Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Annals of Biological Research, 2012, 3 (2):1003-1009
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Survey the effect of seed priming on germination and physiological indices of cotton khordad cultivar

Mohammad Bagher Afghani Asl*, Ghadir Taheri

Department of Plant Biology, Nishabour Branch, Islamic Azad University, Nishabour, Iran

---

ABSTRACT

In order to study the effect of different solutions of seed priming at the amount of activities of some cotton anti oxidative enzymes the factorial experiment in completely randomized block design with three replications was conducted. Cotton seeds controlled by priming solutions (control, 2% kcl, HH_2PO_2 %1, KNO_3 30 gr/lit 6000 PEG %10) in 20^0c. the analyze of data presents that the amount of catalyse, peroxidase, ascorbat peroxidase , controlled seeds with PEG solution in 12 and 24 hours except superoxid dismutase in 36 hours and at KCL solutions was obtained at the most amount.

Key words: Oxidative enzymes, priming, cotton.

INTRODUCTION

Cotton has many wild species that all of them belong to Gossypium genus from malvaceae family. It is a tropical, and resistant against salinity and a self zygosis plant. Its fruit is kind of capsule or boll [1-2]. Germination is the first step of plant growing and one of the important and sensitive stages in plants life cycle and also is a key process in greening plant [3]. This stage affected by environmental factors such as temperature and soil moisture [4-6]. In recent years some cultivars produced by use of plant important ways, so that they can germinate in various environmental circumstances. Producing great seeds with high genetic potential is one of accomplished activities, and these seeds have high strength in growing seedlings even at unsuitable circumstances. But, increasing the size of seed or genetic potential is not sufficient for improving seed vigour, because there are some other factors that effects on its growth, so, it is used of other different approaches for improving the seed quality [7] Seed priming is defined as a care before planting that used of water or an osmosic solution, such that the water inside seed and then the first stage of germination begins, but is prevented from main growth and exit of

rhizome from cod. Different reports show that priming lead to increase germination percent, uniformity and acceleration and greening the seed [8-9] Also, it is reported that this technic make increasing the extend of seed germination in stress making environmental circumstances such as salinity, dryness and temperature stress [10]. Hosseini and kuchaki [11] reported that by setting seeds in Acid cloridric for 2 hours, their preventive chemical compositions of germination decreased in seed crust and at the result their germination increased. In a research that Tavassoli and kasino [12] made on cotton, they reported that priming increased the cotton germination acceleration under temperature and salinity stress, but it has not considerable effect on germination percent. Also, it has been reported that priming lead to improving dryness resistance at germination stage in plants.

MATERIALS AND METHODS

In order to study the effect of seed priming on the amount of activities of some anti – oxidative enzymes at different experimental circumstances in cotton plant the factorial experiment in completely randomized block design with three replications was conducted. So, we used of Khordad cultivar seed that supplied of agricultural research center east cotton (kashmar) at 2011 in Nishabour. Cotton seeds was primed except control seeds by priming solution contain 10 gr.lit KH2PO4 , 30gr,lit KNO3, 40gr.lit KCL and 100 gr.lit polyethylene Glycole (PEG) at 20^0c. in order to priming, at first, the primary moisture percent of seeds was measured. Then, was wet in priming solutions, in darkness and at suitable temperatures for 12, 24, 36 hours respectively. After priming, seeds was along with control was set in 25^0c warm air, so that their moisture reach to the moisture before experiment. Seeds were set before in petri dishes by using of putting them in papers and cultivation room in 25^0c of day long temperature for 16 hours and in 16^0c in night temperature for & hours.

In order to extract cellular extraction (plant extraction) for measuring the activities of catalase peroxidase , and superoxide dismutase , some amount of aerial parts of plant (Khordad cultivar cotton) was used. Those 5 ml of buffer was added to supply enzyme extraction and was at the shaker. The pipes were at refrigerator for 10 minutes, so. That two phase separated from each other and after filtering the solution, was transferred into 2 ml micro and in centrifuge machine was centrifuged at 4^0c by 14000 rpm for 15 min. after centrifuge the above solution (clear solution) was removed carefully and was saved and hold in freezer at – 70^0c for the next stages was made in refrigerator. According to the kinds of studied enzymes, three kinds of enzyme extract buffer was made. The supplying stages of catalase and superoxide dismutase extract buffer was made by Gianopolotis and Rise [13] method and Ascorbate peroxidase by Nakado and Asaada [14] method and also peroxidase was made by koroi [15] method and the stages of supplying buffer tris was mod by Bradford [16] method. Also, the activity of superoxid dismutase enzyme was measured by use of Gianopolotis and Rise [13] method at 560 nm wave length Chance and Maehly [17] method and the activity Ascorbate peroxidase enzyme according to Nakano and Asada [14] in 290 nm. Wavelength and peroxidase enzyme activity was measured by koroi [15] method in 530 nm. Wave length. Data was analysed by MSTAT – C statistical software and averages compared by Duncan, multiple range was done. In drawing graph we used of Excel software.

RESULTS AND DISCUSSION

Catalase: the analyse of data shows that priming has considerable effect (α = 0/01) on the amount of catalyse enzyme activity in Khordad cultivar cotton (Table 1). Comparing of averages show that the most catalyse enzyme activity related to primings with PEG6000 and the less amount of it related to control figure (1).

Table 1: Analysis of variance data

Treat	Catalase	peroxidase	superoxid dismutase	ascorbat peroxidase
Duration× priming	58.067*	19.022^{ns}	2030.647^{ns}	37.928^{ns}
Duration	77.400*	20.689^{ns}	1945.995^{ns}	13.067^{ns}
priming	402.633**	350.589**	8037.240*	357.411**

**and ** Significantly at p* 0.05 > *and* ,0.01 > *respectively*.

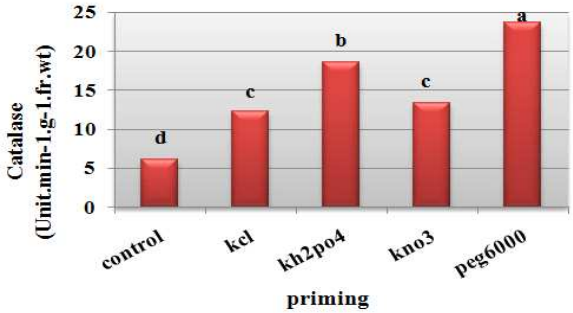

Figure (1) Effect of seed Priming on the catalase enzyme activity in the Khordad cultivar

The effect of seed priming on the amount of activity of catalase enzyme in Khordad cultivar cotton. The analyse of data presens that duration has considerable effect (α = 0/01) on the amount of activity of catalase enzyme related to 36 hours(figure 2).

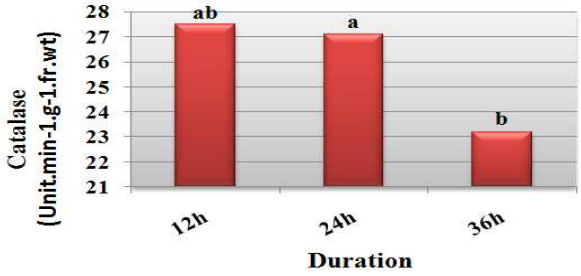

Figure (2): Effect of duration on the amount of Catalase enzyme in the Khordad cultivar

peroxidase : the analyse of data shows that priming has considerable effect (α = 0/01) on the amount of peroxidase enzyme activity in Khordad cultivar cotton. (Table 1). Comparing of averages show that the most catalyse enzyme activity related to primings with PEG and the lowest amount of it related to control(figure 3).

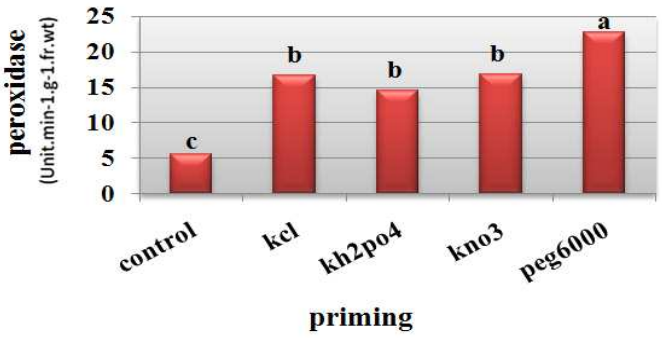

Figure 3: Effect of seed Priming on the peroxidase enzyme in the Khordad cultivar

Analytical data illustrating the during the non-significant (0.01 = α) the amount of peroxidase enzyme cultivar in Khordad (Table 1). Comparison showed that highest amount of peroxidase enzyme the treatments priming in duration 12 hours and lowest peroxidase enzyme is the duration 36 hours (Figure 4).

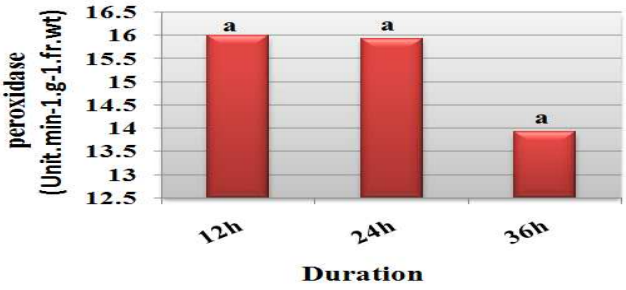

Figure (4): Effect of duration on the amount of peroxidase enzyme in the Khordad cultivar

Ascorbate peroxidase: analysis of data shows that significant priming (0.01 = α) on the antioxidant ascorbate peroxidase in Khordad cultivar (Table 1). Comparison showed that highest enzyme activity the ascorbate peroxidase with PEG treatments priming and lowest enzyme ascorbate peroxidase is the control (Fig. 5).

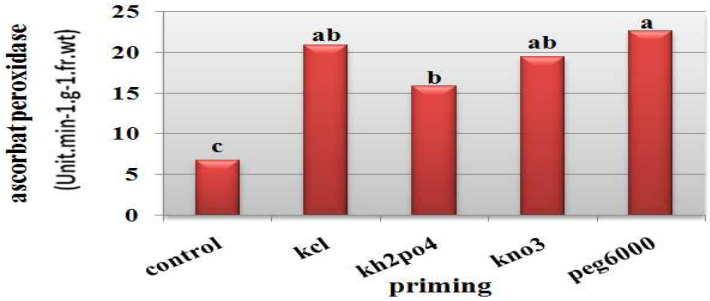

Figure 5: Effect of seed Priming on the ascorbat peroxidase enzyme in the Khordad cultivar

Data analysis shows that non-significant during effect (0.01 = α) and ascorbate peroxidase enzyme activity in Khordad cultivar (Table 1). Comparison showed that the enzyme ascorbate

peroxidasethe treatments in duration priming lowest 12 hours and ascorbate peroxidase enzyme activity is the duration 36 hours (Figure 6).

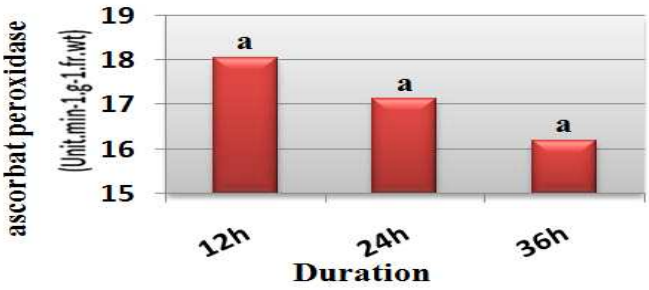

Figure (6): Effect of duration on the amount of ascorbat peroxidase enzyme in the Khordad cultivar

Superoxide dismutase: Analysis of data illustrating the seeds priming significant effect (0.01 = α) is the enzyme superoxide dismutase in Khordad cultivar (Table 1). Comparison shows that highest and lowest enzyme superoxide dismutase, respectively, the KCL and the control (Figure 7).

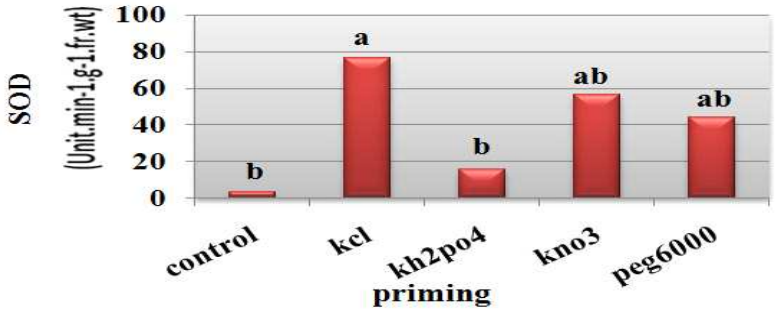

Figure 7: Effect of seed Priming on the superoxid dismutase enzyme in the Khordad cultivar

Data analysis shows that non-significant during effect (0.01 = α) on the superoxide dismutase enzyme activity in Khordad cultivar (Table 1). Superoxide dismutase enzyme activity compared the treatments showed that highest the duration priming and lowest catalase enzyme activity duration 36 hours the 12 hours (Figure 8).

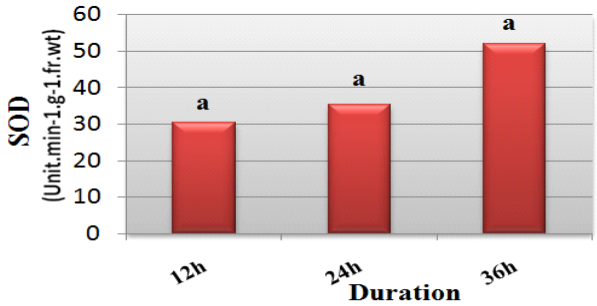

Figure (8): Effect of duration on the amount of superoxid dismutase enzyme in the Khordad cultivar

Hus and sang (1977) reported that priming increase oxidant enzymes such as glothation and ascorbat in seeds, that these enzymes decrease the activity of lipid peroxidation during germination and at the result increase germination percent.

CONCLUSION

The survey results showed priming increased oxidative enzyme activity of the components leading to an improved germination and seedling growth of cotton is. In other words, the seeds were treated before germination started the seeds resulting in faster deployment and will be out sooner than soil and less time exposed to soil pests and pathogens. priming very significant effect on enzyme activity of catalase, peroxidase, ascorbate peroxidase and superoxide dismutase showed a significant effect on enzyme activity. priming interaction and duration of antioxidant enzymes catalase activity priming only showed a significant α=0.05% effect. Although osmopriming most improve the activity of antioxidant enzymes but for reasons such as osmotic substances absorbed by the seeds and the toxic substances or metabolic activity of the seeds and spread of microorganisms and fungi, priming the percentage of germination, did not have positive effect. The results of this experiment, the priming to speed up germination and other traits, germination, and increased enzyme activity and ultimately increase yield, to be confirmed. Best priming substrate, osmo priming PEG solution is. osmo priming best substrate, with the PEG solution. The highest activity of enzymes catalase and peroxidase results And ascorbate peroxidase in a solution of polyethylene glycol 6000 was priming And the highest enzyme activity superoxide dismutase priming solution of potassium chloride (KCL) Enzymes catalase and peroxidase activities and the highest hand and ascorbate peroxidase 12-hour period and the highest enzyme activity superoxide dismutase 36-hour period In other words, ascorbate peroxidase and catalase and peroxidase enzymes that can be said Priming solution in polyethylene glycol 6000, 12-hour period had the highest activity The enzyme superoxide dismutase enzymes catalase and peroxidase and ascorbate peroxidase, unlike priming potassium chloride solution and 36-hour period had the highest activity.

REFERENCES

[1] M Khajehpour; Industrial plants. Isfahan University of Jahad, **1991** and **2004**.
[2] A Samadi, **1976**. Industrial plants, oil plants and fibrous. Ahvaz University.
[3] De Villiers; AJ Van Rooyrn; MW Theron; GK Van; HA Deventer, **1994**. *Germination Seed. Sci and Technol.* 22:591-599.
[4] A Anda; L Pinter, **1994**. *Agronomy Journal* 86, 621-4. Contact: Anda, A. ; Dep. Agrometeorol., Univ. Agric., Keszthely, H-8361, Hungary.
[5] SMA Basra*;* M Farooq; R Tabassum, **2004**. *Seed Sci Technol* 33, 21.
[6] SE Jacobson; AP Bach, **1998**. *Seed Sci and Technol*. 26: 515-523.
[7] Y Fujikura; HL Kraak; AS Basra; CM Karssen, **1993**. *Seed and Technology*. 21:639_642.
[8] M Demir Kaya; G Okçu; M Atak; Y Çikili; Ö Kolsarici, **2006** *Iranian Agricultural Research magazine.* (C). 5, Sh. 1. P.. 85-91.
[9] Murungu; P Nyamugafata; C Chiduza; LJ Clark; WR Whalley, **2003**. *Soil Till. Res*. 74: 161-168.
[10] M Ashraf; MR Foolad, **2005**. *Advan. Agron*. 88: 223-271.

[11] A Hosseini; A Kochaki, **2007**. *Iranian Agricultural Research magazine*. (C). 5, Sh. 1. P.. 75-69.
[12] ME Tavassoli; EC Casino, **2003**. *Seed Sci. & Technol*., 31, 727-735.
[13] CN Giannopolities; SK Ries, **1977**. *Plant Physiol*., 59: 309–314.
[14] Y Nakano; K Asada, **1981**. *Plant Cell Physiol*., 22: 867-880.
[15] SA Koroi, **1989**. *Physiol.Rev*.20:15-23
[16] KJ Bradford, **1995**. Water relations in seed germination. In "Seed Development and Germination" (J. Kigel and G. Galili, Eds.), pp. 351-396. Marcel Dekker Inc., New York.
[17] B Chance; AC Maehly, **1955**. *Methods Enzymol*., 2: 764-775.