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The Effect of Levels and Duration of Pyridoxine Application on Yield of Corn (*Zea mays* L. Var. NS 640)

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ABSTRACT

This experiment was conducted to study the effect of level and duration of pyridoxine application on yield of corn (Zea MaysL.Var.NS 640).The experiment was laid out in a complete randomized block design in three replications. The experiment had two factors, that the first factor was the different levels of pyridoxine application that was included (0.02% , 0.04 % and 0.06 %) and second factor was duration of seed treatment by pyridoxine that included (8,16 and 24 hours).The selected seeds were NS640 . Before planting the seeds were treated by pyridoxine levels (0.02%, 0.04% and 0.06%) for (8, 16 and 24 hours) in the laboratory and after that the treated seeds planted subsequently. Results of variance analysis of data in this investigation showed that effect of different level of pyridoxine was significant at 1 % level on grain yield, harvest index and 1000 grain weight. Also according to results of mean comparison, it was observed that there is significantly variation between levels of pyridoxine on grain yield, harvest index and 1000 grain weight, as the highest was at second level of pyridoxine and the lowest was at first level of pyridoxine. Also the result of mean comparison interactional effect of different levels of pyridoxine application and seed treatment duration showed significantly variation on grain yield, harvest index and 1000 grain weight. As the highest was obtained at second level of pyridoxine and second level of duration of pyridoxine application and the lowest was obtained at the first level of pyridoxine and first level of duration of pyridoxine application. The pyridoxine leaded to increase grain yield, harvest indexand 1000 grain weight. According to the results of this investigation and research development in relation with study of the effect (external treatment) of growth regulators that caused by external factor, can acquire better understanding about physiological mechanisms in plants.

Key Words: Priming, Pyridoxine, corn, yield

INTRODUCTION

Seed soaking by water is not a new technique and seed priming by different materials has been started since forty years ago, increase of some cereals yield is proven by seed priming by pyridoxine via increase the root system and increase of water and nutrients absorption subsequently [2].Today, priming technique or seed preparation is one of the physiological methods to increase the germination percentage, seed efficiency, and preparation of speed and consistency of germination and deployment under stressconditions[7].The advantages of priming the seed is reported so that include increasing the resistance of the plant in the salty areas [1] and under dry [6] seed cultivation[7], increasing the performance of the seeds with low naming power, [2] and also increase the products [8].According to conducted researches it's accepted that pyridoxine treatment on seed caused to increase nitrogen and phosphorous absorption in mustard,mug, lentil [1&4], wheat [3] and canola [11]. Growth indices and amount of chlorophylls were changed by pyridoxine and nitrogen fertilizer [4]. Pyridoxine treatment increased the nutrients absorption in crops [12].Pyridoxine treatment increased the absorption speed in maize [6].In this investigation tried

to apply different levels and duration of pyridoxine to find the best level and duration of these chemical materials for seed treatment for corn in order to achieve to high yield.

MATERIALS AND METHODS

The experiment was laid out in a completely randomized block design in three replications. the experiment had two factors that the first one was the different levels of pyridoxine that included 0.02,0.04,0.06% and second factor was duration of treatment that was include 8,16 and 24 hours. The experiment was conducted on farm in Eslamshahr,Tehran,Iran. At the first the seeds treated by pyridoxine in different levels 0.02, 0.04, 0.06% with different duration 8, 16 and 24 hours and planted as soon as the seeds were prepared. The treated seeds planted on 9 rows that distance between each row were 75cm and distance between each seed was 20cm.the crops were irrigated once a week. Sampling was done once every 14 days. The evaluated traits are: number of grains per year, 1000 grain weight, number of grains row per year, eardiameter, biologicalyield, grain yield and harvest index. Data for various indices were subjected to analysis of variance using SAS software. Duncan's multiple range test (DMRT) at the 0.05 level of probability was used to evaluate the difference among treatment means.

RESULTS

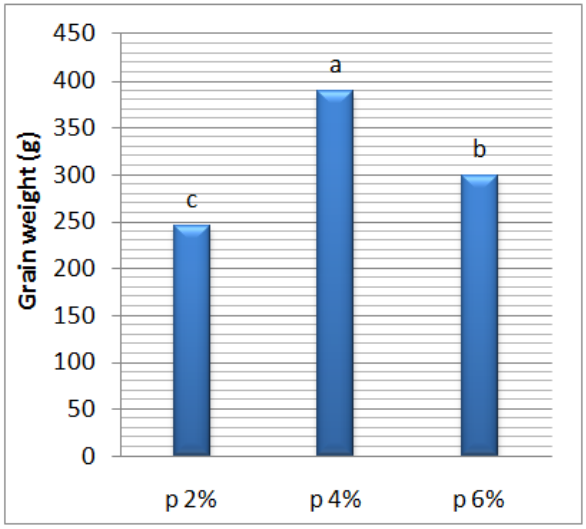

Figure 1- Effect of pyridoxine application on grain weight

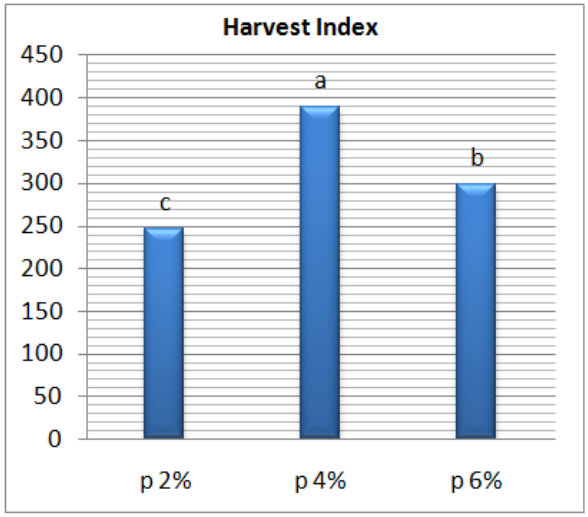

Figure 2- Effect of pyridoxine application harvest index

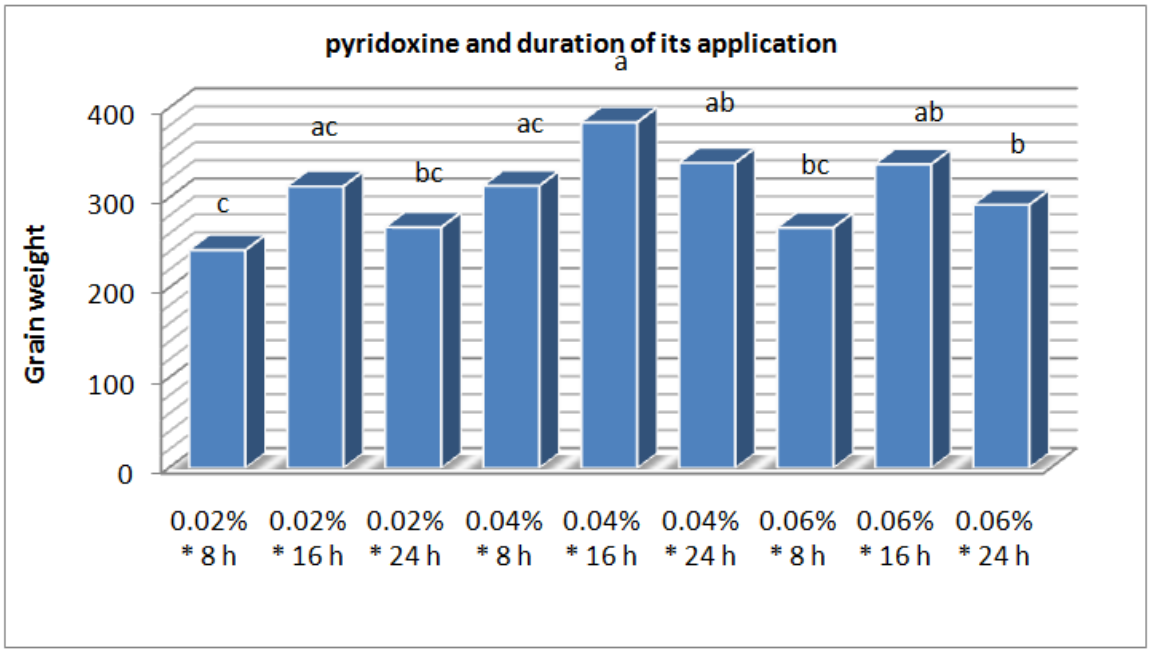

Figure 3- The effect of pyridoxine and duration of its application on grain weight

Table 2 indicates that there is difference between grain yield of different levels of pyridoxine.The highest and lowest grain yield was obtained respectively in pyridoxine 0.04 and 0.02 %. Also,treatment for 16 hours led to highest grain yield and lowest grain yield was caused by treatment for 8 hours (figure 1&3). The result of analysis variance indicates that number of grains per ear, ear diameter and number of grain rows per ear were not different. There is no difference between different levels and duration of pyridoxine application on number of grains per ear, ear diameter and number of grain rows per ear. However the largest ear diameter was obtained in second level of pyridoxine.

Table1 indicates that biological yield was significantly. The effect of different levels and duration of pyridoxine application was significantly on biological yield. According to table 2 can find out that highest biological yield was caused by 0.04 % pyridoxine and 16 h duration of treatment (figure 2).

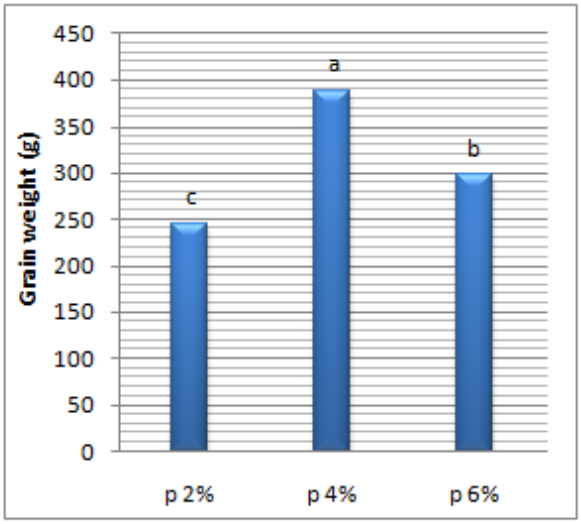

Figure 1- Effect of pyridoxine application on grain weight

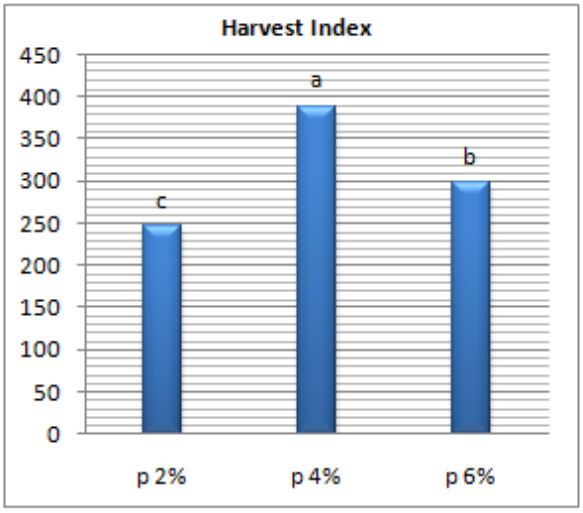

Figure 2- Effect of pyridoxine application harvest index

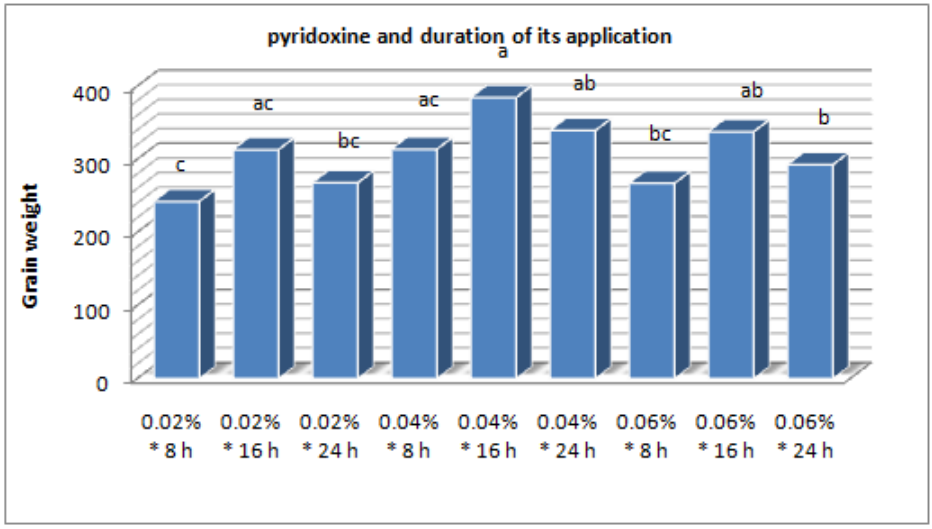

Figure 3- The effect of pyridoxine and duration of its application on grain weight

Table 1: ANOVA of different levels of pyridoxine and duration of its application on yield and yield components in corn (*Zea mays* L. Var.NS 640)

S.O.V	df	Kernel Number Per Ear	1000-Grain weight	Number Of Kernel Row	Ear Diameter	Grain Yield	Biological Yield	Harvest Index
Replication	2	4206.70ns	51065.3**	1.59ns	0.235ns	3370341.75**	0.13ns	2.54ns
Pyridoxine	2	ns 28290.48	6098.77**	2.25ns	1561ns	1592638.8**	0.33ns	77.05**
Time	2	4596.70ns	837.52**	1.03ns	0.792ns	25581746**	0.001**	10.77**
Duration of treatment × Pyridoxine	4	134.204ns	65.49**	0.20ns	0.272ns	92557.54**	0.93**	1.02**
ERROR	12	374.14	17.05	0.09	0.183	66937.71	57035	0.518
CV	_	4.97	3.61	6.79	9.45	5.77	9.7	3.81

*ns and**: Non-Significant and Significant at the 5% levels of probability*

Table 2: Mean comparison effects of different levels of pyridoxine and duration of its application on yield and yield components in corn (*Zea mays* L. Var.NS 640)

Treatment		Kernel Number Per Ear	1000-Grain weight	Number Of Kernel Row	Ear Diameter	Grain Yield	Biological Yield	Harvest Index
Pyridoxine								
	0.02%	574.3b	245.4c	13.98a	1.98b	9125.8c	19934c	46.65c
	0.04%	583b	388.4a	14.81a	2.96b	12352.2a	24118a	49.17a
	0.06%	579.5b	298.2b	13.98a	2.28b	11227.1b	22713b	47.95b
Duration								
	8	571.2b	239.34c	13.55a	1.55b	8987.3c	19001c	44.35c
	16	582.56b	380.65a	13.71a	1.82b	11811.9a	22354a	47.04a
	24	578.1b	290.3b	13.35a	1.75b	10321.6b	20875b	45.93b

Means with Similar Words have non-Significant Difference ($p < 0.05$)

Table 3: Mean comparison interactional effects of different levels of pyridoxine and duration of its application on yield and yield components in corn (*Zea mays* L. Var.NS 640)

Treatment	Kernel Number Per Ear	1000-Grain weight	Number Of Kernel Row	Ear Diameter	Grain Yield	Biological Yield	Harvest Index
0.02% * 8 h	572.75b	242.37c	13.65a	1.75b	8999.8c	19011c	44.55c
0.02% * 16 h	578.43b	313.25ac	13.8a	1.5b	91352.2ac	19657ac	45.58ac
0.02% * 24 h	576.2b	267.85bc	13.78a	1.88b	9095ac	19124bc	45.37bc
0.04% * 8 h	577.1b	313.87ac	13.91a	2.02b	11835.1ac	22935ac	47.64ac
0.04% * 16 h	582.78b	384.52a	14.5a	2.08b	12254.6a	24651a	50.01a
0.04% * 24 h	580.55b	339.35ab	14.1a	2.06b	11952ab	23895ab	48.87ab
0.06% * 8 h	575.35b	267.27bc	13.76a	1.95b	10356.6bc	21357bc	46.23bc
0.06% * 16 h	581.3b	337.92ab	13.94a	2.01b	10937.3ab	22654ab	46.76ab
0.06% * 24 h	578.8b	292.75b	13.88a	1.98b	10737.9b	21754b	46.55b

Means with Similar Words have non-Significant Difference ($p < 0.05$)

CONCLUSION

According to the obtained results it can be concluded that probably pyridoxine by increase of root growth and enhancement of nutrients absorption by crop causes to use more nutrients in soil and causes increase grain yield subsequently by single grain weight, the most important component of yield in corn [15]. Pyridoxine can act as a new type of plant antioxidants and also are involved in a wide range of biochemical reactions, including the metabolism of glycogen and amino acid synthesis and nucleic and the synthesis and metabolism of hemoglobin[5], and also this material in synthesis is involved, sphengomilin and other sphengo lipids neurotransmitters[13&19]. 5-phosphate pyridoxine is involved in acid metabolism of gammaaminobutyric [20&23]. Vitamin B6 in the form of 5-phosphate pyridoxine plays as coenzyme of anti-enzyme, so the seeds of the proteins and carbohydrates of enzymes and reactions of hydrolysis are broken down and ready to participate in the process of germination.pyridoxine is a cofactor for many enzymatic reactions, specially the reaction which involved amino acid metabolism [18].Also it has been established that pyridoxine is required for root development that can effect positively on early seedling growth [17&19].Based on the research done by [22&12] and the increasing role of pyridoxine in the amount of root drawing, cause to appear the leaf soon.As regard to obtained results, application of pyridoxine increased harvest index and that's caused by matter transfer from vegetative organs to reproductive organs.Consequently, according to the results in this experiment and the different level of treating the chemical pyridoxine of this matter we can conclude that probably, pyridoxine by increasing the root development and raising the ability of nutrient attraction

by the plant represents this possibility in order to use the potential of the water and nutrient in the soil. The results of this research showed that seed treatment with pyridoxine can be as an economic simple way and also be effective on increasing the plant output

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