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Short Note

Effect of pre-sowing seed treatments with GA_3 and thiourea on germination and growth of aonla (*Emblica officinalis* Gaertn.)

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Abstract

Pre-sowing seed treatments with GA_3 and thiourea revealed that maximum germination percentage and root growth was obtained when seeds were soaked in thiourea 250 ppm and GA_3 500 ppm. Maximum growth was observed under GA_3 750 ppm treatment.

Keywords: Aonla, GA_3, thiourea, germination, seedling growth.

Aonla, commonly known as Indian gooseberry (*Emblica officinalis* Gaertn.) is one of the important indigenous fruits. It is a hardy tree and can be grown under variable climatic and soil conditions. It is multiplied by budding on one-year-old seedling rootstock. Seedlings are important not only as rootstock for budding but also for *in-situ* plantations in dry areas. The seeds of aonla are impermeable and also exhibit dormancy due to hard seed coat, which acts as a barrier for growing embryo. Therefore, seed germination in aonla is not only difficult and poor but the seedling growth is also slow. These problems have proved to be a major constraint in raising of rootstock for vegetative propagation and rapid spread of aonla in spite of availability of suitable areas for it's planting. Plant growth regulators like auxins, cytokinins and gibberellins can be used for improving the germination percentage and growth of seedlings. Application of gibberellins have been reported to break dormancy of seeds and resulted in early and improved seed germination (Bankar, 1980). Improvement in germination and seedling growth with the application of gibberellins and thiourea in aonla has been reported by Gholap et al, (2000) and Purbey and Meghwal, (2005). However, no such work has been done on this aspect in aonla under Palampur conditions of Himachal Pradesh. Therefore, present experiment was carried out to study the effect of pre-sowing seed treatments with GA_3 and thiourea on germination and seedling growth of aonla.

The trial was conducted in the polyhouse of the Department of Horticulture, CSKHPKV, Palampur during 2007. The treatments comprised of three concentrations each of GA_3 (250 ppm, 500ppm and 750ppm) and thiourea (250ppm, 500ppm and 750ppm) and control. Seeds of aonla were collected and soaked in the GA_3 and thiourea solutions for 24 hours and control comprised of water soaking. The black polythene bags of 6"x 9" filled with potting mixture were used for sowing of seeds. The treated seeds were sown in these polybags (2-3 seeds per bag) on 26th March. 2007. Watering and weeding were done at regular intervals. The experiment was laid out in a randomized block design with four replications (25 polybags/ replication). Observations on germination percentage, seedling height, seedling diameter, seedling fresh weight, seedling dry weight, number of roots and root length were recorded three months after sowing.

Seed germination

There was significant effect of GA_3 and thiourea treatments on the germination percentage over control (Table 1). The maximum germination (47.22%) was recorded in the seeds soaked in thiourea 250 ppm, which was closely followed by the seeds treated with GA_3 500 ppm (38.89%). Least germination was observed in the control (19.44%), which was statistically at par with the treatments GA_3 250 ppm and thiourea750 ppm. This increase in germination may be due to the reason that exogenous application of GA_3 and thiourea might have increased the endogenous levels of these growth regulators, which in turn improved the germination percentage. Various workers have also observed increased germination with GA and thiourea (Dhankar et al, 1997 and Pawshe et al, 1997). Further, it has also been observed in the present studies that higher levels of GA_3 and thiourea reduced the germination but the differences were non-significant in case of GA_3

Table 1. Effect of GA_3 and thiourea on germination and growth characters of aonla seedlings

Treatments	Germination percentage	Seedling height (cm)	Seedling diameter (mm)	Seedling fresh weight (g)	Seedling dry weight (g)	No. of roots	Root length (cm)
GA_3 250ppm	19.44	51.0	3.37	8.35	2.76	2.32	26.00
GA_3 500ppm	38.89	55.70	3.62	11.77	4.42	2.32	27.00
GA_3 750ppm	33.33	61.20	4.42	12.35	4.52	2.00	21.00
Thiourea 250ppm	47.22	52.40	3.15	7.69	2.69	3.32	26.00
Thiourea 500ppm	30.56	36.90	3.42	6.67	2.37	2.32	22.33
Thiourea 750ppm	20.84	34.50	2.95	5.21	2.16	2.00	19.83
Control	19.44	34.40	2.89	4.57	1.71	1.67	19.33
CD (0.05)	9.14	1.16	0.40	0.91	0.38	0.80	4.18

treatments, which may be due to the reason that higher concentration of GA and thiourea causes interference in the enzyme system, which is involved in food system for growing embryo.

Growth characters

The perusal of data given in table1 revealed that GA_3 and thiourea significantly increased seedling height, diameter, fresh weight and dry weight. Significantly higher seedling height (61.20 cm) and diameter (4.42 mm) were obtained in the seeds treated with GA_3 750 ppm. Maximum fresh weight (12.35 g) and dry weight (4.52 g) were also observed under GA_3 750 ppm, which was statistically at par with GA_3 500 ppm treatment. Minimum values for seedling height, diameter, fresh and dry weight were recorded in the control, which was statistically at par with thiourea 750 ppm except for dry weight. Application of growth regulators has been found useful for increasing seedling height, diameter, fresh and dry weight in aonla under climatic conditions of Akola by Gholap *et al.* (2000) and in Anand (Gujarat) by Dhankar *et al.* (1997). The beneficial effect of GA_3 in increasing plant growth may be due to the reason that gibberellins are known to increase cell division and cell elongation when applied in proper concentration.

Number and length of roots

The number of roots and root length were increased with the application of GA_3 and thiourea (Table1). Significantly higher number of roots (3.32) was obtained in the seeds soaked in thiourea 250 ppm, whereas all other treatments did not differ significantly. Maximum root length (27 cm) was recorded under GA_3 500 ppm treatment, which was closely followed by GA_3 250 ppm (26 cm) and thiourea 750 ppm treatment (26 cm). The minimum values for root length were observed in the control, which was statistically at par with GA_3 750 ppm and thiourea 500 and 750 ppm.The present findings in respect of number of roots with GA and thiourea treatments were also in conformity with the results of Gholap et al (2000).

It is concluded from the present studies that thiourea 250 ppm and GA_3 500 ppm proved to be beneficial for germination and root growth, whereas GA_3 750 ppm may be used to get maximum growth in aonla seedlings.

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