

Low Frequencies in the Function of Corn Seed Germination

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Abstract: In recent years, conventional agrotechnical measures have been combined with the unconventional ones, such as electromagnetic seed treatment. By exerting biophysical action on seeds and plants, the man succeeded in accessing the process of organic matter production in a natural way.

Two NS and four ZP corn hybrids were used in the study. Prior to germination, seed samples were calibrated for weight and treated with five different frequencies in the range from 0 to 1000 Hz. Germination was done on the filter paper at the temperature of $25 \pm 0.5^\circ\text{C}$ under controlled conditions. Each hybrid was tested in five replicates. The obtained results were statistically processed. The hybrid NSSC-420 responded positively to the treatments C, D and E (2% of increase in germinability), whereas the hybrid NSSC-300 responded positively to all the treatments increasing the germinability by 2-3%. The hybrid ZP-42a increased its germinability by 3% in the treatment C, ZPSC-580 by 4-9% in C and B, whereas ZPSC-704 and ZPSC-677 decreased their germinability by 4-7% and by 4-8%, respectively, in D and A.

In terms of frequency, the hybrids apparently showed the differences.

Key words: corn, hybrid, treatment, germinability, organic matter production.

Introduction

Manifold use of corn has brought about its economic significance, hence, its growing on the vast areas in and out of the country. Due attention must be paid to each of the agrotechnical measures in order to achieve as high and stable yields as possible. Only if ecological conditions are harmonized with the grown plants requirements can full effects be expected.

In addition to the conventionally used agrotechnical, some non-standard, such as electromagnetic corn seed processing measures have recently come into use.

Materials and Method

The research work proceeded in the laboratory conditions. Germinability was studied with filter paper at the temperature of $25^{\circ}\text{C} \pm 0,5^{\circ}\text{C}$ of the thermometer and counted up for 7 days after the research had commenced. The following hybrids were examined: NSSC-420; NSSC-300 and ZPSC-704; ZPSC-677 and ZPSC-580. Prior to germination, the seed samples were treated with low frequencies from 0-1000 Hz with the precision of the second decimal. Five different frequencies and the control variant were tested. The mass of the tested seeds was equalized for germinability in each of the variants and replicates, respectively. Each hybrid comprised the testing repeated five times and lasting for eight months. This paper presents the average variants. The obtained results were processed with the analysis of the factorial trial.

Discussion and Results

The Table 1., outlines the mean values of the seed germinability in the hybrid NSSC-420.

The seed germinability was 96% on the control variant, using the resonant impulse electromagnetic seed processing (RIES), with significantly increased germinability in the variants C, D and E, 2% of the level of significance. As regards the other two variants, their germinability was also increased by 1 %, which was not significant statistically.

Tab.1 Corn Seed Germinability in NSSC-420 and NSSC-300

Treatment/frequencies		Germinability, %	
		NSSC – 420	NSSC - 300
	Ø	96	89
	A	97	91
	B	97	91
	C	98	91
	D	98	92
	E	98	91
LSD	005	2	2
	001	3	3

Corn seed samples responded best to the electromagnetic treatment in NSSC-300, with variants showing a positive effect on the germinability. Also, a statistically significant increase was achieved in all the variants.

The Table 2. outlines the results got in ZPSC-704, which considerably differed from those obtained in NSSC-420 where all the variants tested depressively affected germinability.

Except for the variant D, in which 4% of the insignificant germinability was recorded, in all the other variants its values seemed to be significantly lower, varying from 5 to 7%.

The corn seed germinability in ZPSC-677 is shown in the table 2. Similar to the hybrid ZPSC-704, the depressive effect on the germinability was observed in the variants tested. Statistically, a considerably lower germinability was observed in the variants A and B and its slight decrease in those other than A and B.

Tab.2. Corn Seed Germinability in ZPSC-704 and ZPSC-677 Hybrids

Treatment/frequencies		Germinability, %	
		ZPSC – 704	ZPSC - 677
	Ø	92	94
	A	85	86
	B	87	87
	C	85	90
	D	88	90
	E	86	89
LSD	005	5	6
	001	6	8

As far as ZPSC-420 is concerned, a significant increase in the germinability of 3% was noticed in the variant C, while the germinability was at the level of the control in the two, and less than that in the other two variants.

The results of germinability in ZPSC-580 appeared to be specific, with its considerable increase of 9% recorded in the variant B, and its remarkable decrease of 7% reported in the variant D. In this view, no significant differences existed in the remaining variants.

Tab.3. Corn Seed Germinability in ZPSC-420 and ZPSC-580

Treatment/frequencies		Germinability, %	
		ZPSC – 420	ZPSC - 580
	Ø	93	85
	A	92	85
	B	93	94
	C	96	89
	D	93	78
	E	92	83
LSD	005	3	9
	001	4	12

The obtained results are in agreement with those of Bhatnager et al., (1997), Grigorev et al., (1998), Milošev et al., (1999), Maronek (1975), Marinković et al., (2000., 2001., 2002.), Malesević et al., (2001) who pointed out a convenient effect of the electromagnetic processing, as well as with those of Marinković et al., (2002) stressing the specificity of the cultivar and/or hybrid relating to frequency.

Conclusions

A comprehensive series of the research work resulted in the following conclusions:

- In the corn hybrid NSSC-420, germinability was increased by 2% in the variants C, D and E.
- In the corn hybrid NSSC-300, 3% of the increased germinability was detected in the variant D.
- In this regard, the other variants were evidenced as positive in both hybrids
- In ZPSC-704, germinability decreased most (7%) in the variants A and C.
- In ZPSC-677, germinability decreased most (7%) in the variant A.
- Depressive effect was present in all the variants of the hybrids ZPSC-704 and ZPSC-677.
- A stimulating effect of 3% was noticed in the variant C of the hybrid ZPSC-420, and
- The highest positive effect was noticed in ZPSC-580 in the variant B (9%) and a negative one in the variant D (7%).

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NISKE FREKVENCije U FUNKCIJI KLIJANJA SEMENA KUKURUZA

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Rezime

U poslednje vreme, klasične agrotehničke mere se sve više kombinuju sa neklasičnim, kao što je tretman elektromagnetnog semena. Podstičući biofizičku aktivnost semena i biljke, čovek je uspeo da uđe u proces proizvodnje organske materije prirodnim putem.

U ovom ispitivanju korišćena su dva NS i četiri ZP hibrida kukuruza. Pre klijanja, uzorci semena su mereni i tretirani sa pet različitih frekvencija u rasponu od 0 do 1000 Hz. Klijanje je vršeno na filter papiru, na temperaturi od $25 \pm 0.5^{\circ}\text{C}$ u kontrolisanim uslovima. Svaki hibrid je ispitan sa pet ponavljanja. Dobijeni rezultati su statistički obrađeni. Hibrid NSSC-420 reagovao je pozitivno na tretmane C, D i E (2% porasta klijavosti) dok je hibrid NSC-300 reagovao pozitivno na sve tretmane povećavajući klijavost za 2-3%. Hibrid ZP-42a povećao je svoju klijavost za 3% u tretmanu C, hibrid ZPSC-580 za 4-9% u tretmanima C i B, dok su hibridi ZPSC-704 i ZPSC-677 smanjili klijavost za 4-7% odnosno za 4-8% u tretmanima D i A.

Ispitivani hibridi su pokazali jasne razlike u pogledu optimalne frekvencije.