EFFECTS OF SOWING TECHNIQUES AND SEED QUANTITY ON WHEAT EMERGENCE

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Abstract
Sowing techniques and the type of sowing machines play an important role in the placement of seeds in the soil and their emergence influences the growth of crops and their yield. The choice of sowing method depends on the period, soil moisture, irrigation methods, the amount of stubble on soil and in soil and of the type of machinery used for sowing.
The main objectives of the study were to determine the effects of different seeding techniques and machines, as well as different seed quantities on crop emergence, and final crop yield. The seeds were sown at different depths of 4.0 cm, 5.0 cm and 5.5 cm in different amounts of 180 kg/ha, 210 kg/ha and 240 kg/ha respectively.
The results showed that both the seeding machine used and the sowing depth and seed quantity had a significant effect on emergence.

Key words*: sowing, emergence, uniformity of emergence*

INTRODUCTION

When sowing wheat, seeders are mainly used in dense rows with mechanical or pneumatic distribution of seeds. Also, the methods and doses of seeds are different. When selecting seeders and sowing methods must be taken into account for the correct placement of seeds in the soil, their emergence and higher grain yield (Asoodar, 2001; Gruber et al., 2004; Asoodar, et al., 2006). Afzalinia (1998) indicated that mechanical seeding produces better seed emergence and row uniformity than pneumatic seeding. Hammerschmid (1990) showed that pneumatic seeders have greater row uniformity and less seed damage than mechanical seeders.

Choosing the appropriate seeding method also depends on the amount of crop residue on the field and the type of seeding machinery to be used.

In recent years, it has become more necessary to improve sowing techniques by preparing the seed bed and early sowing (Eskandari, 1999; Asoodar et al., 2000 and Asoodar and Barzegar, 2006; Gruber and Claupein, 2006).

Current conventional systems place seeds in the soil without controlling the variation in seed depth which has resulted in reduced seed emergence (Tessier et al., 1991; Riethmuller, 1995; Rainbow et al., 1992; 1994; Eshraghi et al., 2007). Also, using the correct type of furrow to open the furrows ensures better crop emergence which is due to improved depth control and seed-soil contact (Asoodar, et al., 2006; Asoodar and Desbiolles, 2004; Buttar et al., 2006). Sowing techniques and the type of seeding machines play an important role in placing seeds in the soil and their emergence which ultimately influences crop development and yield. Choosing the appropriate sowing method depends on the sowing period, irrigation methods, the amount of residue in the field and the type of sowing machines.

Thus, an experiment was carried out in the north of Olt county, on an area of 4.5

hectares, an area on which there was a spring crop and which ended up being studied following the crop rotation. We mention that before one year the same surface was subjected to a study on the influence of the preparation works of the germinal four on the emergence of the wheat crop. The main objectives were to determine the effects of different sowing techniques and depths, and different seed quantities on emergence.

The seeds were sown on flat land prepared by processing with a vertical rotary tiller on an area of 4.5 hectares divided into three lots of 1.5 hectares each.

MATERIALS AND METHODS

Location and soil

This study was carried out on a soil in the southern area of Olt county on an area of 4.5 hectares which is an agricultural company. According to the classification system of soil taxonomy, the soils are zonal chernozems, whose properties are presented in table no. 1. The soils are simple and almost simple, inclined 0 + 1% and deeply profiled, located on very old alluvial subsoil.

The climate was characterized by a temperate and average annual precipitation of 265.8 mm towards the dry.

Fig.1 The land area used

A common wheat seed, the Glosa variety, was used for most areas in the county.

For sowing, a seed drill with mechanical distribution was used with the distance between coulters of approximately 12.5 cm adjusted for the three amounts of seeds (180,210,240 kg/ha).A harrow with vertical rotors was used to prepare the land.

To control the field of weeds before sowing, 3 l/ha of herbicide was applied.

Measure

Seed depth uniformity was measured after emergence at different time periods using equation (1) (Senapati, 1989):

$$Se = (1 - Y/D) \times 100 \quad (1)$$

Where:

Se = appropriate seed depth coefficient (%)

D = the average depth to be measured, cm

Y= mean difference

Also, the emergence rate index was calculated using equation (2) (Afzalinia, 1998)

$$ERI = \sum_{i=f}^{L} \frac{[\%di - \%(di-1)]}{D} \quad (2)$$

Where:

d = percentage of seedling emergence on day X

(d-1) = sunrise percentage (D – 1) day

D = number of days post-sowing

F = number of days post-sowing to the emergence of the first seeds

L = number of days post-sowing when emergence is complete

The percentage of emergence was calculated by equation (3) (Hemmat, 1996):

$$m = \left(\frac{ppsm}{(spsm) \times P \times G} \right) \times 100 \quad (3)$$

Where:

Ppsm = number of sprouted plants per square meter

Spsm = number of seeds sown per square meter

P = percent seed purity

G = Germination percentage

RESULTS AND DISCUSSIONS

Land preparation

The results of measuring the degree of shredding function
of the working speed of the aggregate for

Working speed, Km/h Intervals Lump size of soil,mm	0.52
<20	29.3
20-50	33.5
50-80	21.7
80-100	12.2
>100	3.3

the preparation of the germinal bed.

Fig.2 Land prepared for sowing

Emergence

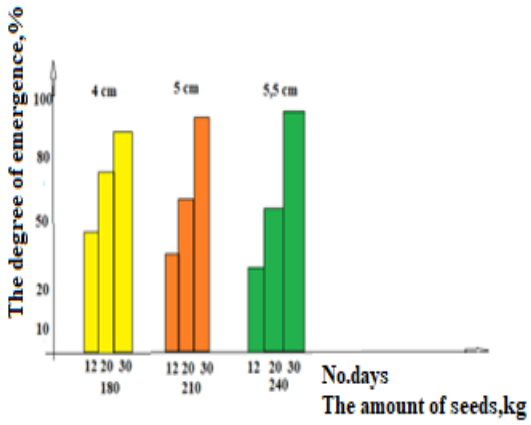

Fig. 2. Effect of sowing depth and seed quantity on emergence

Fig.3Aspects from the field of experimentation

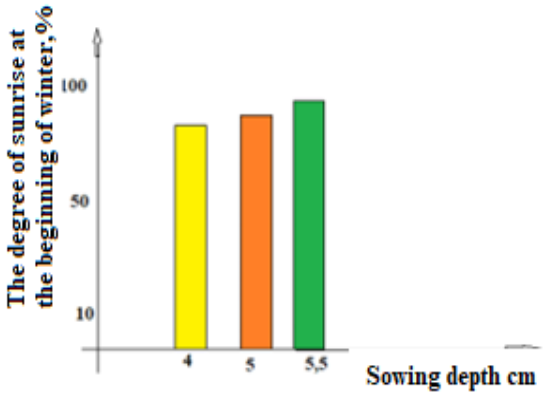

Figure 4. Effect of sowing depth on seed germination rate per row

Appropriate seed depth

The type of seeder, with mechanical distribution, had a significant effect on seed placement in the soil. The corresponding depth of the seeds with the mechanical seeder was large, the main reason for the low depth was the degree of preparation of the germination bed. It was found that on the land with small bumps or with a considerable number of lumps there were seeds not covered with soil that did not germinate and they did not rise. (fig.5)

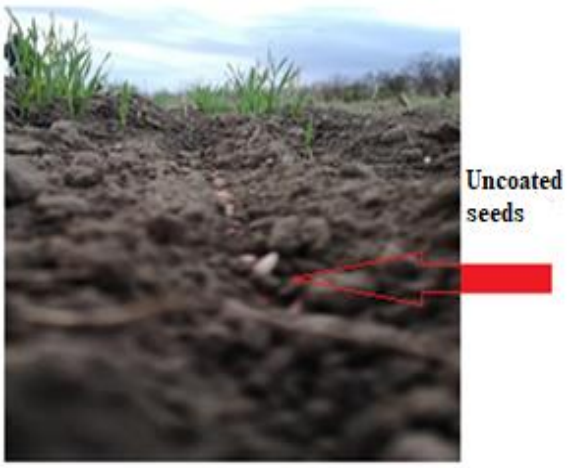

Fig.5 Ungerminated seeds sown at 4 cm and uncovered

CONCLUSIONS

The mechanical distribution seeder equipped with a 12.5 cm coulter was suitable for sowing with higher seed emergence at the depth of 5.5 cm and the rate of 240 kg/ha.

Seed germination rate was significantly influenced by sowing depth, which indicated that wheat has a high level of flexibility in terms of germination rate and able to compensate for the lower rate with the part produced by twinning and increasing the grain yield of the number of ears per unit area.

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