

Effect of GA₃ on seed germination of *Pyracantha crenulata* (D. Don.) M. Roem Sunil Chandra Joshi, Debarati, Preeti, S.S. Parihar and HCS Negi

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Abstract: The objective of the present investigation was to evaluate the effect of GA₃ on seed germination and vigour of *Pyracantha crenulata* (D. Don.) M. Roem. The seeds were collected from Kumaun region of Uttrakhand. The seeds were soaked in GA₃ 250 and 500 ppm solution for 18 and 24 hrs. The data indicated that the highest germination (68%) was recorded for GA₃ 250 ppm after 24 hrs of soaking followed by GA₃ 250 ppm after 18 hrs. of soaking. Maximum Seedling length 2.72 cm observed in GA₃ 250 ppm after 24 hrs of soaking. GA₃ 500 ppm concentration reduced the germination percentage as 38% and 28% in 18 and 24 hrs respectively. So result indicates that the concentration and duration of GA₃ treatment if increased it reduced the germination and vigour of *Pyracantha* seeds. [New York Science Journal 2010;3(9):55-57]. (ISSN: 1554-0200).

Key words: GA₃, *Pyracantha crenulata*, ppm, germination, vigour

1. Introduction

Pyracantha crenulata (D. Don.) M. Roem. is a firethorn, an ornamental plant of the family Rosaceae found in Himalayan region. In Kumaun region it known as Ghingarau. The leaves are used to make herbal tea. The wood can be use to make walking sticks. The pome fruit is orange-red and are food for birds. Its fruits are a major food source for the Himalayan Langur (*Presbytis* sp.) and it is a good soil stabilizer. Plants maintain and expand their populations over time by the process of regeneration (Barnes *et al.* 1998)¹. The fruits are rich in sugar. The ripe fruit is eaten fresh. The knowledge of exact stage of seed collection is of immense importance to avoid the collection of immature and non-viable seeds (Willian 1985)², which can cause nursery and plantation failure.

Pre-sowing seed treatments with growth substances such as gibberellic acid have been found to improve the seedling growth of many species (Shanmungavelu 1970³, Singh *et al.* 1989)⁴. Seed germination and seedling growth are known to be regulated by exogenous hormones (Khan 1977⁵, Verma & Tandon 1988)⁶. This investigation with growth regulators will help in determining that which of GA₃ concentration are suitable for seed germination and seedling growth. This analysis is considered necessary since the beneficial effect of presoaking treatment of seeds with growth regulator and other substances have been reported in the literature repeatedly.

2. Material and Methods

The present investigation was conducted at seed testing laboratory Division of seed science and technology, Indian Agricultural Research Institute New Delhi. The objective of the study was to evaluate the effect of GA₃ on seed germination and vigour. The seeds of *Pyracantha crenulata*

were collected from Kumaun region of Uttrakhand state during August, 2009. The fruit is 6-8 mm in diameter. The seeds are cuboidal, brown shiny and measures 2.7 x 1.5 x 3.6 mm (Length x width x thickness). 1000 seed weight was 4.3 gm. Germination studies were conducted on top of the paper method using 100 seeds in four replication in each of the treatments by incubating seeds at 25°C. The seeds were soaked in GA₃ solution of different concentration for different duration. The different concentrations of GA₃ were 250 and 500 ppm and the different duration were 18 and 24 hrs., first count and final count was on 12th and 15th day. The germination expressed as the percentage of seed which produced normal seedlings (ISTA 1985)⁷. After the germination count, ten normal seedlings from each replication of each of the treatment are randomly selected and measured for root and shoot length. Seedling vigour index I was derived by multiplying percent germination with total seedling length in centimeter (Abdul-Baki and Anderson 1973)⁸.

3. Results and Discussion

Growth regulators used in pre-sowing seed treatment play an important role in regulating germination and vigour. Treatment with high concentrations of GA₃ is effective in overcoming dormancy and causing rapid germination of seed. The germination substratum may be moistened with 500 ppm solution of GA₃, when the dormancy is weaker, 200 ppm may be enough. When it is stronger upto 1000 ppm solution may be used. (R.L.Agrawal 1994)⁹. Seed germination and seedling vigour as influenced by different concentration of GA₃ are presented in Table 1. It is revealed that the highest germination (68%) was recorded for GA₃ 250 ppm concentration after 24 hrs of soaking followed by 54% in GA₃ 250 ppm

concentration after 18 hrs. of soaking. GA₃ increase germination percentage of *Anemone coronaria* seeds at supra optimum (25⁰C) but not at optimum temperature 10⁰-20⁰C temperature. (Bullock *et.al.* 1975)¹⁰. Seedling evaluation is a major part of seed concentration of GA₃ if increased as 500 ppm the germination percentage of the seeds decreased, seed germination 38% found in GA₃ 500 ppm for 18 hrs. but it reduced upto 28% in 24 hrs. Soaking in GA₃ 500 ppm. So result indicates that duration of seed treatments affect the seed germination same as in *Canna indica* (Joshi and Pant 2010)¹¹. GA₃ 10 ppm treatment showed highest germination

testing. Normal, abnormal seedlings and ungerminated seeds (Hard seed, freshly ungerminated seed and dead seed) are the main component of seed testing. According to the data presented in the table that the percentage as well as the higher radical and plumule length in Black gram and Horse gram (Chauhan *et.al.* 2009)¹². In the present investigation seedling length 2.72 cm observed in GA₃ 250 ppm after 24 hrs of soaking followed by 2.64 cm in GA₃ 250 ppm after 18 hrs. Maximum percentages of dead and freshly ungerminated seeds are observed in 500 ppm of 24 hr. treatment.

Table 1: Germination percentage, Seedling length and Vigour index of *Pyracantha crenulata* after GA₃ treatment.

T	G%	Ab	Fu	D	SL (cm)	VI 1
Control	38	7	8	47	2.47	93.86
GA 250 ppm 18 hr.	54	2	7	37	2.64	142.56
GA 250 ppm 24 hr.	68	5	6	21	2.72	184.96
GA 500 ppm 18 hr.	38	3	7	52	2.52	95.76
GA 500 ppm 24 hr.	28	3	9	60	2.61	73.08

Acronym used: T= Treatment, G= Germination, Ab= Abnormal Seedling, Fu= Freshly ungerminated, D= Dead, SL= Seedling Length, VI 1= Vigour Index 1, ppm= Part per mole

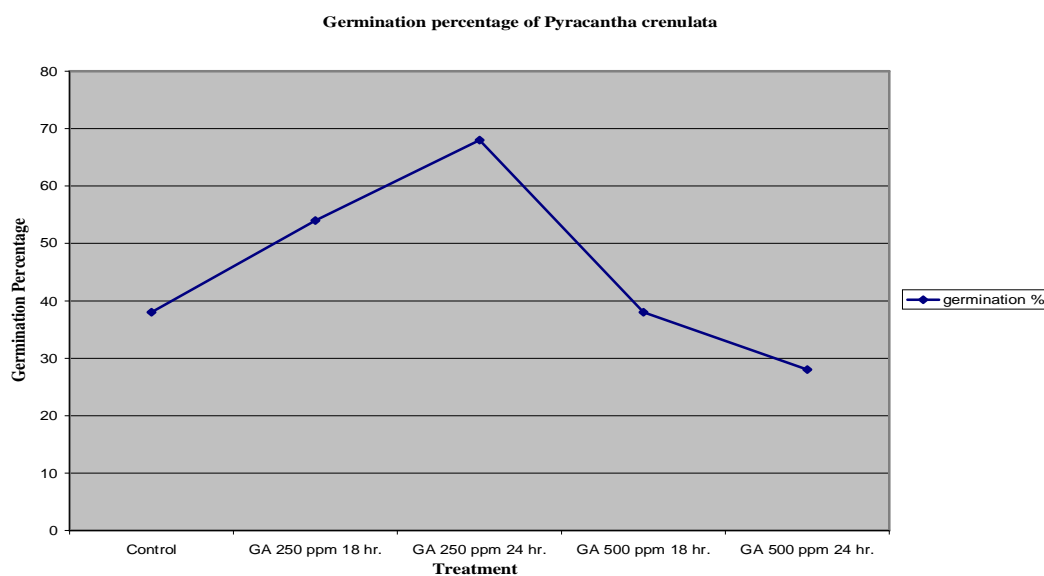


Figure 1: Germination percentage of *Pyracantha crenulata* after GA treatment

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