Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Annals of Biological Research, 2011, 2 (3) :419-423
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0976-1233
CODEN (USA): ABRNBW

Priming effect of different times of maize seeds with nutrient elements in water stress on corn yield

Elnaz Farajzadeh Memari Tabrizi[1], MehrdadYarnia[2], VahidAhmadzadeh[3] and Noshin Farjzadeh[4]

[1]*Islamic Azad University, Malekan branch. Iran and phd student of Agronomy Islamic Azad University, Tabriz*
[2]*Department of Agronomy, Faculty of Agriculture, Islamic Azad University, Tabriz branch. Iran.*
[3]*MSc of Agronomy, Tabriz University Iran and member of young research club Islamic Azad University, Tabriz*
[4]*MSc student Agronomy and member of young research club Islamic Azad University, Tabriz*

ABSTRACT

Drought is one of the factors limiting crop growth and yield. The ways that drought effects on crop growth and yield reduced is priming. The purpose of this experimental was priming effect water and nutrients (zinc and molybdenum) on corn yield. The results showed that treatment with Zinc had greatest impact on growth and yield of maize. Among the seed treatments evaluated times for 16 hours and 24 hours more than the effect of treatment was 8 hours. The highest maize grain yield equivalent to 73/39 gr by zinc seed prime obtained and lowest seed weight per plant equal to 50/68 gr with water priming seeds obtained. The results showed that Prime seeds with zinc increased seed weight are 44/81%. This review drought reduces the characteristics were investigated.

Key word: Priming, nutrient elements, corn and yield.

INTRODUCTION

Maize (Zea mays L.) among cereal with mechanism of photosynthesis C_4 had potentially high yield and today as food, feed and industrial use [1]. Crops determine the amount and composition of certain elements of food are needed. Also get much more high-yield need food elements. Each of shortage of food elements of plant growth stops .Macro and micro nutrient elements in plant nutrition are important. But due to strong fields, with low consumption of fertilizers, macro and micro nutrient are elements from soil depletion [2]. Researchers have estimated that 60 percent of the world's agricultural lands are suffering from food shortages caused by lack, non-availability or toxicity of some nutrient elements is necessary [3]. Zinc and molybdenum are micronutrients for optimal growth and reproduction of crop plants is essential [4]. Drought most important non-biological factors that make crop production are severely restricted. However, it is expected that future drought will be even more prevalent [5]. Water shortage is one of the most important factors limiting agricultural production. And among all the substances that are essential for the survival of plants, amount of water than other materials is needed to reduce plant growth due to drought is the main reason for decline yield [6]. Some biological and non-biological stress seedling establishment in farm reduced. Priming is one of the effective strategies to overcome drought stress [7]. Priming is simple, inexpensive and safe for environment [8]. Priming is used to improve germination, reduce the duration of germination and improve plant establishment and yield [9]. Fast and uniform emergence under field conditions to achieve maximum yield and quality is important. Priming is that it makes [10].

MATERIAL AND METHOD

A split factorial experiment based on randomized complete block design with three replications was conducted during growing season of 2010 at Islamic Azad University, Tabriz Branch, and Agricultural Research Station. Treatments included different elements (Zinc, Molybdenum and water), different priming time (0, 8, 16 and 24 hours) and Different levels of water stress (7 and 10 days irrigation). To determine available soil nutrients, samples were taken from 0-30 cm depth. Based on the results of soil analysis, 300 kg/ha urea, 100 kg/ha triple super phosphate and 150 kg/ha potassium sulfate were applied to soil as the starter fertilizer prior to planting. When the plants were at 2-4- and 6-8-leaf stages, thinning, weeding and nitrogen top dressing were performed. Plots were then furrow irrigated regularly every week in the mornings. Pretreatment for operations on maize seeds from three food composition in a concentration five thousand were used at different times after preparation of solutions seeds for 24 hours in a solution in the ordinary laboratory temperature, ie 22-20 ° C away from direct sunlight for 24 hours immediately after seeds been removed from the solution using surface water were washed three times and then treated seeds on paper plates at room temperature away from direct sunlight for 3 days and used for field investigations. By mid August An area of 2.5 m from 3 line of plot area was separately harvested and yield, dry weight, height were evaluated. MSTAT-C and EXCEL were used to analyze data and draw graphs, respectively.

RESULTS

According to analysis of variance table showed that period different priming in height, chlorophyll content, shoot dry weight and yield significant difference at 1%. Various nutrients showed that shoot dry weight and yield had significant difference at 1%. Various nutrients in shoot dry weight and yield showed significant difference at 1 %(Table 1).

Height

Among the different time maximum height was 188/8 cm by the placement seeds for 24 hours in solutions and the lowest plant height in the absence of priming equivalent to 121/8 cm. can be expressed is the lack of priming Reduced the height of the plant is 35/49 percent, so the positive effects can be realized seed priming (Fig.1).Marshner reported that the consumption Zinc causing wheat height increased. Çakmak has also reported that zinc plays a role in cell elongation [11,12]. Therefore, improving the elongation of cells in the early stages of plant growth can lead to improvements in plant growth. The researchers also reported on the molybdenum in plant growth are required [13]. Sun *et al* reported that treatment seed by Molybdenum Germination and Seedling growth in Brassica napus increased [14].

Shoot dry weight

There are Significant differences among the various food elements in the mean comparisons. According to Figure (2) is expressed such that the maximum shoot dry weight equivalent to 145/6 gr by seed priming with zinc and the lowest dry weight was priming with water equal 98/75 gr, so the positive effects of nutrient can be seen 47/44 percent of dry weight. Yu and Wang reported that seed treatment with molybdenum of nitrate reductase activity in wheat seedlings increased [15]. Grain yield and shoot dry weight also affected seed treatment with molybdenum increased. Other researchers reported that wheat cultivar that had more of molybdenum, the amount were more dry matter accumulation. Application molybdenum in bean dry matter accumulation and yield increased [16]. Also application different time priming had significant difference between times. The highest shoot dry weight, with 24 hours priming equal 153/7 gr and the lowest was equal 77/81 gr without priming. Thus can express the positive effects of Prime 92/53% increase in dry weight (Fig. 3).

Chlorophyll content

The results of variance analysis showed that water stress reduced the leaf chlorophyll content was such that different levels of water and duration of different seed priming showed significant difference at 5% level. Results of comparing different times showed that priming had positive role in increasing seed leaf chlorophyll content but the times of priming had not significantly different. The highest chlorophyll in the leaf was equivalent 44/23 CCI by 24 hours priming corn seeds and the lowest was 38/42 CCI without priming that 13/13 % reduction shown and among Prime time 8 hours prim had least chlorophyll content of leaves(fig. 4). Drought the absorption of carbon dioxide causes the balance to disassemble photosystem II photochemical activity and requires electron Calvin cycle is leading to excess excitation energy, producing active forms of oxygen and eventually can damage photosystem II. Because of drought and changes in the amount of chlorophyll pigments are fluorescent. Rate of nutrient uptake by the plants due to reduced transpiration, active transport and damage the membrane impermeability is drought reduced [17]. Bao *et al* reported that priming with nutrient elements and hormones affect salinity in cotton can reduce the amount of chlorophyll in leaves [5].

Seed weight per plant

According Figure (5) had significant differences between nutrients. The highest weight corn kernel was equivalent 73/39 gr by priming zinc sulfate obtained and lowest seed weight per plant equal to 50/68 gr with water priming obtained so that the results showed Priming seeds by zinc sulfate increased seed weight 44/81%. Yu *et al* reported that reported that wheat yield under the influence of seed treatment with molybdenum increased [18]. Researchers have reported that soybean seeds coat with molybdenum later stage growth do not require application and molybdenum application increases the yield of this plant. Molybdenum application yield Beans increased [16]. Sajid *et al* reported that treatment corn seed with Zinc increasing yield [19]. Significant difference was obtained in duration between different seed priming on seed weight per plant. The results show were not significant differences among the two hours (24 and 16 hours Prime) the highest seed weight equivalent to 78/58 gr by 16 hours priming and the lowest weight was 39/85 gr without seed priming. Treatment by priming the seeds 87/15 % increase in weight seeds. the positive effects of priming is observed of seed weight (Fig. 6). Ghassemi-golezani *et al* on different time priming was observed in beans in between time periods 0, 7, 14 and 21 hours with increased duration to 14 hours the amount of priming increased yield, but in the long Priming time of 21 hours will reduce the yield suffered [20]. The review also increased to 16 hours duration priming increased seed yield, but then suffered was reduced.

Table 1 Analysis Variance of traits in corn

S.V	df	Height(cm)	Dry weight(gr)	Chlorophyll content(CCI)	Yield(ton/ha)
Replication	2	739/892 **	161/738 n.s	16/955 n.s	0/665 n.s
Different level irrigation	1	13179/438 **	34502/492 **	11620/628 **	77/487 **
Ea	2	2/335	41/220	4/011	0.15
Micro Element	2	1977/933 n.s	13163/569 **	8/833 n.s	21/496 **
Different levels of water × Micro Element stress	2	2454/097 n.s	2230/931 n.s	24/873 n.s	4/254 n.s
Different times of priming	3	15483/905 **	20927/507 **	112/168 *	33/927 **
Different × Different levels of water stress times of priming	3	219/441 n.s	15/046 n.s	8/694 n.s	0/248 n.s
Different times of priming × Micro Element	6	158/162 n.s	1511/533 n.s	23/447 n.s	2/337 n.s
Different × Different levels of water stress Micro Element×times of priming	6	189/230 n.s	281/416 n.s	24/759 n.s	0/873 n.s
Eb	44	1896/278	801/655	31/211	2/539
C.V (%)		26/64	23/15	13/37	30/81

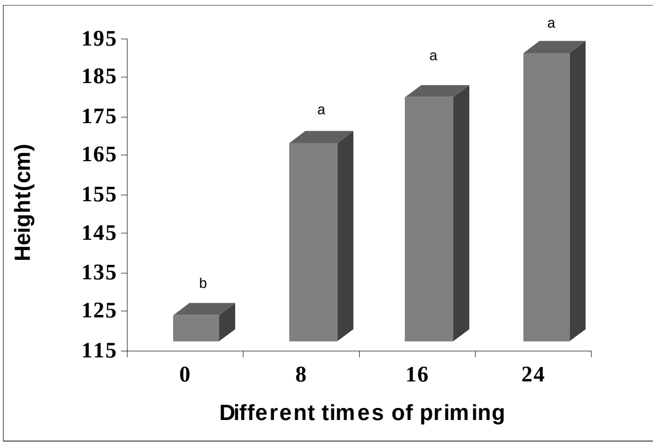

Figure 1) Different times of priming effect on corn height

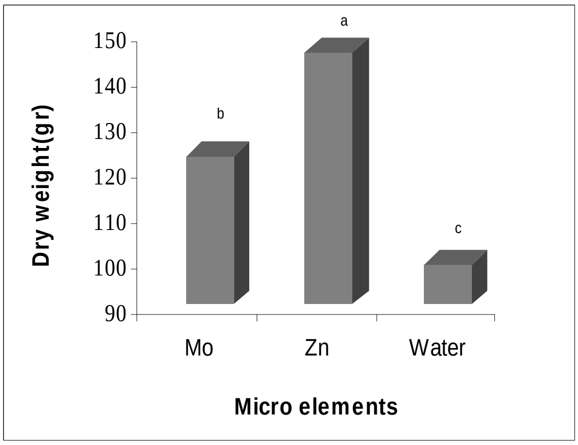

Figure 2) Priming seeds with nutrient elements on dry weight

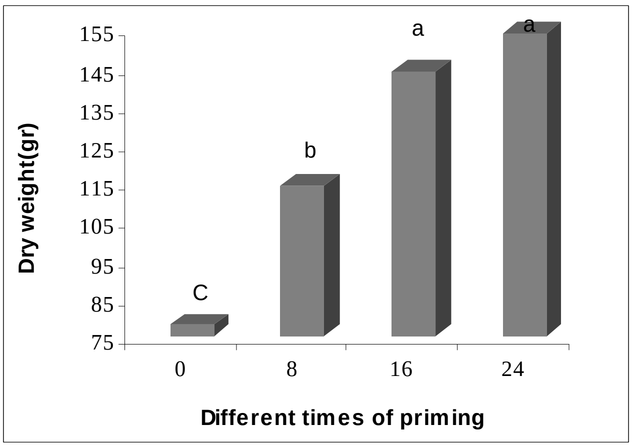

Figure 3) different time of priming effect on dry weight

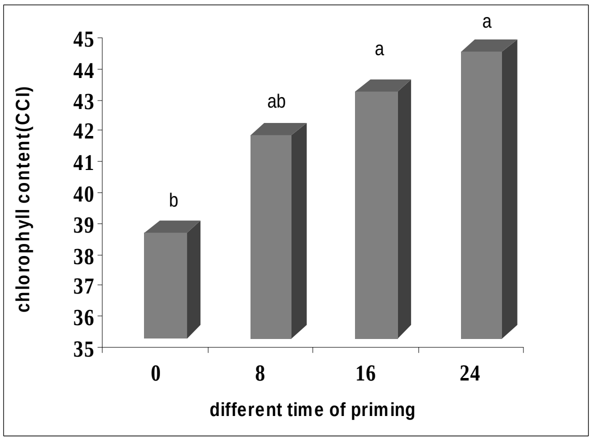

Figure 4) different time of priming effect on chlorophyll content

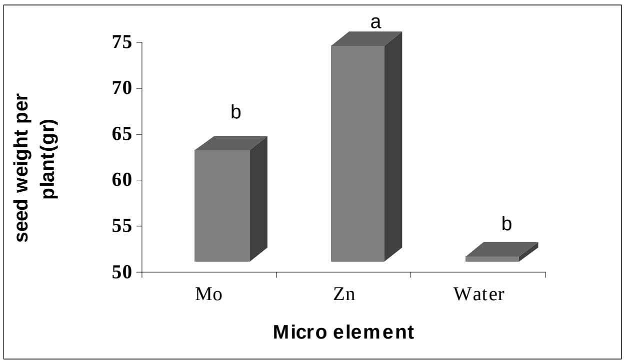

Figure 5) Priming seeds with nutrient elements on seed weight

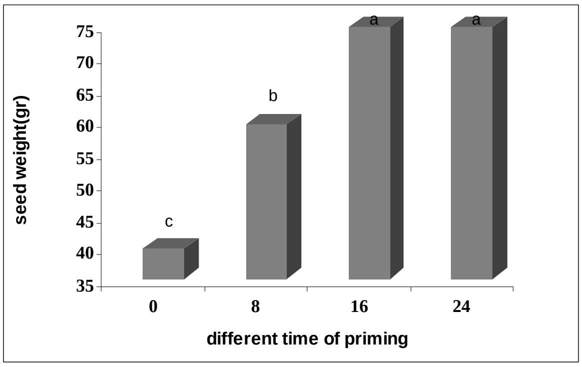

Figure 6) different time of priming effect on seed weight

Acknowledgements
We wish to thank the Islamic Azad University, Malekan Branch, for financial support of this project.

REFRENCES

[1] V. B, K. Muthukumar, Velayudham and N. Thavaprakaash. *Resaerch Journal of Agriculture and Biological Sciences*, **2005**, 1(4): 303-307
[2] M Arif, M.A. Chohan, S. Ali, R.G. and S. Khan,. *Journal of Agricultural and Biological Science*, **2006**, 1:30-34.
[3] G., M. Bukvić, S. Antunović, M. Popović, Rastija. *Plant Soil Environ*., 49(11), **2003**, 505–510.
[4] B. J. Alloway, Zinc in soils and crop nutrition. International Zinc Association (IZA), Belgium., **2004**, PP: 128.
[5] A. Bao, S. Wang, G. Wu, J. Xi, J. Zhang and C. Wang, *Plant Science*, **2009**, 176: 232–240.
[6] C. Graciano, J. J.Guiame´t, and J. F. Goya, *Forest Ecology and Management*, **2005**, 212:40–49.
[7] M, Yagmur, and D. Kaydan, *African Journal of Biotechnology*, **2008**, 7(13): 2156-2162.
[8] M. Igbal, M. Ashraf, *Ann. Bot. Fennici*, **2006**, 43: 250-259.
[9] S. M. A. basra, , I. A. Pannuand, I. Afzal,. *International Journal of Agriculture & Biology*.5(2), **2003**, 121–123
[10] K. D. Subedi, and B. L. Ma.. *Agron*, **2005**, J. 97:211–218.
[11]Marshner, H.1995.Mineral nutrition of higher plants. 2nd ed. Academic Press.
[12] I. Cakmak, *Plant Soil* (**2008**) 302:1–17.
[13] B. N.Kaiser, K. L. Gridley, J. N. Brady, T. Phillips, and S. D. Tyerman, *Annals of Botany*, **2005**, 96: 745-754.
[14] Sun Ting, P, liu, C. jiang, D.he, Effects of Boron and Molybdenum on Seed Germination and Seedling Physiological Characteristic in Brassica napus, **2009**.
[15] M. Yu, C. Hu and Y. Wang, *Plant and Soil*, **2002**, 245, Number 2, 287-293
[16] S. Mohandas, *Plant and Soil* ,**1985**, 86:283-285.
[17] B. Efeoğlu, Y. Ekmekçi, and N. Çiçek, *South African Journal of Botany*, **2009**, 75 : 34–42.
[18] M. Yua, C. Hua, and Y. Wanga, *Journal of Plant Nutrition*, **1999**, 22: 1433 - 1441
[19] Sajid Ali, A. Riaz Khan, M. Ghazal Mairaj, A, Mehwish Fida and S. Bibi, *Australian Journal of Crop Science*, **2008**, 2(3):150-157.
[20] K. Ghassemi-golezani, A. chadordooz-jeddi, S. nasrollahzadeh, M. moghaddam, *Not. Bot. Hort. Agrobot. Cluj* , **2010**, 38 (1) : 109-113.