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Effect of Seed Priming on Germination, Growth and Flowering of Snapdragon (*Antirrhinum majus*)

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ABSTRACT

The present investigation entitled "Effect of seed priming on germination, growth and flowering of snapdragon var. Snapshot burgundy" was carried out during 2022-23. The experiment was laid out in randomized block design with seven treatments and three replications. The treatments were non-primed seeds, Distilled water, GA_3 150 ppm, GA_3 250 ppm, KNO_3 0.02M, KNO_3 0.002M and *Trichoderma viride*. Observations were recorded for germination, vegetative and flowering parameters. Among all the treatments maximum germination percentage (65.33%) and early germination (5.00 days) was recorded in GA_3 (150 ppm). Vegetative growth parameters such as plant height and branches per plant were found best in KNO_3 (0.002M). Maximum number of spikes per plant (22.25 spikes) and maximum spike length (24.87 cm) were also found in KNO_3 (0.002M). Therefore, GA_3 and KNO_3 in low concentration can be recommended for seed priming of Snapdragon.

Key words: *Antirrhinum majus, Germination, Seed priming, GA_3, KNO_3 and Trichoderma*

Introduction

Antirrhinum is an excellent cut flower and it can be grown throughout the world. It is herbaceous plant and native to Mediterranean region. *Antirrhinum* is also known as dog flower, dragon flower and Snapdragon because of the shape of flower (Hou and Chen, 2018). The main problem in cultivation of snapdragon is low germination percentage. Seeds of snapdragon are costly, difficult to germinate and show heterogenous emergence of seedlings (Bhargava *et al.,* 2015). Seed priming is most important technique which is introduced to increase germination percentage and to produce healthy seedlings. Seed priming reduces time of emergence of seedlings and protect seed from environmental stress. It is successfully used in Snapdragon and in other flowering crops. Mirlotfi, *et al*. (2015) reported that seed priming has positive effect on establishment of seedlings of *Calendula officinalis*. Karimi and Varyani, (2016) reported that 100 mg/l GA_3 and distilled water for 72 hours give highest germination percentage of Calendula seeds. Seed priming has positive effect on germination,vegetative growth of plants and flowering characters of *Antirrhinum* (Bhargava *et al.,* 2015). Therefore, present research was carried out to study seed priming effect on production of Snapdragon and to find best priming agent for Snapdragon.

Materials and Methods

Present experiment was carried out at Mata Gujri college, Sri Fatehgarh Sahib, Punjab during 2022-2023. Field of experimental site lies at 30.6435° North latitude and 76.3970° East longitudes. The al-

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titude of the location is 246 meter above the mean sea level. During the period of investigation (October, 2022 to April, 2022) maximum temperature was 31 °C and minimum temperature was 7.3°C. The experiment was laid out in Randomized Block Design (RBD) with three replications and seven treatments. Seeds of Variety Snapshot burgundy were used for priming. Origin of seeds was Pan American Company.

For hydro-priming treatment, distilled water was used. Seeds were kept in petri-dish and 6ml distilled water is put in petri- dish. For hormonal - priming, 150 ppm and 250 ppm of GA_3 solutions were prepared. Out of final volume (1 litre), 6 ml solutions were put in petri dishes. For osmotic – priming, 0.02M and 0.002M solution of KNO_3 were prepared and 6ml solution was used in petri-dish for priming. For bio-priming, *Trichoderma viride* 2×10^8 cfu/ml was used. All the petri dishes containing priming solution along with seeds were placed in incubator at 23 °C for 24 hours.

After drying seeds with blotting paper, sowing was done in nursery pro- trays containing Sand, soil and Farm in the ratio of 2:1:1 (v/v). After it, seedling was transplanted in main field with spacing of 40×40cm where vegetative and flowering parameters were recorded.

Results and Discussion

Maximum germination percentage and early germination was found in 150 ppm GA_3 because GA_3 stimulated germination of seeds in plant species by inducing hydrolytic enzymes and by stimulating growth potential of embryo. GA_3 induced hydrolytic enzymes in seeds and also increase growth potential of embryo present in seeds. Karima and Varyani (2016) also reported maximum germination percentage of calendula seeds in GA_3 priming treatment. Shah *et al.* (2018) also reported maximum germination percentage of lisianthus (*Eustoma grandiflorum*) in seeds primed with GA_3.

Plants show best vegetative growth (Plant height and branches per plant) in 0.002M KNO_3 because KNO_3 activate enzymes involved in protein synthesis and metabolism of carbohydrates. Potassium nitrate provides nitrogen and potassium to plants during early stage of its growth. Potassium promote photosynthesis which results in more sugar production in plants and activate metabolism of carbohydrates which result into formation of more number of branches. This finding is in agreement with Mushtaq *et al.* (2012) and Mirabi and Hasanabadi (2012).

Flowering parameters such as number of spikes per plant (22.25 spikes) and Spike length (24.87cm) were also found best in KNO_3 (0.002M) because KNO_3 acts by providing nitrogen and potash to plants which are required for flowering. potassium nitrate increase carbohydrate content, protein content and C/N ratio. Therefore, number of spikes are increased in plants. Bhargava *et al.* (2015) observed more number of spikes in case of KNO_3 priming as compared to control (non-priming). Sarker and Rahim (2013) also observed maximum number of panicles in mango after applying KNO_3.

Conclusion

150 ppm GA_3 and 0.002M KNO_3 are best priming agents for Snapdragon var Snapshot burgundy because GA_3 improves all germination parameters and KNO_3 improves all vegetative and flowering parameters.

Table 1. Effect of Seed Priming on vegetative and flowering parameters of *Antirrhinum majus* var. Snapshot Burgundy.

Treatments		Germination percentage	Days taken to germination	Plant height (cm)	Branches per plant	No. of spikes per plant	Spike length (cm)
T_1	Non-primed seeds	34.67	11.33	25.89	10.19	19.87	22.24
T_2	Distilled water	21.33	8.67	24.68	10.36	20.16	22.76
T_3	150ppm GA_3	65.33	5.00	24.86	10.50	18.75	21.90
T_4	250ppm GA_3	58.33	6.33	24.32	8.61	17.94	20.62
T_5	0.02M KNO_3	55.67	7.67	25.56	9.43	19.44	21.89
T_6	0.002M KNO_3	50.67	9.33	27.75	13.61	22.25	24.87
T_7	*Trichoderma viride* 2×10^8 cfu/ml	5.33	12.33	19.54	9.43	13.50	16.47
	Sem±	1.10	0.81	0.54	0.71	0.72	0.54
	CD	3.38	2.50	1.65	2.19	2.20	1.68

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Conflict of interest

I have not any personal interest to publish my paper. I want to publish it for professional interest.

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