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POSSIBILITIES OF ACCELERATED SOWING OF AUTUMN CEREALS

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ABSTRACT

We examined the possibilities of accelerating sowing and its effect on accuracy with the help of 5 farmers in Hungary. Because there are a lot of work in the autumn period the speeding up of sowing is an important issue for optimal performance. Our objectives were in this experiment to show if there are any negative effects of speeding up the sowing of autumn cereals. In summary, it can be said that in the case of narrow row seed drills of different constructions and technologies, adequate quality can be achieved at increased speeds also in terms of sowing uniformity and sowing depth. Therefore, where it is necessary and the area and soil condition are suitable for it, it is worth speeding up the work in order to achieve the optimal sowing time.

1. INTRODUCTION

The autumn season is the most stressful period for agricultural work. This is another peak of work for agriculture, when it is important to harvest our summer crops (sunflower, corn, etc.) and to cultivate our soils before the cereals. These jobs in themselves are a great burden for the farmer, whether it is the need for machinery, labor or financial outlay. In addition, autumn sowing is necessary before the frosts occur, possibly at the most optimal time and in the best quality, bescause due to agricultural structures (winter wheat and other cereals make up a huge part of the economy) a large percentage of next year's income depend on it. In Hungary among autumn-sown crops, cereals play an extremely important role. Not only because one of the main crops at the national level is winter wheat, but it is also because the sown area occupied by autumn cereals, the amount of goods produced annually and the value of the goods produced are not negligible. (Antal et al., 2012)

Years	Winter wheat				
	2015	2016	2017	2018	2019
Characteristics of production					
Harvested area, hectares	1 029 318	1 044 314	966 400	1 026 151	1 015 640
Total harvested crops, tonnes	5 331 426	5 603 184	5 246 258	5 258 432	5 377 707
Average yield, kg / hectare	5 180	5 370	5 430	5 120	5 290

Table 1. (Hungarian Central Statistical Office, Summary data of agriculture)

The quality of the sowing basically determines the winter tolerance of autumn cereals and the number of grains that determine the yield at harvest. The most important parameters influencing the yield are sowing depth, seed quantity and sowing time. (Antal et al., 2005) (Radics et al., 2012) The optimal sowing depth and other sowing data for our autumn cereals are given in Table 2. As a general rule, sowing should be 1 cm deeper than optimal, so that the bush is sure to be at the right depth. (Antal et al., 2005)

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Sowing	Time	Depth (cm)	Seed (million p/ha)	Seed amount (kg/ha)
Winter durum wheat	10. 10-20.	4-5	5,5-6,0	220-260
Winter wheat	10. 10-20.	4-6	5,0-6,5	200-266
Winter barley	09. 25.-10.05.	4-5	5,0-6,0	190-255
Rye	09. 15-25.	3-6	4,5-5,0	150-170
Triticale	09. 15-25.	4-5	4,8-5,2	220-250

Table 2. (Antal et al., 2005)

The amount of seed to be sown may vary depending on the variety and production area. Within certain limits, tillering compensates for variations, but less than optimal amount of seed can cause significant yield loss, and too dense sowing is also unfavorable because such a crop is also less resistant to diseases. (Darwinkel et al., 1977) For delayed sowing times higher seed rate must be used, (Spink et al., 2000) but overall late sowing causes yield loss. (Oleksiak, 2014)

In Hungary, the optimal period for sowing autumn cereals is September and October. (Radics et al., 2012) The optimal time to sow is actually determined by the time it takes to achieve the development that ensures overwintering. Barley, which tillers in autumn, is therefore sown earlier, while wheat, which tillers in spring, is sown later. Earlier sowing can result in stronger autumn development and thus reduce the chances of overwintering. Another problem in warm autumns is the presence of viral vectors. Subsequent sowing, however, does not in most cases provide the 3–5 leaf condition required for overwintering. Of the cereals, winter barley is the most sensitive to sowing time, and triticale is the most indifferent to it. The optimal sowing time for barley is between 25 September and 5 October. Winter wheat is one of our most widespread and oldest cultivated crops, with an optimal sowing time of October 10-20. Adherence to sowing time is particularly important, as experience has shown that a 2-week deviation from the optimum can reduce yields by more than 20%. (Antal et al., 2005)

The two most common row spacing is 12 and 15 cm between grain drills, there is no significant difference between them in terms of productivity. But the wider the row spacing, the higher the evapotranspiration of the crop. (Chen et al., 2010) Modern seed drills are usually pneumatic and the seed metering is controlled by an electric motor.

Optimal sowing depth has a large effect on emergence and yield (Lindstrom et al., 1976), for best competition aganst weeds winter wheat optimal sowing depth was found 4 cm. (Keshtkar et al., 2009) The decreasing of sowing depth in arid conditions can cause inadequate emergence, and yield loss. (Mahdi et al., 1998)

2. OBJECTIVES

In the framework of the EIP AGRI European Union tender project, we examined the possibilities of accelerating sowing and its effect on accuracy with the help of 5 farmers. Because there are a lot of work in the autumn period the speeding up of sowing is an important issue for optimal performance. But as we have seen in our spring time experiments, the acceleration can cause quality problems. (Tóth, Czakó, 2021) Our objectives were in this experiment to show if there are any negative effects of speeding up the sowing of autumn cereals.

3. METHODOLOGY

Four different speeds were set for each participating farmer, 8, 10, 12, and 14 km / h. The experiments were installed int he towns of „Tura”, „Tápiószőlős”, „Simaság”, „Fertőhomok” and „Gyóró”. After harvesting the corn and sunflowers, the consortium partners carried out the autumn tillage and then the sowing tasks for the autumn cereals. After sowing, the difference in sowing depths of the different treatments was measured during the first examinations. During the measurements, the uniformity and accuracy of the sowing depth were examined. The requirement for sowing drills is that the depth of the machine is adequate and that 90% of the seed is within the set depth (plus or minus 1-2 cm deviation is acceptable). During the stock inspection, sowing and seedbed preparation errors were recorded. The distances between the plants were not measured in the present case. In cereals sown with a large number of seeds, this distance varies on average between 1.0 and 2.0 cm, and the seed amount per hectare is stable.

4. RESULTS

Tura

The sown crop was winter wheat. The sowing depth was set to 4 cm, the average was at 8 km / h 4.4 cm, at 10 km / h 4.2 cm, at 12 km / h 4.0 cm and at 14 km / h 4.1 cm. Keepingof the sowing depth was even. With the drill, the recommended sowing speed is 8-10-12-14 km / h. We rarely encountered sowing errors. At the time of recording, the area was weed-free.

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Tápiószőlős

The sown crop was winter wheat. The sowing depth was set to 4,5 cm, the average was at 8 km / h 4.5 cm, at 10 km / h 5.1 cm, at 12 km / h 5 cm and at 14 km / h 4.7 cm. With the drill, the recommended sowing speed is 8-10-12-14 km / h. The area is weed-free with well managed plant protection. The soil surface was even, seedbed preparation was well done. The crop showed a uniform picture.

Simaság

The sown crop was winter wheat. The sowing depth was set to 3 cm, the average was at 8 km / h 2.7 cm; 3.0 cm at 10 km / h; 2.9 cm at 12 km / h and 3.1 cm at 14 km / h. At different sowing speeds, the differences are not significant, the difference between the average maximum and minimum depths does not reach 0.5 cm. The drill did a good job in all speed ranges. Sowing errors were more common only at the 8 km / h treatment. At the time of the study, the board was almost weed-free, but it is worth mentioning that the soil surface was quite uneven.

Fertőhomok

Winter wheat was also sown in the experiment in Fertőhomok. The sowing depth was set to 3 cm, the average was at 8 km / h 2.9 cm, at 10 km / h 2.7 cm, at 12 km / h 3.1 cm, and at 14 km / h 2.7 cm. The recommended sowing speed with the drill is 8-10-12-14 km / h. The drill performed well in all four sowing speed ranges. We did not encounter any plant protection problems on the experimental field, it was weed-free.

Gyóró

In the experiment near Gyóró, our sown crop was winter wheat. The sowing depth was set to 4 cm, the average was at the 8 km / h treatment 4.2 cm, at the 10 km / h 3.9 cm, at the 12 km / h 4 cm and at the 14 km / h 4.2 cm. The drill worked very well at all sowing speeds. At different sowing speeds, the differences between the maximum and minimum values do not reach 0.5 cm. We did not encounter any sowing errors or incomplete rows. The crop was in good development. The experimental area was weed-free.

5. CONCLUSIONS

In summary, it can be said that in the case of narrow row seed drills of different constructions and technologies, adequate quality can be achieved at increased speeds also in terms of sowing uniformity and sowing depth. Therefore, where it is necessary and the area and soil condition are suitable for it, it is worth speeding up the work in order to achieve the optimal sowing time.

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