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THE EFFECT OF FERTILIZATION AND SEED SIZE ON THE GERMINATION PERCENTAGE OF TRITICALE VARIETIES

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ABSTRACT
The objective of our study was to examine the effect of different fertilization treatments and seed size on the germination percentage of two triticale varieties. The field experiment was set on the area of Cereal Research Non-Profit Ltd. in Fülöpszállás, in four replications. The soil was meadow soil, its nutrient content was good. There were ten different fertilizer treatments. We porcessed the obtained data by analysis of variance. The nutrient supply did not have significant effect on the germination percentage. The maximum germination percentage of GK Szemes was obtained in the N0PK30 treatment. GK Idus reached the highest germination percentage in the N30PK0 and N0PK90 treatments. We studied the effect of seed size on the germination percentage, too. After the harvesting we divided the seeds into three groups. The first group contains seeds smaller than 2.2 mm, the second group is for grains between 2.2-2.8 mm, and the third one for grains bigger than 2.8 mm. Along with the growing grain size, the germination percentage was also improving. In the case of GK Idus the germination percentage difference between the highest and lowest seed size was statistically justified.

Keywords: triticale, fertilization, seed size, germination percentage

INTRODUCTION

Triticale can be utilized in many different ways. In Europe, it is mainly used for animal feed, while in India and Ethiopia it is used for human consumption. Due to its favorable amino acid composition it has good feed value, so it is a good component of feeds. Nowadays, there are varieties, which have good baking properties, therefore it is suitable for human use (BÓNA AND ÁCS, 2012).

In Hungary, the sowing area of triticale is between 110-150 thousand hectares and the harvested yield ranged between 300-600 thousand tons/year (HTTP1). The successful triticale production is determined by the complex effect of ecological, biological, and agrotechnical factors. Among the biological factors the different seed testing parameters (germination percentage, thousand seed weight, germination vigour) are very important (SZABÓ, 1981).

The most important feature of the seed is the germination. The germination result will decide whether the seed is suitable for field production (KRUPPA, 2004).

For good germination of cereals, the proper nitrogen supply is essential (LIERES, 1996; MONOSTORI, 2004; PETHŐ, 2004). The satisfactory nitrogen supply provides big thousand seed weight (KRUPPA, 2004).

DRENA (2004) examined the effect of seed size of different cereals (winter wheat, winter barley, rye, oat, triticale) on the germination percentage and germination vigour. After sowing, the seeds were divided into three groups: small, medium and big. The non-sieving/unscreened seeds were also tested. It was stated, that the germination vigour of the small seeds was the lowest. The germination vigour of the small seeds was 5% lower than that of the non-sieving//unscreened seeds. The total germination of small seeds was lower,

the big seeds was higher. The germination difference between the small and big seeds was 10%.

MATERIAL AND METHOD

Soil properties of the experimental field

The field experiment was performed on the area of the Cereal Research Non-Profit Ltd in Fülöpszállás. The soil was meadow soil. The soil analysis data showed that it had good nitrogen, phosphorus and potassium contents (*Table 1*).

Table 1. Main properties of the experimental field area

pH (H_2O)	P_2O_5 (mg/kg)	K_2O (mg/kg)	Humus (%)	Soil plasticity value (K_A)
7.57	172	384	3.03	48

We examined the seed germination percentage of 2 triticale varieties (GK Szemes and GK Idus). Triticale seeds originated from a fertilizer treatment where we used ten different nutrient treatments (N0PK0, N30PK0, N60PK0, N90PK0, N0PK30, N0PK60, N0PK90, N60PK30, N120PK60, N180PK90). We devided the seeds into three groups. The first group contains seeds smaller than 2.2 mm, the second group is for grains between 2.2-2.8 mm, and the third one is for grains bigger than 2.8 mm.

Laboratory experiments

We studied the germination percentage of the triticale varieties in the laboratory of the Institute of Plant Sciences and Environmental Protection of the University of Szeged Faculty of Agriculture.

We made the germination tests on wet filter paper in rolls. The temperature was 20-22 °C, and the humidity was 80-90%. The humidity of the filter paper rolls was checked daily, and if necessary, the rolls were sprayed with water to avoid dehydration. The filter paper rolls were opened after three, five, and seven days. The normal germs were selected and counted. We processed the obtained data by single factor variant analysis (SVÁB, 1981).

RESULTS

The effect of nutrient supply on the germination percentage

The germination percentage of GK Szemes was 94.67% in the N0PK0 treatment. Compared to this data, the unilateral N treatments increased the germination percentage (95-95.83%). The unilateral PK fertilizers - except for the N0PK60 treatment - also improved the germination percentage compared to the control. We measured the maximum value of germination percentage (96.17%) in the N0PK30 treatment. Compared to the control value, we measured lower results in the N60PK30 and N120PK60 treatments (92.5 and 94.33%, respectively). In the N180PK90 treatment, the germination percentage (95.33%) was higher than in the control. The fertilization did not cause significant change of germination percentage (*Figure 1*).

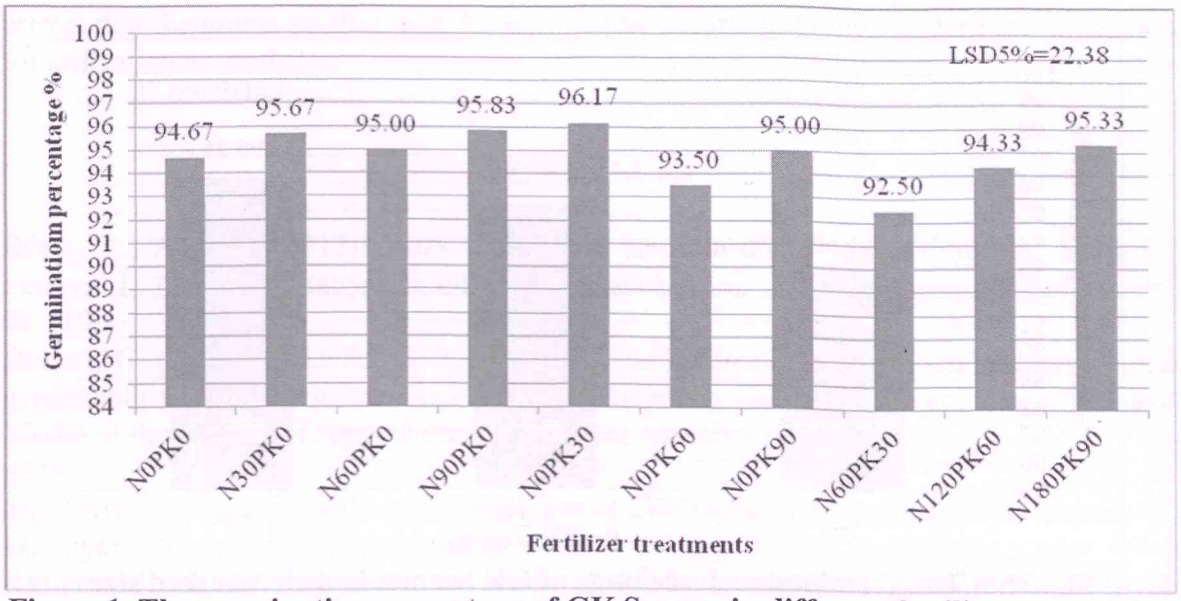

Figure 1. The germination percentage of GK Szemes in different fertilizer treatments

The germination percentage of GK Idus was 96% in the non-fertilized treatment. Compared to the control, the unilateral N treatments increased the germination percentage (96.83 and 98.83%). We measured the highest germination percentage of 98.83% in the N30PK0 treatment. Compared to the control, the unilateral PK fertilization caused similar or better results. We got the second highest value 98.83% in N0PK90 treatment. The N60PK30, N120PK60 and N180PK90 treatments also improved the germination percentage of GK Idus. The fertilization treatments did not cause significant changes in the germination percentage (*Figure 2*).

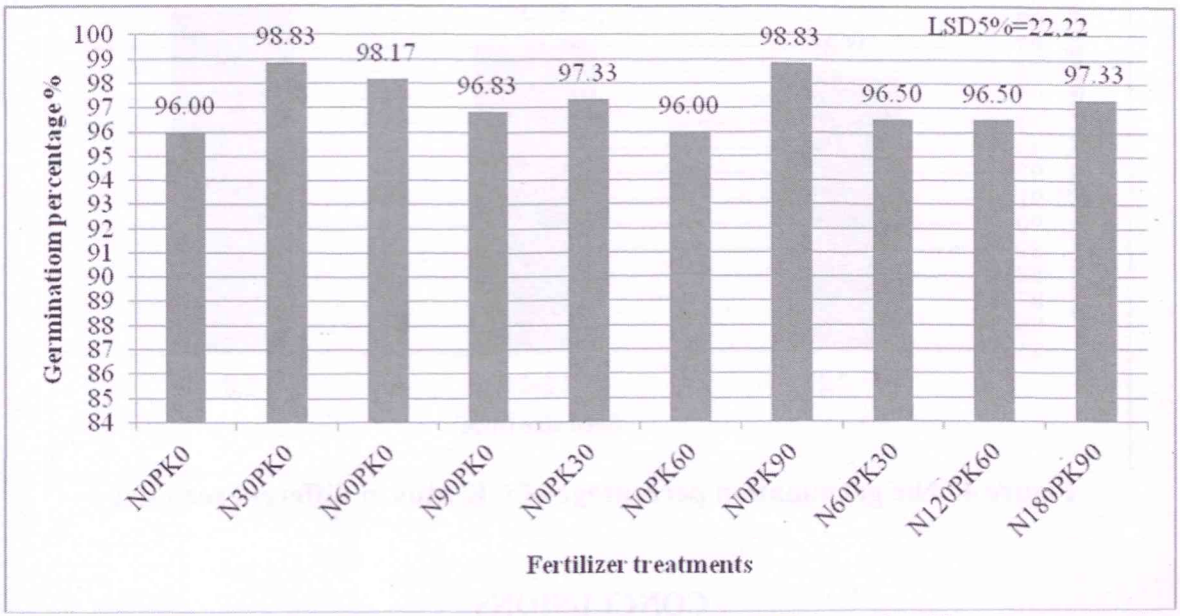

Figure 2. The germination percentage of GK Idus in different fertilizer treatments

The effect of seed size on the germination percentage

The germination percentage of the smallest seeds of GK Szemes was 92.90%. Compared to the control result, the values of germination percentage improved. The biggest seeds had the best germination percentage (96.25%). The change of seed size did not cause significant difference in germination percentage (*Figure 3*).

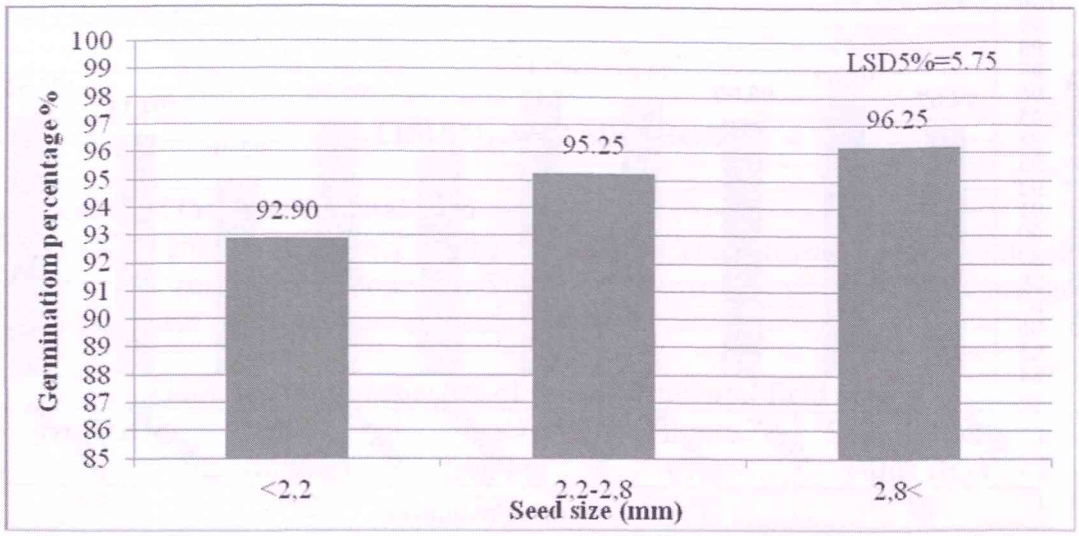

Figure 3. The germination percentage of GK Szemes in different seed size

In the case of GK Idus, the lowest germination percentage had the smallest seeds, too (95.85%).

The increasing seed size resulted in the improvement of germination percentage. Compared to the smallest seed germination percentage (95.85%), the result of the biggest seeds was statisticaly justified higher (98.88%, LSD5%=1.54). In this examination, the germination percentage of GK Idus was better than that of GK Szemes *(Figure 4)*.

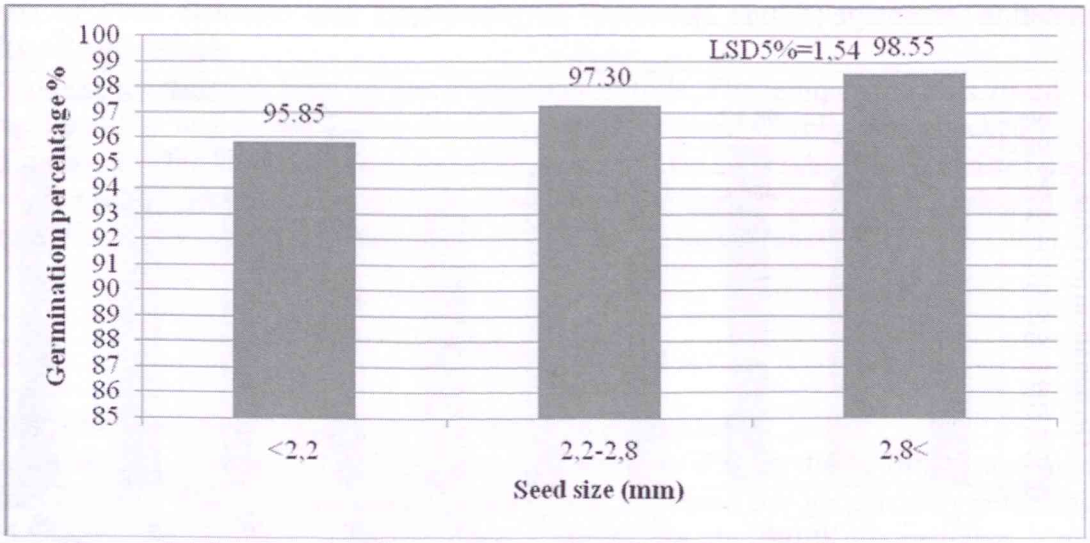

Figure 4. The germination percentage of GK Idus in different seed size

CONCLUSIONS

The fertilization treatments had different effect on the germination percetage of the examined triticale varieties. In the case of GK Szemes, the unilateral N treatments and PK treatments had positive effect. In the case of the GK Idus, all nutrient treatments caused similar or better germination percentage compared to the control. We can conclude that the genotype also had effect on the germination percentage. Under the influence of increasing seed size, the germination percentage of the examined triticale genotypes improved, which

proves that the grains smaller than 2.2 millimeters according to the standard are unsuitable for utilization as seed.

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HTTP1:
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