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### Effect of two types biological fertilizers containing amino acids on germination indices of wheat varieties under in vitro drought stress conditions

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#### ABSTRACT

An experiment were done for evaluation effect of two types biological fertilizers containing amino acids on germination indices of 11 wheat varieties under in vitro drought condition in research laboratory of Islamic Azad University, Ardabil branch. For this purpose, factorial experiment was applied on the basis of completely randomized block design in three replications. Factor A was in two conditions (drought and normal); Factor B in three levels (water, Aminol Forte and Fosnutren) and Factor C included 11 wheat genotypes. Results showed significant differences between amino acid compositions of this research for average duration of germination, germination speed, final germination percent and average daily germination at probability level of 5 %. Results of means comparison revealed that Sardari had the highest germination speed by 0.03322 and Cross Sabalan the lowest amount by 0.02661. Fosnutren was the best of all traits except of germination speed. We can conclude that biologically amino acid fertilizers Can contribute a great positive impact on the germination indices of wheat.

**Keywords:** Wheat, Amino acid, Germination indices.

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#### INTRODUCTION

Identifying cultivars or genotypes which are more tolerant to stress during germination are of essence [1]. Considering the biologic fertilizers'' positive effects on various growth stages, studying various fertilizer types for finding proper methods in retrofitting to drought stress during germination seems to be significant [2]. Thomas et al [3] studied the amino acids formulations roles, such as humiforte which are biologically active, on tea production quality. Also, Mostafa et al [4] studied arginine effect on Late planting wheat growth and yield. Some of biological stimuli, such as humiforte have been introduced to the market in order to deal with environmental stresses.

The main objective to the following research is to study wheat cultivars responses to two types of amino acids during germination and determining cultivars for optimal usage in water and fertilizers.

## MATERIALS AND METHODS

To study Aminol-Forte and Fosnutren effects, as two biological fertilizers containing amino acids, on 11 wheat cultivars, a research was conducted in Ardebil IAU Research Laboratory. Fertilizers were from Inagropars Company in Iran which is the agent for Inagrosa from Spain. The study design was factorial on base of completely randomized block in three replications. Factor A, B and C were respectively in two conditions (drought and normal), in 3 levels of (water, Aminol-Forte and Fosnutren) and 11 wheat cultivars (Finkan, Kuhdasht, Gascogne, ...). Aminol-Forte and Fosnutren were added to 500ml water in amount of two cc for each. Polyethylene glycol 6000 was used for conducting drought treatment, in laboratory condition. Wheat seeds were disinfected by three percent sodium hypochlorite solution for two minutes. 10 seeds were planted in each petri dish. To measure germination indices, germinated seeds were counted daily. Coefficient of velocity of germination (CVG), germination rate index (GRI), mean germination time (MGT), final germination percentage (FGP), germination rate (Rs) and mean daily germination (MDG) were calculated using the following formula table:

Data variances analysis and comparing their means were carried out by SAS and MSTATC softwares. Means were compared by Duncan's multiple range tests at 5%.

## RESULTS AND DISCUSSION

Considering the variance analysis results on (Table 1) studied traits, it was observed that there is a significant difference at 1% among studied cultivars. This shows the biological variety between cultivars for selecting desired traits. Also, there was a significant difference found between amino acids combinations in Rs, CVG, FGP and MDG at 5%. There was no significant difference found between laboratory conditions and the interaction in studied traits.

Results from comparing data means (Table 2) on cultivars suggested that Cross Sabalan with a mean of 37.70 had the highest MGT while Sardari with a mean of 31.38 had the lowest MGT. Kuhdasht, Cross Sabalan, Chamran formed one group, Gascogne, Azar 2 and Zagros formed another group and MV 17 and Saysonz formed another and they showed no differences on this trait. On Rs, Sardari with the mean of 0.03322 and Cross Sabalan with them mean of 0.02661, were the highest and the lowest, respectively. Kuhdasht, Gascogne, Cross Sabalan, Azar 2, Zagros and Chamran formed one group and Bezostaya, MV 17 and saysonz formed another and they showed no differences on this trait. Chamran, Cross Sabalan and Kuhdasht with a mean of 95 percent had the highest FGP while Sardari with a mean of 80 percent had the lowest FGP. Kuhdasht, Gascogne, Cross Sabalan, Azar 2, Zagros and Chamran formed one group and Bezostaya, MV 17 and Saysonz formed another and they showed no differences on this trait. On GRI, Cross Sabalan with a mean of 23.39 was the best cultivar while Sardari with 19.05 was the worst. Kuhdasht, Cross Sabalan, and Chamran formed one group and Finkan and Sardari formed another group, and Bezostaya, Saysonz and MV 17 formed another and Kuhdasht and Cross Sabalan formed another, Azar 2 and Chamran formed another group and they showed no differences on this trait. Chamran and Kuhdasht with a mean of 13.57 had the highest MDG while Sardari with a mean 11.43 had the lowest MDG. Kuhdasht, Gascogne, Sabalan, Azar 2, Zagros and Chamran formed a group and Bezostaya, MV 17 and Saysonz formed another group and they showed no differences on this trait.

**Table 1. analysis of variance table for measured traits in labratuary condition**

Source of Variations	df	Mean Square					
		Coefficient of Velocity of Germination	mean germination time	germination rate	final germination percent	germination rate index	mean daily germination
Condition	1	0.213ns	7.293ns	8.081*10 <sup>-6</sup> ns	40.909ns	0.002ns	0.836ns
Amino Acid	2	0.159ns	51.488*	4.970*10 <sup>-5</sup> *	279.293*	18.647ns	5.700*
Genotype	10	1.047**	74.808**	7.708*10 <sup>-5</sup> **	42.556**	46.788**	8.685**
C×A	2	0.110ns	2.289 ns	7.626*10 <sup>-7</sup> ns	4.545 ns	2.785 ns	0.093 ns
C×G	10	0.227 ns	14.936 ns	1.956*10 <sup>-5</sup> ns	83.131 ns	7.297 ns	1.696 ns
G×A	20	0.219 ns	17.209 ns	1.999*10 <sup>-5</sup> ns	98.737 ns	9.835 ns	2.015 ns
C×A×G	20	0.203 ns	17.784 ns	1.864*10 <sup>-5</sup> ns	115.101 ns	7.593 ns	2.349 ns
Error	132	0.192	14.83	1.666*10 <sup>-5</sup>	94.44	6.97	1.92
CV (%)	-	1.80	10.81	14.31	10.73	12.47	10.73

\* and \*\* Significantly at  $p < 0.05$  and  $< 0.01$ , respectively

**Table 2. Mean comprasion of genotypes for measured traits**

Genotypes	Characters					
	Coefficient of Velocity of Germination	germination rate	final germination percent	germination rate index	mean daily germination	germination rate index
Finkan	33.13 cd	0.03100 ab	84.44 bc	19.37 d	12.06 bc	24.17 bcde
Kuhdasht	37.50 a	0.02706 c	95 a	23.36 a	13.57 a	24.65 a
Gascogne	36.11 ab	0.02767 c	91.67 a	20.80 bcd	13.10 a	24.08 de
Bezostaya	34.33 bc	0.02956 bc	87.78 ab	19.96 cd	12.54 ab	24.14 cde
Cross Sabalan	37.70 a	0.02661 c	95 a	23.39 a	13.57 a	24.65 a
MV17	35.16 abc	0.02894 bc	90 ab	20.05 cd	12.86 ab	24.03 de
Saysonz	35.25 abc	0.02861 bc	90 ab	19.98 cd	12.86 ab	23.97 e
Sardari	31.38 d	0.03322 a	80 c	19.05 d	11.43 c	24.48 ab
Azar 2	37.06 ab	0.02706 c	93.89 a	22.47 ab	13.41 a	24.45 abc
Zagros	36.76 ab	0.02733 c	93.33 a	22.81 abc	13.33 a	24.30 bcd
Chamran	37.60 a	0.02672 c	95 a	22.63 ab	13.57 a	24.41 abc

*Differences between averages of each column which have common characters are not significant at probability level of 5%.*

**Table 3. Mean comprasion of conditions for measured traits**

Experimental conditions	Characters				
	mean germination time	germination rate	final germination percent	germination rate index	mean daily germination
Water	35.41 ab	0.028 ab	90.30 ab	20.97 ab	12.90 ab
Aminol Forte	34.88 b	0.029 a	88.36 b	20.76 b	12.66 b
Fosnutren	36.61 a	0.027 b	92.72 a	21.77 a	13.24 a

*Differences between averages of each column which have common characters are not significant at probability level of 5%.*

## CONCLUSION

The results showed that Use a liquid fertilizer **Fosnutren** than other amino acids tested, Can have a positive effect on wheat germination indices. Finally, it can be stated that the use of biological fertilizers, as **Fosnutren** including free amino acids and oligopeptides, can play an important role in the positive effect on the germination indices of wheat genotypes.

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