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Impact of different pre-sowing treatments on seed germination and seedling growth of custard apple in Bemetara district of Chhattisgarh

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Abstract
The present study was conducted in Saja, Bemetara District of Chhattisgarh, to investigate the "Impact of different pre-sowing treatments on seed germination and seedling growth of Custard apple in Bemetara district of Chhattisgarh" The experiment was carried out with the following objectives. A. To study the effect of different pre-sowing Seed treatments on germination and seedling growth of Custard apple. B. To study the effect of different pre-sowing seed treatments on survival of custard apple seedlings. Custard apple is a widely cultivated species in India and the tropics, belongs to the Annonaceae family and genus Annona. It is a deciduous tree with irregular branches and black seeds surrounded by a creamy, custard-like pulp. It is also known as Sugar apple, Sharifa, Sitaphal and Attichaka. Pre-sowing treatments are used to improve seed germination and growth by ensuring uniform and rapid germination. The study revealed that different pre-sowing treatments significantly affected seed germination. Treatment T_2 (soaking in GA_3 500 ppm for 24 hours) resulted in the lowest germination days and the highest germination percentage, The maximum length of seedlings and number of leaves per plant were observed at 45, 60, 75, and 90 days after sowing. The fresh weight of shoot, root and were observed at 60 and 90 days after sowing.

Keywords: GA_3, cow dung slurry, cow urine, germination, survival percentage

Introduction
Custard apple (*Annona squamosa* L.) also known as Sitaphal, sugar apple, sweet soap etc. which is grown in tropical and subtropical climates. It belongs to the Annonaceae family and it has a chromosome number (2n=14). It is a native of the West Indies, it has long been cultivated in Central America and Southern Mexico. Fruits has a palatable pulp that is soft, granular, juicy and sweet with hardly acidity. In addition to their industrial value, Custard apples are valued for their medicinal properties, used in ice-cream, confections, some milk products and the preparation of preserves, jelly, jam and other goods. It is beneficial for heart disease, diabetes, thyroid hyper function and cancer. The fruits contain a high amount of carbohydrates (23.5 g), protein (1.6 g), mineral (0.9 g), fiber (3.1 g), calcium (17 mg), moisture (70.50%), iron (1.5 g), vitamin C (37 mg), phosphorus (47 mg) and vit-C (37 mg. In India, the total area covered under Custard apple is 56 thousand ha. with a production of 510 thousand MT and a productivity of 8.71 MT (Anon., 2022) [1]. Custard apple is commercially produced in states like Maharashtra, Andhra Pradesh, Karnataka, Tamil Nadu, Orissa and Assam as well as some humid areas of Rajasthan. In Chhattisgarh, the total area under custard apple is 9.690 thousand ha. with an annual production of 53.715 thousand MT with a productivity of 5.44 MT (Anon., 2022) [1]. In Chhattisgarh, it is grown in the districts of Bastar, Bemetara, Dantewada, Janjgir-champa, Kanker, Rajnandgaon, Kabirdham, Korba, Mahasamund, Bilaspur and Korea. The astonishing growth in area is proof that growers are willing to accept this fruit in exchange for huge financial returns. The area under Custard apple production in bemetara district of Chhattisgarh is around 0.026 thousand ha. With a production of 0.080 thousand MT. It can be grown commercially well in regions with a 125-250 cm annual rainfall. The ideal temperature range is between 15-25 °C. It can be effectively grown up to 1000 meters above sea level and has a wide range of adaptation (Joshi *et al*., 1999, Joshi *et al*., 2000 and Bose *et al*., 2002) [7, 8, 5].

Seeds of custard apple remain ungerminated even under favorable conditions. Such kind of dormancy in seeds may be due to presence of hard and impermeable seed coat, germination inhibitors and improper development of embryo. Such seeds may require special treatments like scarification, soaking in water, growth regulators and chemicals etc. to overcome dormancy. Use of plant growth regulator may improve the germination of the seed and treatment with high concentrations of GA_3 is effective in overcoming dormancy and causing rapid germination of seeds. For enhancing seed germination hot water as well as cow dung and cow urine were used. Plant growth regulators such as GA_3 improve seedling germination and survival. Gibberellins (GA_3) mobilize the energy reserves from the endosperm, activate the vegetative growth of the embryo and weaken the endosperm layer that surrounds the embryo and limits its expansion (Bewley, 1997) [3]. The germination of custard apple seeds are also accelerated by soaking in cow urine or cow dung solution for 24 hours. Using cow urine could be a breakthrough in the current situation since it is easily available. Cow urine contains Iron, urea, Uric acid, estrogen and progesterone has very good impact on seeds germination shoot and root growth parameter and seedling vigour (Dilrukshi, 2009) [6].

Materials and Methods

The present experiment entitled "Impact of different pre-sowing treatments on seed germination and seedling growth of Custard apple in Bemetara district of Chhattisgarh" was carried out at the Nursery, Department of Fruit Science College of Horticulture and Research Station, Saja, Bemetara (C.G.) during February to May 2025. The experiment was laid out in Completely Randomized Design (CRD) with 10 treatment and 3 replication seeds were sown in poly bags (30 cm x 10 cm) containing a growing media comprising garden soil, sand, vermi-compost, in a 1:1:1 ratio seeds were socked in different organic substance like T_0 Control, T_1 GA_3-250 PPM, T_2 GA_3-500 PPM, T_3 Cow Dung Slurry Soaking for 48 Hours, T_4Cow Dung Slurry Soaking for 72 Hours, Cow Urine @ (15%), T_6 Cow Urine @ (30%), T_7 Hot Water, T_8 Cold Water and last through T_9 Urea 0.1% in 24 hr. Seed were sown with prepared growing medium in black poly bags in at 3-3.5 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 to ensure proper germination. The observation on the parameter listed below were recorded daily for germination parameter at 60 and 90 days for growth parameters.

Results and Discussion

Germination attributes

The results obtained during the experiment indicated that the number seed germination and requirement days for germination are show in (table no. 1) seed germination was observed in treatment T_2 GA_3-500 PPM (33.37) and germination percentage (82.00%) and maximum days are T_0 Control (39.73 days) and germination percentage is lowest (60.33%) at 90 days Barche *et al*. 2010 [2]. Identified response of seed treatment on gibberellic acid at @ 500 ppm of different cultivar of Custard apple and found that the maximum germination.

Growth parameters

Analysis of growth observation as presented in (table no 1&2) Showed significant differences in seedlings growth among treatments Seed treatment, Th highest Length of seedling (cm) at 45,60,75, 90 DAS. The data indicated that the maximum Length of seedling (10.23, 15.75, 18.77, 21.78 cm) was recorded in treatment T_2 (GA_3 500 ppm) whereas the minimum is T_0 Control (l 6.16, 9.40, 10,80, 13.55 cm) at 90 DAS. Effect of gibberellic acid on seed germination and minimum is T_0 Control (2.50, 4.28, 6.13, 6.50) at 90 DAS. Chopde, N., (1999) [4]. Effect of different pot mixtures on germination and growth of custard apple (*Anona squamosa* L.). Highest Fresh weight of shoot are observed in experiment in T_2 GA_3 500 ppm (0.92, 2.11 g) and minimum are recorded in T_0 Control (0.60, 1.28 g), at 60 and 90 DAS. Fresh weight of root are observed in experiment in T_2 GA_3 500 ppm (0.13, 0.39 g) and minimum are recorded in T_0 Control (0.6, 0.20 gm).

Table 1: Impact of different pre-sowing treatments on days taken to germination, germination percentage, Length of seedling in Custard apple.

Treatment	Days taken to germination	Germination percentage 90 DAS	Length of seedling 45 DAS	Length of seedling 60 DAS	Length of seedling 75 DAS	Length of seedling 90 DAS
T_0-Control	39.73	45.00	6.16	9.40	10.80	**13.55**
T_1-GA_3-250 PPM	35.69	80.66	10.19	14.41	18.04	21.78
T_2-GA_3-500 PPM	33.37	82.00	10.23	15.75	18.77	22.48
T_3-Cow Dung Slurry	36.23	75.33	7.71	11.69	14.60	19.19
T_4-Cow Dung Slurry	35.59	77.00	8.22	12.16	15.73	19.48
T_5-Cow Urine (15%)	38.43	67.00	9.33	14.30	16.56	19.54
T_6-Cow Urine (30%)	37.52	70.33	8.27	14.17	15.74	18.69
T_7-Hot Water	38.53	46.00	7.20	9.46	13.55	17.76
T_8-Cold Water	37.62	48.33	9.26	12.76	13.78	15.72
T_9-Urea 0.1%	38.67	60.33	8.47	10.03	12.20	13.64
SEm (±)	0.23	0.23	0.12	0.09	0,17	0.21
CD (5%)	0.67	0.70	0.37	0.28	0.52	0.65

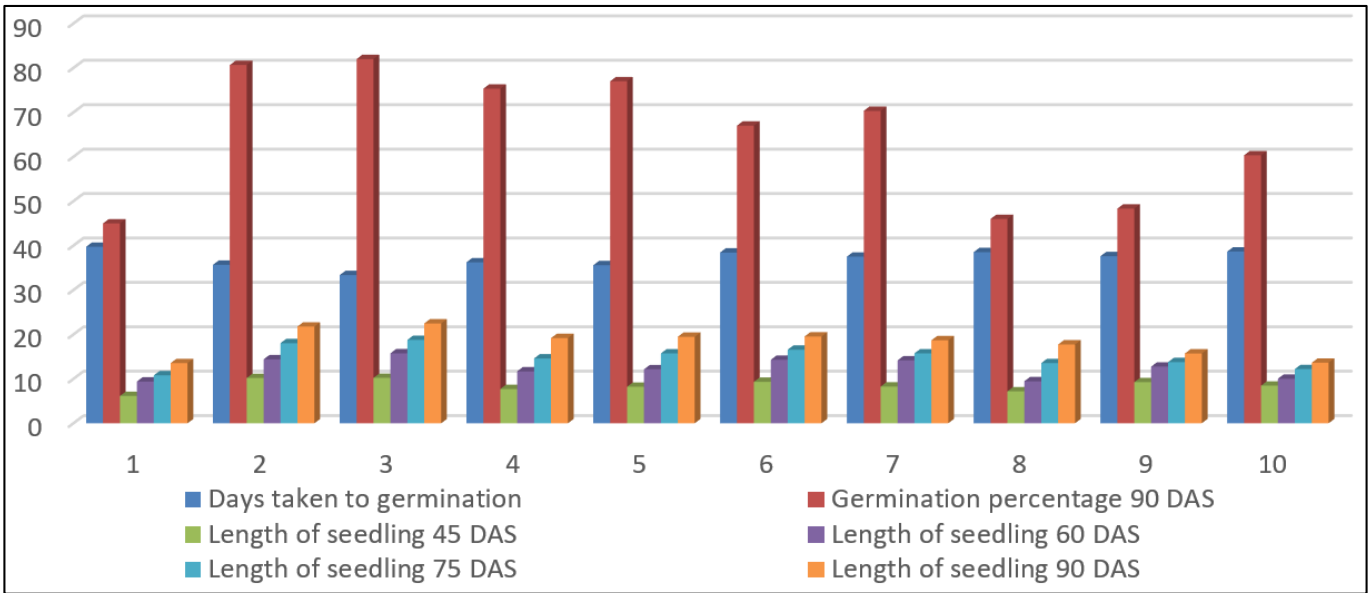

Fig 1: Impact of different pre-sowing treatments on days taken to germination, germination percentage, Length of seedling in Custard apple.

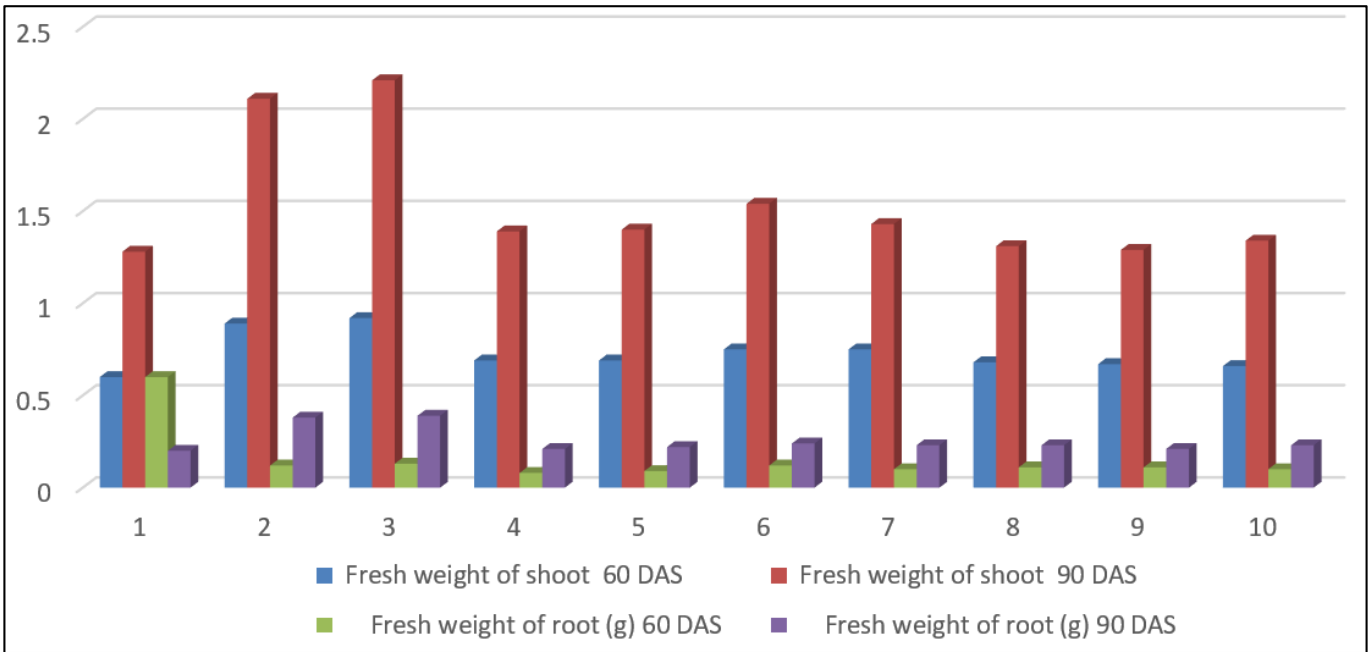

Fig 2: Impact of different pre-sowing treatments on fresh weight of shoot and root per plant in Custard apple

Table 2: Impact of different pre-sowing treatments on fresh weight of shoot and root per plant in Custard apple

Treatments	Fresh weight of shoot		Fresh weight of root (g)	
	60 DAS	90 DAS	60 DAS	90 DAS
T0-Control	0.60	1.28	0.6	0.20
T1-GA3-250 PPM Soaking for 24 Hours	0.89	2.11	0.12	0.38
T2-GA3-500 PPM Soaking for 24 Hours	0.92	2.21	0.13	0.39
T3-Cow Dung Slurry Soaking for 48 Hours	0.69	1.39	0.08	0.21
T4-Cow Dung Slurry Soaking for 72 Hours	0.69	1.40	0.09	0.22
T5-Cow Urine (15%) Soaking for 24 Hours	0.75	1.54	0.12	0.24
T6-Cow Urine (30%) Soaking for 24 Hours	0.75	1.43	0.10	0.23
T7-Hot Water Treatment Soaking for 24 hours	0.68	1.31	0.11	0.23
T8-Cold Water Treatment Soaking for 24 Hours	0.67	1.29	0.11	0.21
T9-Urea 0.1% Soaking For 24 Hours	0.66	1.34	0.10	0.23
SEm (+ _)	0.21	0.33	0.06	0.15
CD (5%)	0.61	0.96	0.18	0.44

Conclusion

The results obtained from the research experiment, indicate that among different pre-sowing treatments, T_2 (soaking in GA_3 500 ppm for 24 h) recorded minimum days taken to seed germination and maximum germination percentage. The treatment also produced the highest seedling length, fresh weight of shoot and fresh weight of root at 60 and 90 days after sowing.

Hence, soaking custard apple seeds in GA_3 @ 500 ppm for 24 hours can be recommended as an effective pre-swing treatments for enhancing seed germination and seedling growth.

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