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Effect Of Plant Growth Substances On Seed Germination Of *Asparagus Racemosus* (Satavar)

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ABSTRACT: *Asparagus racemosus* is an important medicinal plant commonly called Satavari considered both a general tonic and a female reproductive tonic with ability to increase fertility and vitality. Charak Samhita written by Charak and Ashtang Hridyam written by Vagbhata, the two main texts on Ayurvedic medicines, list *Asparagus racemosus* as part of the formulas to treat women's health disorder. Due to its multiple uses, demand for *A. racemosus* is constantly on the rise however, the supply is rather erratic and inadequate. Destructive harvesting, combined with habitat destruction in the form of deforestation has aggravated the problem. There is a need for conservation of this plant. To overcome these prevalent problems, the availability of genetically superior and uniform planting material is essential. The seed mediated propagation is unsatisfactory due to dormancy and low germination percentage. This however, decelerates the conservation strategy of this species. Thus efforts were made in this study to break dormancy and improve germination of seeds by different growth regulators for boosting conservation. The TZ (Triphenyl tetrazolium chloride) test showed 97% of viable seeds. The present investigation was carried out to study the influence of different growth substances on seed germination, length of root and shoot and vigour index. The seeds were soaked in different growth regulators like GA_3, NAA & KNO_3 with different concentration to evaluate their effect on germination at a constant temperature of 25^0C, it was found that GA_3 300 ppm had a highest significant effect on germination as compared to control and all other treatments at a constant temperature on top of the paper substrata, but as the concentration increased above 300 ppm the germination decreased rapidly.
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KEY WORDS: *Asparagus racemosus;* growth regulators; seed germination.

INTRODUCTION

Asparagus racemosus (Liliaceae) is commonly called Satavar (queen of herbs). The plant grows throughout the tropical and sub tropical parts of India. Plants(roots) used in traditional Indian medicine(Ayurveda). Satavar have rejuvenation effect in female reproductive organs, it is useful in treatment of tumours, inflammations, tuberculosis, leprosy, epilepsy, dysentery and night blindness, also used as uterine sedative. Dried tuberous roots have ulcer healing resistance or cytoprotection. Medicated oil prepared from tubers is beneficial for nervous & rheumatic complaints.[1] The plants are cultivated by the seeds and germination of seed is low. Seed dormancy is common in the Liliaceae. Seeds are endospermic, it surrounded the embryo. Growth regulators play important role in increasing germination rate of seeds.

MATERIAL AND METHODS

The study was conducted in the department of seed science & technology, H.N.B. Garhwal University, Srinagar, Garhwal, Uttarakhand. Seeds of *Asparagus racemosus* were collected from the near by fields of the University campus, during January 2014. Germination studies were conducted on top of the paper substrata. Aqueous solutions of different growth substances(GA_3, NAA, KNO_3) were prepared separately with concentration of 100, 200, 300 ppm and 0.5, 1, 2% respectively. Control was also maintained in parallel with treated material. Seeds were soaked in different growth regulators with different- different concentration for 2-3 hours at 30-35^{0}C[2] before putting them for germination. For each treatment 100 seeds were taken in three replications. Petri dishes were kept for germination at constant temperature of 25^0C in dark conditions. Observations were recorded daily for emergence of radical, number of days required for germination.

RESULT AND DISCUSSION

Recently, various seed priming techniques have been developed, including hydropriming (soaking in water), halopriming (soaking in inorganic salt solutions), osmopriming (soaking in solutions of different organic osmotic), thermopriming (treatment of seed with low or high temperature), biopriming (hydration using biological compounds). Each treatments has advantages and disadvantages and may have varying effects depending upon plant species, concentration/ dose of priming agent and incubation period. Earlier reports on seed germination and seed emergence revealed the beneficial effects of seed priming by several ways (heat, smoke, soaking, leaching, temperature, scarification and NaCl salanity)[3]. Seed germination and seedling growth are known to be regulated by exogenous harmones[4,5]. Growth regulators used in presowing seed treatments play an important role in germination and vigour. Seed hardness, which is prevalent in many species belonging to the family leguminosy, malvaceae and liliaceae is one form of dormancy and is caused due to genetic and environmental factors[6]. Seedling emergence of *Asparagus* takes from four to six weeks depending upon temperature and soil water potential.

Seed viability

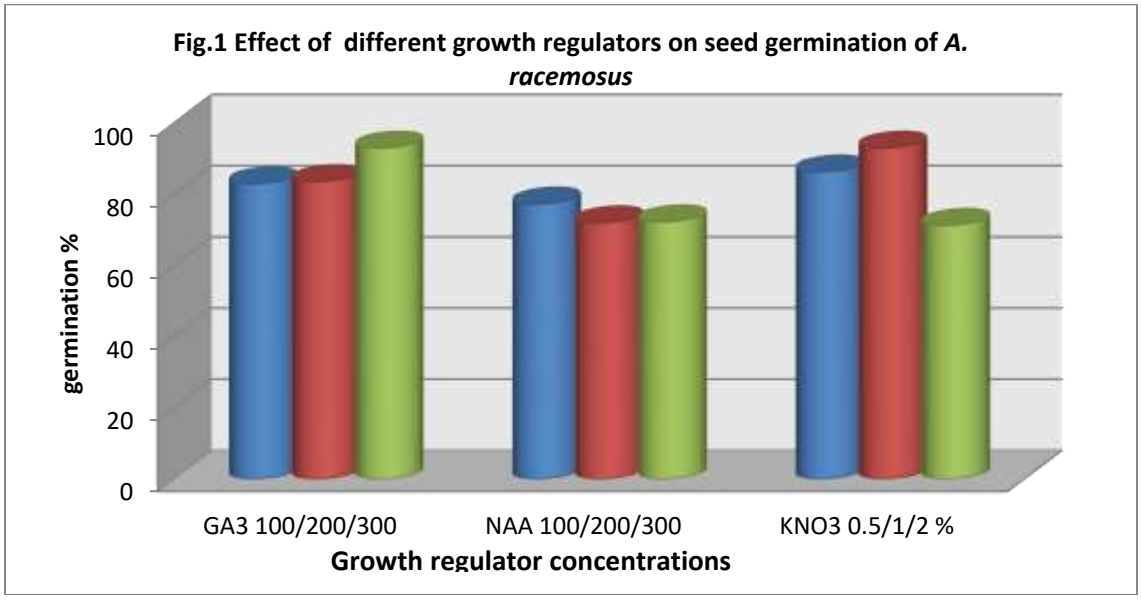
The viability of *Asparagus racemosus* seed was 97%. However seed dormancy was observed in the experiment, results of tetrazolium test was not in accordance with the seed germination percentage.

Effect of pretreatments on germination percentage of *Asparagus racemosus*

The growth substances and their concentration significantly affected seed germination. The highest germination percentage of *Asparagus racemosus* seeds in control was 45% at an incubation temperature of 25^0C. The germination percentage increased to 77.3% when the seeds were treated with 100 ppm NAA followed by 72%, 72.3% by 200 & 300 ppm NAA respectively. On the other hand KNO_3 1% Showed highest percentage of germination (93%) comparision to 0.5 & 2% i.e 86.3 & 71.3% respectively[7]. When *Asparagus racemosus* seeds treated with 1% KNO_3 was effective in improving the germination percentage but the high dose of KNO_3 was not effective in this case[8]. Seeds treated with GA_3 (300 ppm) and KNO_3 (1%) achieved highest germination percentage of 93 at 25^0C[9], which was highest as compared to control and all other treatments (Table & Fig. 1).

TABLE-1

	Concentration	Germination (%)	Root length (cm)	Shoot length (cm)	Vigour index (G x SL)
Control		45	6.4	8.5	759.9
GA_3	100 ppm	83	6.0	8.8	1228.4
	200ppm	83.6	9.2	8.3	1463
	300ppm	93	11.2	13.5	1990.2
NAA	100ppm	77.3	7.2	13.5	1600.1
	200ppm	72	6.3	8.4	1058.4
	300ppm	72.3	6.4	8.2	1055.6
KNO_3	0.5%	86.3	5.2	6.7	1026.9
	1%	93	6.2	9.6	1469.4
	2%	71.3	4.9	8.1	926.9
C.D. Values Growth regulators(A): 3.818 Concentration (B): N.S A*B: 6.612					



Out of the three growth regulators GA_3 and KNO_3 had a significant effect on germination. However, GA_3 was highly effective to induce germination(table 1). Seeds took 25 days for final germination in control, 21 days in KNO_3 & NAA and 17 days in GA_3. It was observed that, GA_3 was found most effective in inducing seed germination. No doubt all growth substances gave better result than control.

GA_3 was the most effective chemical that showed good response in increasing the germination percentage of *Asparagus racemosus*[10]. The results of our work are similar to those of Baskin and Baskin[11] where they found positive effect of GA_3 solution on *Osmorhiza claytonia* seeds. It is reported that GA_3 is effective in breaking the non – deep physiological dormancy, but it does not overcome the deep physiological dormancy[12].

Two functions for gibberellins (GA) during seed germination have been proposed, first GA increases the growth potential of the embryo secondly, it is necessary to overcome the mechanical restraint conferred by the seed covering layers, by weakening of the tissues surrounding the radicle[13,14].

From the above results of the present work it is concluded that *Asparagus racemosus* have non-deep physiological dormancy. GA_3 broke dormancy of the seeds significantly and increase germination percentage from 45 to 93%.

REFERENCES

1. Khare, C.P., Indian medicinal plants, *An illustrated dictionary*, Springer- Verlag, Berlin, New York, USA, 2007, pp.812.
2. Kandari L.S., Rao K. S., Chauhan K., Maikhuri R. K., Purohit V.K., Phondani P.C. and Saxena K.G., Effect of presowing treatments on the seed germination of two endangered medicinal herbs of the Himalaya(Angelica glauca Edgew and Pleurospermum angelicoides wall. Ex Dc. Benth. Ex. C.B Clarke) proc. *Indian Nat. Sci. Acad.*,73,11-16(2007).
3. Ahmed A.K., Johnson K.A., Burchett M.D. and Kenny B.J., The effects of heat, smoke,leaching, scarification, temperature and Nacl salinity on the germination of *Solanum* central (the Ausralian bush tomato), *Seed Science and Technology*, 34, 33-45 (2006).
4. Khan A.A., *The Physiology and Biochemistry of Seed Dormancy and Germination*, Elsevier Scientific Publications Co. Amsterdam, 477 (1977).
5. Verma A.N. and Tandon P., Effect of growth regulators on germination and seedling growth of *Pinus kesiya* and *schima khosiana*, *Indian Journal of Forestry*, 11, 32-36 (1988).
6. Copeland L.O. and McDonald M.B., *Principles of Seed Science and Technology* 4th edn. Kluwer Academic Publisher press (2001).
7. Sarwar N., Yousaf S. and Jamil F.F., Induction of salt tolerance in chickpea by using simple and safe chemicals. *Pak J Bot.*, 38, 325-329 (2006).
8. Tang D., Hamayun M., KOY., Zhang Y., Kang S. and Lee I., Role of red light, temperature, stratification and nitrogen in breaking seed

dormancy of *Chenopodium album L. J. Crop sci. Biotech.,* 11 (3),199-204(2008).
9. Kasera, P.K., Prakash, J., Shukla, J.K., Saharan, P. and Mohammed, S., *JHEN*, 2011, 1, 38-41.
10. Kedia,S., Kasera, P. K.and Mohammed, S., *Seed research*, 2012,40: (in press).
11. Baskin C.C and Baskin J.M., Non deep complex morphophysiological dormancy in seeds of Osmorhiza claytonia(Apiaceae). *Ani J. Bot.,* 78, 588-593 (1991).
12. Baskin J.M and Baskin C.C., A classification system for seed dormancy. *Seed science research*, 14, 1-16 (2004).
13. Kucera B., Cohn M. A. and Leubner-Metzger G., Plant harmone interactions during seed dormancy release and germination. *Seed sci. Res.*,15, 281-307(2005).
14. Finch-Savage W.E., Cadman C.S., Toorop P.E., Lynn J.R and Hilhorst H. W., Seed dormancy release in *Arabidopsis* cvi by dry after- ripening, low temperature, nitrate and light shows common quantitative patterns of gene expression directed by environmentally specific sensing. *Plant J.*, 51, 60-78 (2007).

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