

Type of seed drill	Working speed [km / h]	Sowing depth [cm]	
		Adjusted	Measured
Monosem NG4+	5	3.8	4.2 - 3.3
	7	3,5	4.0 – 3,6
	9	3.3	3.8 – 2.8
	11	3,1	3,6 – 2,3
	13	2.8	3.5 -2.5
Matermacc MS T	5	4,4	5,2 – 3,4
	7	4,4	5,2 – 3,6
	9	4,2	5,1 – 3.1
	11	4,7	5,8 – 3,7
	13	4,5	5,5 – 4,6
Vaderstad Tempo	9	3,3	4,8 – 2,7
	11	3,5	4,1 – 3,0

(Source ARVALIS Institute)

WORKING METHOD

- The test plot with a size of 100/12 meters has been established,
- staggered at the ends from a distance of 10 meters, determined the speed of movement for each test, marked every 5 meters the place for measuring the sowing depth, the sowing depth and the distance between the nests, using milestones and a roulette with peak of 50 meters.
- Maize seeds were used under the following conditions: mass of 1000 seeds of 344 g; distributor disc with 16 holes; depression of 340 mm col H2O;
- Set speed, 5.7, 9 km / h for rated engine speed

RESULTS

The determinations were made in 3 repetitions, at the same number of nests

per unit area (500000) the results being presented in table 2

Table 2

INFLUENCE OF WORKING SPEED ON SOWING ACCURACY OF FSC6 FSU SEED DRILL

Test conditions				**Results**	
Travel speed [Km / h]	Nr. Nests per hectare	Adjusted depth [cm]	Adjusted nesting distance [cm]	Average distance between nests per row [cm]	Average sowing depth [cm]
5	50000	6	28	30,4	5,8 – 3,7
7	50000	6	28	31,36	5,5 – 4,6
9	50000	6	28	31,58	5,2 – 3,4

CONCLUSIONS

• The sowing depth is affected twice when faced with obstacles on the ground, the greater the distance between the disc and the compaction wheel, the greater the influence on the accuracy of the sowing depth and the increase in travel speed.

• The speed of movement also influences the sliding of the drive wheel which leads to the increase of the distance between the nests in a row implicitly to the reduction of the number of plants per unit area

• The short distance between the hole disc and the compaction wheel reduces this effect

• The degree of soil preparation and the degree of shredding and the degree of leveling also have an effect on the sowing depth.

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