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Research Article

Influence of Gibberellic Acid (GA_3) Different Concentrations on Seedling Growth of Bael (*Aegle marmelos* L.)

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ABSTRACT

An experiment was conducted during the year 2015-16 at Nursery of Biotechnology-cum- Tissue Culture Centre, OUAT, Bhubaneswar, India to study the effect of GA_3 pre treatment (i.e. 100, 200, 300, 400 ppm) respectively and a control (without any treatment) on seedling growth in Aegle marmelos L. seeds. Seeds treated with GA_3 at 400 ppm significantly enhanced the germination percentage (76.67 %), plant height (16.00 cm) at 90 DAS, number of branches (3.33) and number of leaves (3.67). Hence it may be concluded that seeds pre-treated with GA_3 at 400 ppm play an important for obtaining better quality seedlings of Aegle marmelos L. than control.

Keywords: *Aegle marmelos, GA_3, Germination, Seedling.*

INTRODUCTION

Aegle marmelos is a slow-growing, medium sized tree, as much as 12-15 m tall with short trunk, thick, soft, flaking bark, and spreading, sometimes spiny branches, the lower ones drooping. Bael makes use of against diverse diseases and lots of bioactive compounds have been isolated from this tree. Bael is local to India (Zeven & De Wet, 1982) and observed all through Southeast Asia. In India this fruit is grown in Indo-Gangetic plains and Sub-Himalayan tracts up to a height of 500 m, in North-East India and dry and deciduous wooded area of imperative and southern India. *Aegle marmelos* is a subtropical plant and grows as much as an altitude of 1200 m altitude from sea level. It grows well within the dry forests on hilly and plain areas.

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Aegle marmelos is a widely distributed plant and observed in India, Ceylon, China, Nepal, Sri Lanka, Myanmar, Pakistan, Bangladesh, Nepal, Vietnam, Laos, Cambodia, Thailand, Indonesia, Malaysia, Tibet, Sri Lanka, Java, Philippines and Fiji. In India it discovered in Sub-Himalayan tracts from Jhelum eastwards to West Bengal, in imperative and south India. It revealed nearly in all of the states of India (CSIR, 1985).

It is used to treat a number of diseases in India and its medicinal properties consist of as a slight laxative; to irritation of the mucous membrane having a un fastened discharge; advocated for the therapy of asthma; reduces or removes fever; promotes the elimination of mucous secretions from the bronchial tubes; for the peculiar accumulation of liquid inside the cell tissue accompanied with constipation and jaundice; for the mixture of severe irritation of the attention or conjunctiva, acute bronchitis and inflammation of body; for intermittent fevers with melancholia or a depresses sad emotional country and heart palp itation; for strengthening and giving tone to the stomach, to prevent scurvy and adding indigestion; for chronic diarrhoea or dysentery and infection of the alimentary track; for indigestion, discomfort or pain inside the stomach. The basic extracts of *Aegle marmelos* have shown abund ant activities consisting of antidiabetic, anti ox idant, anti inflammatory, analgesic, antiulcer, a ntimicrobial, anti hyperlipida-emic, anti-cancer, antiviral, radio-protective and anti-spermatogenic properties.

The tree propagated by vegetatively are true to type, and as a result, it is possible get homogeny in growth, yield and quality of fruits (Kala, 2006). Vegetative propagated fruit trees come in to bearing earlier as compared to seedling, while bael is commonly propagated from seeds and root suckers. Organized orcharding of Bael are not available due to lack of recognized cultivars and well accepted vegetative propagation techniques. Seed priming is known as seed pre-treatment along with the maintenance of seed hydration level and essential metabolic activates needed for the initiation of the germination. The relevance of the Bio regulators is successful in improving seedling growth and stand establishment (Busra, 2003). Notably few research documents are available on Bael seed pre-treatment and seedling growth. Hence an urgent need was there for the healthy seedling establishment with GA_3. Keeping the significance of the study an investigation was carried out to assess the seedling growth in Nursery condition.

MATERIALS AND METHODS

The present experiment entitled was carried out during the year 2015-2016 under the Bhubaneswar agro-climatic conditions at the nursery of Biotechnology- cum-Tissue Culture Centre, OUAT, Bhubaneswar, Odisha, India. Seeds were collected from candidate plus trees identified in Bhubaneswar during the month of June 2015. The nursery area is located at 20 º 15’ North latitude 85 º 52’ East longitudes and at altitude of 25.9 meters above mean sea level. It experiences typical tropical weather conditions, and succumbs to the heat and cold waves that sweep in from north India. The summer months from March to May are hot and humid, and temperatures often shoot past 45° C in May. The south west monsoon lashes Odisha and in June, July and August receive, the maximum rainfall, which may average over 220 mm a month. Pleasant weather conditions prevail during November in Bhubaneswar, but December and January face the chilly winds from the North and North-east at average speeds of 7 miles/hour. Temperatures drop to approximately 15° C during these months. Uniform sized, fully matured and true to type fruits were collected from Candidate plus trees pre-identified in Bhubaneswar. The seeds were extracted carefully, washed with clean water and dried in shade for a day. The seeds were then treated with GA_3 of different concentration separately each for 24 hours as per the treatments (i.e. ppm). Seeds were sowed in 25 x 15 cm size polythene bags. The polythene bags were punctured to get better drainage and filled with

the garden mixture which was prepared by well mixing of two parts of soil, 1 part of fine sand, and 1 part of well rotted FYM. Seeds were monitored for 45 days of sowing to record plant height (30 DAS/45 DAS), number of bipinnate leaves (30 DAS/45 DAS), root length, fresh biomass, dry biomass and survival percentage were calculated on observations basing on the number of seedling survived. Randomly five seedlings from each replication were marked for observation. The experiment was designed in completely randomized design (CRD) and replicated thrice. Cultural operations like regular watering, weeding and plant protection way like spraying of insecticides against insect, pest were taken. The data observed were subjected to statistical analysis (Panse & Sukhatme, 1967). The data were transferred from where ever required before suitability of ANOVA analyzed in statistical package SAS version 7.0.

RESULTS AND DISCUSSION

The findings of the study are presented in the table.1, maximum germination percentage were recorded in T_5 (400ppm GA_3) (76.67) and the minimum germination percentage was recorded in the T_1 control (53.33). The plant height show significantly maximum in T_5 (400 ppn GA_3) 12.33 cm and minimum in the control (6.67 cm) at 30 Days after sowing (DAS), similarly the plant height 14.33 cm are recorded in T_5 (400 ppm GA_3) and minimum were recorded at T_1 Control (8.67 cm) at 60 DAS, plant height maximum (16.00 cm) at T_5 (400 ppm GA_3) and Minimum was recorded at control T_1 (10.23 cm). Maximum number of branches was recorded in T_5 (400 ppm GA_3) (3.33) and minimum number of branches was recorded in T_1 control (2.00). The maximum no of leaves was recorded (3.67) in T_5 and minimum number of leaves was recorded in T_1 control (2.33). Priming the seeds with the Bioregulators may help out reducing the risk of the poor stand establishment under the nursery conditions. This process partially hydrates the seeds (Bary, 1976). GA_3 treated seeds might be attributed to fact that the GA_3 helps in breaking the seed dormancy which results in early and enhanced seed germination due to the diffusion of endogenous auxin and gibberellins like substances (Gurung et al., 2014; Rout et al., 2017). All GA_3 treatments were useful for increasing in growth of seedling when compared with the control. This may be due to activated amylase which digested the available carbohydrate into simpler sugar, so that energy and nutrition were easily available to earlier growing seedling. Boost in plant growth due to GA_3 treatment (Lee et al., 1999; Rout et al., 2016; Dilip et al., 2017).

Table 1: Effect of Plant Bio-regulators seed pre treatments on Seed Germination and seedling growth of Bael (*Agele marmelos*)

Treatment Details	Germination %	Plant Height @ 30 DAS (cm)	Plant Height @ 60 DAS (cm)	Plant Height @ 90 DAS (cm)	No. of Branches	No. of Leaves
T_1 (Control)	53.33	6.67	9.00	10.23	2.00	2.33
T_2 (100 ppm GA_3)	60.00	6.67	8.67	10.50	2.67	2.67
T_3 (200 ppm GA_3)	63.33	8.67	10.50	11.50	2.67	3.00
T_4 (300 ppm GA_3)	73.33	9.33	13.77	14.67	3.00	3.67
T_5 (400 ppm GA_3)	76.67	12.33	14.33	16.00	3.33	3.67
SEm (±)	3.76	0.72	0.49	0.41	0.24	0.37
C. D. at 5%	**10.42**	**2.00**	**1.37**	**1.16**	**0.68**	**1.04**

CONCLUSION

It was concluded from the findings that there was a major effect of GA_3 on the seedling growth of Bael (*Aegle marmelos* L.). Therefore seeds pre-treated with GA_3 with 400 ppm are suggested to obtain better growth and quality seedling of this medicinal tree species.

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