Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 787-789
Received: 01-03-2020
Accepted: 03-04-2020

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Effect of various treatments on breaking seed dormancy and germination enhancement in Custard apple (*Annona reticulata* L). Local cultivar

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Abstract
Custard apple (*Annona squamosa* L.) is a very sweet delicate flesh in the human diet for ages due to its nutritional and medicinal values; it is a deciduous or semi-deciduous tall woody shrub. The effect of various treatment on breaking seed dormancy and germination enhancement in (*Annona squamosa* L) Local. Natural regeneration by seeds is poor due to seed dormancy. To overcome poor germination problem cultivar was study carried out at, the experiment was laid out in Randomized Block Design with seven treatments and thrice replicated, organic substance like are Coconut water @ 50%, Urea @ (0.1%), Hot Water @, Cold Water @, Cow urine @ (10%), Cow dung slurry @ (10%) and Control (Distilled water) in 24 hours socking. Amongst the different treatments, the seed soaked in coconut water are maximum observation germination percentage (69.483%), however, minimum days required for germination (31.14 days), Height of seedling (cm) 19.04, Diameter of the stem 2.09, Number of leaves per seedling 18.52, and Leaf area (cm^2) 90 DAS respectively, was observed under treatment T_1. The present investigation concluded that the better seed germination and growth of custard apple seedling was observed in treatment T_1 Coconut water @ 50% for 24 hours is desirable.

Keywords: Germination, *Annona*, organic substance, dormancy

Introduction
Custard apple (*Annona squamosa* L.) is known as sugar apple, Sweet shop or Ata, plant are delicious in natures but in Soursop apple (*Annona muricata*) is evergreen in nature in this family Annonaceae. It is one of the most drought tolerant fruit trees in India and grown in rocky soils. It is generally accepted that they originated in different areas of Central and South America (Popenoe, 1921), the first botanical references to the *Annona* genus appeared in the 16th century and described morphologically different species (Hernández, 1959). The family includes 126 genera and approx. 1200 species, distributed for the most part in the tropical and subtropical areas of Africa, America, Asia, Australia and Europe (Watson and Dallwitz, 1992 onwards). There are several large genera, including *Annona* (150 spp.), *Guatteria* (265 spp.), *Duguetia* (100 spp.), *Uvaria* (100 spp.) and *Polyalthia* (100 spp.); some genera, e.g. *Annona*, *Anaxagorea and Xylopia*, are distributed almost worldwide. *Annona* only six *spp.* are cultivation i.e. custard apple, cherimoya, soursop, bullock's heart, pond apple and atemoya are major commercial importance. Flower are current season in old wood and fruit are botanically, custard is a aggregate fruit "etaerio berryes " wherein the fruit is developed from the merger of several individual flowers (ovaries) into a large fruit mass (infructescence). Fruits are usually nearly round, ovoid, conical and heart-shaped; the skin is covered by finger print-like markings or conical-rounded protuberances (areoles) (Morton, 1987). Uses and composition fruit is popular for its sweet and slightly tangy, creamy textured flesh custard apple fruits are mostly used as table fruits or pulp is mixed with milk or ice-cream. It is rich in CHO's and provides good amount of proteins and minerals, good source of Vit-A and C, and calorific value ranges from 822 to 1050 K Cal/kg (as compared to 741 K cal/Kg of mango).Custard apple is propagated through seed then germination is effected by many factors, environmental factors such as temperature, oxygen, and water. Irregular germination, in custard apple seeds may be due to dormancy or due to hard seed coat is very poor and takes long time, very slow growth of seedlings limit its use as rootstock is very much essential to meet the growing demands for budding and grafting. Studies have indicated that use of pre-sowing treatments of organic substance to improve the germination and better growth of seedlings of *Annona spp.* Very limited work has been carried out on this aspect in different parts of the world indicating, the utility of GA_3 from 150-500 ppm is helpful for getting better germination of custard apple

seeds (Banker, 1987; Stino *et al*., 1996; Pawshe *et al*.,1997; KB Palepad *et al*.,2017; and Nilesh P.*et al*.,2017),

Materials and Methods

The experiment was conduct in the Horticultural Form, Department of Horticulture and Postharvest Technology, Palli Siksha Bavana,Visva-Bharti Sriniketan during the year January 2019 to May 2019. Select Custard apple fruits of matured green stage were subjected to uniform size, colour and free from injuries fruit seed are extract and washes through dry. The experiment is use to Completed Randomized Design (CRD) with 7 treatment and 3 replications seed were sown in poly bags (12cm x 10cm) media comprising garden soil, sand, FYM and vermi-compost @ 2:2:1:1. Seed are socked in different organic substance like T_1 Coconut water @ (50%), T_2 Urea @ (0.1%), T_3 Hot Water T_4 Cold Water, T_5 Cow urine @ (10%), T_6 Cow dung slurry @ (10%) and last through T_7 control (Distilled water) in 24 hr. Seeds are sown with prepared growing medium in black poly bags with in at 5 cm depth in the (one seed per poly bags) with proper treatment of seed in fungicide are seeds. Sowing after lightly watering in daily with rose can up to germination. Regular watering to maintained to water table, with proper pesticide are spry to healthy seedlings. The observations on the parameters listed below were recorded daily for germination parameters and after 90 days for growth parameters.

Results and Discussion

Germination attributes

The results on the obtained during the experiment, seed germination and requirement days for germination are show in (table no.1).Seed germination was observed in treatment T_1 Coconut water @ (50%) (31.14 days) and germination percentage (69.48%) and maximum days are T_7 Control (Distilled water) (48.87 days) and germination percentage is lowest (30.35%) at 90 days. Barche *et al.* (2010) [2] identified response of seed treatment on gibberellic acid at @ 500 ppm of different cultivars of papaya and found that the maximum germination.

Seedling growth parameters

Analysis of observation as presented in (table no.1). Seed treatment is different organic substance, and chemicals on Custard apple in observation of height of seedling (cm), Diameter of the stem, number of leaves per seedling, and Leaf area (cm^2) at 90 DAS. The data indicated that the maximum height of seedling (19.04 cm) was recorded in treatment T_1 Coconut water @ (50%) and minimum is T_7 Control (Distilled water) (10.03 cm) at 90 DAS. Bekim Gashi, *et al.* (2012) [3]. Effect of gibberellic acid and potassium nitrate on seed germination of the resurrection plants *Ramonda serbica and Ramonda nathaliae*. Stem diameter of seedlings has been recorded maximum (2.09 cm) in T_1Coconut water @ (50%) and lowest in T_7 Control (Distilled water) (0.36 cm) at 90 DAS. Maximum number of leaf observed in per seedling in T_1Coconut water @ (50%) (18.52) and minimum is T_7 Control (Distilled water) (20.96) at 90 DAS. Chopde, N., (1999). Effect of different pot mixtures on germination and growth of custard apple (*Anona squamosa L.*). Highest leaf area (cm^2) are observed in experiment in T_1Coconut water @ (50%) (32.70 cm^2) and minimum are recorded in T_7 Control (Distilled water) (20.96 cm^2), at 90 DAS. Choudhary, R. C *et al*., Kanwar, J., (2018) [5]. Effect of GA_3 and growing media on seedling growth of papaya (*Carica papaya* L.) cv. Pusa Nanha.

Table 1: Effect of pre-sowing treatments on days required for seed germination and germination percentage and growth of seedling at 30 and 90 days.

Treatment	Days required for seed germination	Seed germination % 30 DAS	Seed germination % 90 DAS	Height of seedling (cm)	Diameter of the stem	Number of leaves per seedling	Leaf area (cm^2)
T_1 Coconut water @ (50%)	31.14	40.39	69.48	19.04	2.09	18.52	32.70
T_2 Urea @ (0.1%)	40.66	22.16	45.27	14.25	1.08	11.19	20.47
T_3 Hot Water	36.43	23.50	47.28	16.05	0.93	9.18	24.57
T_4 Cold Water	40.40	18.10	49.53	14.48	0.47	11.27	23.24
T_5 Cow urine @ (10%)	35.69	30.25	51.55	16.28	1.30	10.33	27.61
T_6 Cow dung slurry @ (10%)	31.55	38.28	52.30	16.56	1.04	9.29	28.17
T_7 Control (Distilled water)	48.87	28.21	30.35	10.03	0.36	6.43	20.96
SE±(m)	0.10	0.15	0.10	0.28	0.12	0.25	0.22
C.D. (5%)	0.33	0.47	0.33	0.88	0.39	0.79	0.70

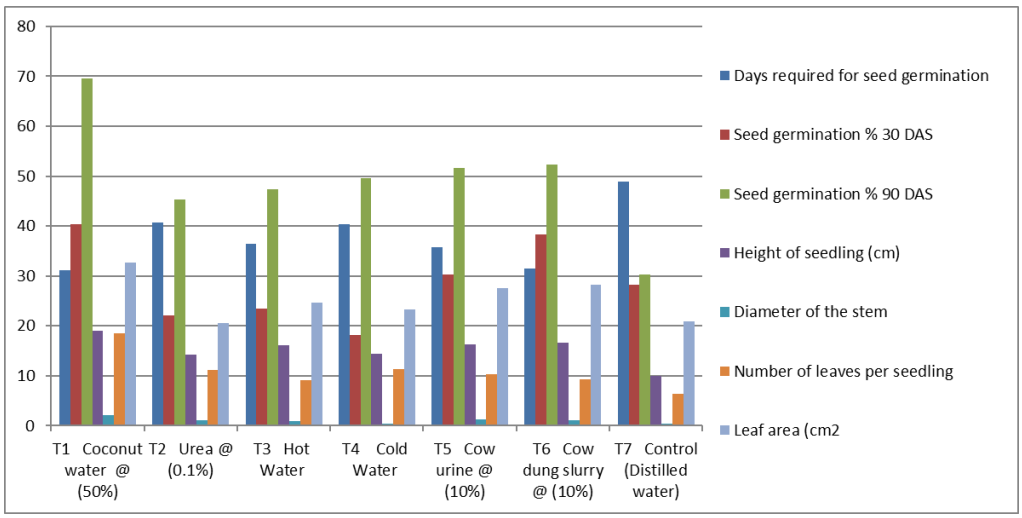

Fig 1: Effect of pre-sowing treatments on days required for seed germination and germination percentage and growth of seedling at 30 and 90 days.

Conclusion

In conclusion, the results various treatments in organic substance in best treatment are observation because this is a low cost and easily available in farmer field the present study revealed that seeds exhibit dormancy due to hard seed coat, the significant effect of T_1 Coconut water @ (50%) on it can be concluded that for better germination and seedling growth. Overall, Coconut water @ (50%) was best as a seed treatment of custard apple (*Annona rericulata* L.)

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