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Effect of GA_3 on Germination and Seedling Vigour Index in Brinjal Species

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ABSTRACT: An experiment was conducted to assess the effect of gibberlic acid on germination and seedling vigour index in brinjal species at Department of Vegetable science, College of Horticulture, Venkataramannagudem (A.P.). A total of nine brinjal species (T_1: *Solanum torvum,* T_2: *Solanum mammosum,* T_3: *Solanum gilo,* T_4: *Solanum indicum,* T_5: *Solanum seaforthianum,* T_6: *Solanum viarum,* T_7: *Solanum aethiopicum,* T_8: *Solanum melongena* cv. Pennada Local, T_9: *Solanum melongena* cv. Dommeru Local) were involved in the study. Seeds of these species were soaked in GA_3 solution (1000 ppm) for 24 hours in the study. The study revealed that *Solanum seaforthianum* exhibited the earliest germination. Maximum germination percentage was noticed in *Solanum melongena* cv. Pennada Local on par with *Solanum melongena* cv. Dommeru Local. The highest seedling vigour index was observed in *Solanum melongena* cv. Dommeru Local.

Keywords: Effect, gibberlic acid, germination and seedling vigour index.

INTRODUCTION

The development of novel vegetable varieties with increased resistance to biotic and abiotic stresses as well as maintenance of natural diversity is very important to feed the ever-growing population. Wild relatives in vegetables have great potential to combat future challenges. Wild relatives of crop plants are an important reservoir of genetic variability for various economic characteristics such as disease and insect resistance, tolerance for abiotic stresses, male sterility, increased biomass, enhance yield and improved quality characteristics. Thus, economic potential and environmental benefits of improved crop production and quality through breeding with crop wild relatives have a tremendous impact for sustainable crop production. Besides opting wild brinjal species for crossing, use of these plants as rootstocks for grafting has become popular.

The primary limitation for the practical use of *Solanum* species as rootstocks in commercial production of grafted plants, as well as in breeding programmes, is poor, irregular and erratic germination due do dormancy in seeds. Seeds of the wild species germinate slowly and some cases at low percentages constraining their use as root stocks across locations. Improving seed germination of wild species was reported through soaking treatment of gibberellic acid. Works on this aspect led to improve confidence to brinjal growers seeking a reasonable plant stand in wild species thus facilitating their use for root stock purposes. Under this background the present study was conducted with an objective of elucidating the effect of GA_3 on improvement of germination and seedling vigour in wild brinjal species.

MATERIAL AND METHODS

A. Collection of material

The seed material for the study was collected from Indian Institute of Horticultural Research (ICAR-IIHR), Bengaluru, Karnataka.

B. Seed treatment

Seeds of brinjal species were soaked for 24 hours in the solution (GA_3 at 1000 ppm). Desired quantity of GA_3 was dissolved in few milli litres of ethyl alcohol and the volume was made up to one litre by adding distilled water to obtain respective concentration of 1000 ppm. Fifty milli litres of solution was taken in 100 ml beaker to soak seeds thoroughly. Soaked seeds were taken out and washed with distilled water, after which they were placed on blotting paper in petri dish. Seedlings were transferred to protrays after emergence of radicles.

Observations were recorded on days taken for germination, germination percentage, shoot length (cm), root length (cm) and seedling vigour index

C. Statistical Analysis

Completely randomized design was used for the experiment, and there were three replications.

RESULTS AND DISCUSSION

The data pertaining to days taken for germination, germination percentage, shoot length (cm), root length (cm) and seedling vigour index as influenced by brinjal species are presented in Table 1. There were significant differences among the species in respect of these observations.

The mean number of days taken for germination was 5.94 days and mean germination percentage was 80.44. Minimum number of days taken for germination (4.00 days) was observed in *Solanum seaforthianum* (T_5) and maximum germination percentage was recorded by *Solanum melongena* cv. Pennada Local (T_9) (94.00 %) on par with *Solanum melongena* cv. Dommeru Local (T_8) (93.50 %) and maximum number of days taken for germination and lowest germination percentage was noticed in *Solanum torvum* (T_1) (7.50 days, 64.50%).

Variation among the species with respect to germination percentage might be due to capacity of producing mRNA molecules that codes for hydrolytic enzymes (amylases and proteases) in germinating seeds (Gupta and Chakrabarty 2013). The process of germination would have been facilitated by the released energy on account of enzymatic action, breaking down and hydrolysing carbohydrates and proteins in the endosperm. It is also pertinent to mention here that GA_3 was found capable of increasing DNA replication and mRNA synthesis (Lahuti *et al.*, 2003). These results are in accordance with Wei *et al.* (2010); Hayati *et al.* (2005); Ranil *et al.* (2015).

Maximum shoot length, among the species, was recorded by *Solanum indicum* (T_4) (7.33 cm) followed by *Solanum viarum* (T_6) (6.66 cm) whereas, minimum was noticed in *Solanum gilo* (T_3) (4.48 cm). The root length was maximum in the genotype *Solanum torvum* (T_1) (7.36 cm) followed by *Solanum indicum* (T_4) (7.01 cm) whereas, shortest roots were noticed in *Solanum seaforthianum* (G_5) (5.28 cm).

Differences among species with respect to activation of embryo, enhancing vegetative growth, mobilization of endosperm reserves and weakening of endosperm layer around embryo, favoring its growth, might be responsible for corresponding differences in root and shoot length. An increase in root and shoot growth through increased cell division and cell elongation in the cambial tissue of plants might be due to an activated metabolic processes (Chauhan *et al.*, 2019). The result coincides with those of Gholap *et al.* (2000).

The highest seedling vigour index was observed in *Solanum melongena* cv. Dommeru Local (T_9) (1100.1) followed by *Solanum melongena* cv. Pennada Local (T_8) (1041.6) and minimum seedling vigour index was recorded in *Solanum mammosum* (T_2) (797.5).

The germination percentage and seedling length determines seedling vigor index. Genotypic differences in seedling vigour index values could be due to the corresponding differences in respect of germination percentage and length of seedling. Similarly, higher vigor index as observed in the present study could be due to the corresponding higher values of these two parameters (Poovarasan *et al.*, 2019).

Table 1: Effect GA_3 concentration on Days taken for germination (DTG), Germination percentage (GP), Shoot length (cm), Root length (cm) and Seedling vigour index (SVI) of brinjal species.

Sr. No.	Brinjal species	DTG	GP	SL	RL	SVI
T_1	*Solanum torvum*	7.50	64.50	6.31	7.36	881.6
T_2	*Solanum mammosum*	7.00	72.50	5.65	5.36	797.5
T_3	*Solanum gilo*	5.50	82.50	4.48	6.40	897.1
T_4	*Solanum indicum*	7.00	76.00	7.33	7.01	1091.0
T_5	*Solanum seaforthianum*	4.00	80.00	6.57	5.28	947.9
T_6	*Solanum viarum*	7.00	77.00	6.66	5.53	938.2
T_7	*Solanum aethiopicum*	4.50	84.00	4.82	6.24	928.9
T_8	*Solanum melongena* cv. Pennada Local	5.50	94.00	5.36	5.72	1041.6
T_9	*Solanum melongena* cv. Dommeru Local	5.50	93.50	5.80	5.97	1100.1
Mean		**5.94**	**80.44**	**5.89**	**6.10**	**958.2**
S Em±		0.468	0.70	0.05	0.06	12.6
CD at 5%		1.35	2.01	0.16	0.17	36.3

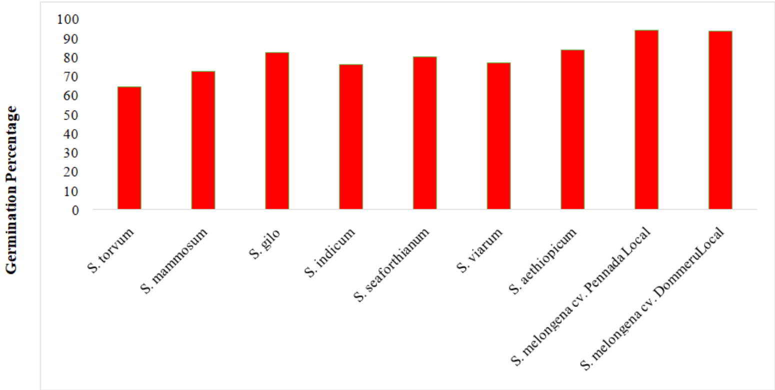

Fig. 1. Variation in germination percentage among the brinjal species.

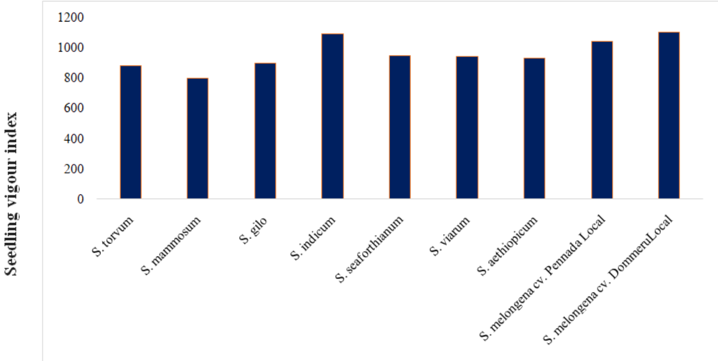

Fig. 2. Variation in seedling vigour index among the brinjal species.

CONCLUSIONS

The present study revealed that priming with GA_3 at the rate of 1000 ppm can be effectively used as a pre-germinative treatment to break the dormancy in brinjal species.

FUTURE SCOPE

For the practical use of *Solanum* species as rootstocks in commercial production of grafted plants, as well as in breeding programmes, the primary limitation is poor, irregular and erratic germination due do dormancy in seeds. Effect of GA_3 at different concentrations need to be studied to break the dormancy more effectively in brinjal species.

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Conflict of Interest. None.

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