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Effect of seed priming on germination and initial growth of Sweet William (*Dianthus barbatus*)

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ABSTRACT

This research laboratory done in 2010 at the Faculty of Agriculture, Chamran University was for effects of seed priming on germination and initial growth of Dianthus barbatus seeds compared with controls (not Prime). Seed priming is a method that allows water uptake as controlled before planting the seeds will germinate the primary activities such as activation of hormones, enzymes and dissolve the food materials stored. However, the rooting is prevented from leaving and then the seeds are dry until planting is able to maintain capability. Priming is benefits for action many including, increased viability, germination rate under low temperature, increased root yield, increase the power of germination and seedling establishment under conditions fungal infections, increase the power of germination under salinity and drought, reducing the need for Water green and finally to establish better and more plants per unit area in different plants. In this experiment, Sweet William seeds were placed for 24 h in solutions GA_3 (with two concentrations 50 and 100 ppm), KNO_3 (0.5 and 1%), KH_2PO_4 (1 and 2.5%). After completion of priming, seeds were dry at room temperature and dark conditions. For evaluation behavior of germination, 20 seeds from each treatment was placed within the Petri dish between two layers of filter paper, in 5 ml distilled water to each petri dish was added, for germination was transferred germinator 2±25 °C. Design was used in this study based on factorial Completely Randomized Design. At the end of germination were evaluated traits such as root length, shoot length, germination percentage, and dry weight plant. Test results showed that seed treatment with gibberellin solution concentration of 100 ppm was significant germination, root length, and shoot length in comparison with other treatments as a significant level of 5%.

Key word: Priming, *Dianthus barbatus*, Germination

INTRODUCTION

The *Dianthus barbatus* is a plant from *Caryophyllaceae* family. The genus *Dianthus* L. comprises about 300 species with a worldwide distribution but centered in the Mediterranean region; some species are cultivated as ornamentals [1]. Seed priming is a method that allows water uptake as controlled before planting the seeds will germinate the primary activities such as activation of hormones, enzymes and dissolve the food materials stored. However, the rooting is prevented from leaving and then the seeds are dry until planting is able to maintain capability. Priming is benefits for action many including, increased viability, germination rate under low temperature, increased root yield, increase the power of germination and seedling establishment under conditions fungal infections, increase the power of germination under salinity and drought, reducing the need for Water green and finally to establish better and more

plants per unit area in different plants. Although priming (osmoconditioning) is one of the physiological methods, which improves seed performance and provides faster and synchronized germination [2].

Some researchers [3,4,5] on tomatoes, some [6] with asparagus and tomatoes, and also [7] with cucumber, have concluded that seed priming improves seed germination, seedling emergence and growth under saline conditions. Therefore, the present study was conducted to examine the effect of priming on germination and initial growth of Sweet William.

MATERIALS AND METHODS

This research laboratory done in 2010-2011 at the Faculty of Agriculture, Chamran University was for effects seed priming on germination and initial growth of *Dianthus barbatus* seeds compared with controls (not Prime). In this experiment, Sweet William seeds were placed for 24 hours in solutions GA_3 (with two concentrations 50 and 100 ppm), KNO3 (0.5 and 1%), KH_2PO_4 (1 and 2.5%). After completion of priming, seeds were dry at room temperature and dark conditions. For evaluation behavior of germination, 20 seeds from each treatment were placed within the Petri dish between two layers of filter paper, in 5 ml distilled water to each petri dish was added, for germination was transferred germinator 2±25 °C. Design was used in this study based on factorial Completely Randomized Design. At the end of germination were evaluated traits such as root length, shoot length, germination percentage, and dry weight plant.

RESULTS AND DISCUSSION

According to the results, all studied traits were affected by the experimental factors and there was completely significant difference between control (none primed seeds) and primed seeds (Table 1).These results showed that the most germination percentage and highest germination rate in seeds were in the GA_3 with concentrations 100 ppm treatment. Basra et al. [8] and Salinas [9] reported improvement in germination percent, emergence, and seedling stand by using seed priming techniques. In fact, priming induces a range of biochemical changes in the seed that required initiating the germination process i.e., breaking of dormancy, hydrolysis, or metabolism of inhibitors, imbibitions, and enzymes activation [10].

By comparing the other treatments with distilled water (control), showed that in the treatment of Sweet William (*Dianthus barbatus*) with different concentrations GA_3 (50 and 100 ppm) and KNO_3 (0.5 and 1%), KH_2PO_4 (1 and 2.5%) , distilled water (Control) has lowest of the plumule length, while the highest seedling Radicle and Plumule length(cm), Fresh weight of Radicle(g) and of Plumule (g), dry weight of Radicle (g) and Plumule (g) was attained from GA_3 with concentrations 100 ppm (Table 1). Many plant hormones such as auxin, gibberellin (GA), cytokinin, and brasinolide regulate elongation and division of plant cells, hence determine architecture of plants. Historically, GA was found to function in internodal elongation.

Table1. Means comparison of studied traits in Sweet William by Duncan multiple range test

	Control (Distilled water)	KNO_3		KH_2PO_4		GA_3	
		0.5%	1%	1%	2.5%	50 ppm	100 ppm
Germination percentage (%)	85 ^{c}	93 ^{bc}	95 ^{b}	80 ^{d}	89 ^{c}	94 ^{b}	100 ^{a}
Germination rate	0.772 ^{b}	0.870 ^{ab}	0.987 ^{a}	0.678 ^{c}	0.787 ^{b}	0.989 ^{a}	0.998 ^{a}
Radicle length (cm)	1.5 ^{b}	1.3 ^{b}	1.5 ^{b}	0.6 ^{c}	0.9 ^{c}	1.8 ^{a}	2.1 ^{a}
Plumule length (cm)	2 ^{b}	2.3 ^{b}	2.5 ^{ab}	2.6 ^{ab}	2.5 ^{ab}	2.9 ^{a}	2.9 ^{a}
Fresh weight of Radicle (g)	0.002 ^{b}	0.002 ^{b}	0.001 ^{c}	0.001 ^{c}	0.001 ^{c}	0.002 ^{b}	0.003 ^{a}
Fresh weight of Plumule (g)	0.03 ^{b}	0.04 ^{a}	0.034 ^{ab}	0.02 ^{c}	0.027 ^{bc}	0.03 ^{b}	0.035 ^{ab}
Dry weight of Radicle (g)	0.0006 ^{b}	0.0006 ^{b}	0.0002 ^{c}	0.0003 ^{c}	0.0002 ^{c}	0.0007 ^{b}	0.001 ^{a}
Dry weight of Plumule (g)	0.0033 ^{b}	0.005 ^{a}	0.0035 ^{b}	0.0013 ^{d}	0.0027 ^{c}	0.0031	0.0038 ^{b}

CONCLUSION

In this experiment, seed inoculation with GA_3 showed significant effects on Sweet William growth components. It can be suggested that should be applied in flower seed, especially for plant seeds with problem in germination, inoculation with GA_3 (100 ppm).

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