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Impact of different seed treatments on germination of chironji (*Buchanania lanzan* Spreng.)

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Abstract
An experiment was conducted to study the effect of different seed treatments on germination and seedling growth of chironji (*Buchanania lanzan* Spreng.) carried out under propagation chamber at College Farm, College of Horticulture, Jagudan during October, 2022 to March, 2023 and laid out by Completely Randomized Design withthree repetition and fifteen treatments *viz*.,T_1: Absolute control; T_2: Water soaking for 24 hrs.; T_3: Hot water treatment (99±1 °C for 10 second); T_4: Hot water treatment (99±1 °C for 30 second); T_5: Mechanical scarification (break seed coat by hammering); T_6: H_2SO_4 @ 2.5% for 10 minute; T_7: H_2SO_4 @ 5% for 10 minute; T_8: GA_3 @ 200 ppm for 24 hrs.; T_9: GA_3 @ 400 ppm for 24 hrs.; T_{10}: Cow urine @ 10% for 24 hrs.; T_{11}: Cow urine @ 20% for 24 hrs.; T_{12}: Cow dung slurry @ 10% for 24 hrs.; T_{13}: Cow dung slurry @ 20% for 24 hrs.; T_{14}: *Beejamrut* @ 5% for 24 hrs.;T_{15}: *Beejamrut* @ 10% for 24 hours. Among seed soaking treatments, T_5 [Mechanical scarification (break seed coat by hammering)] significantly recorded minimum number of days taken for germination (24.53) and maximum germination percentage (63.67).

Keywords: Germination, GA_3, H_2SO_4, cow urine, cow dung slurry, *Beejamrut* and seed

Introduction
Chironji (*Buchanania lanzan* Spreng.) a member of the family Anacardiaceae, originated in the Indian sub-continent. The tree is found growing as wild in the tropical deciduous forests of north, west and central India mostly in the states of Madhya Pradesh, Bihar, Orissa, Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Rajasthan and Maharashtra. In Gujarat, it is found growing especially in Dang, Valsad, Vadodara and Dahod district. Chironji is a small to medium size semi evergreen minor fruit tree with straight cylindrical trunk up to 15 meter height. Trees have the alternate bearing nature like mango. Tree shows deciduous nature for short time in summer and new leaves come in the late May. Leaves are 6-10 inches in length, oblong, obtuse; flowers whitish green, sessile; fruit drupe, green when immature and dark black at ripened stage. Flowering occurs in the month of January-February and fruits ripen in April-May.

The flesh of ripe fruit is very palatable and is largely eaten raw or roasted. The oily kernels are the most important part which are used in preparation of puddings. Kernel contains 34-47 percent oil. Chironji oil is non-repellent and non-toxic which is suitable for human consumption (Banerjee and Jain, 1988) [1]. Hemawathy and Prabhakar (1988) [3] reported that the total kernel lipid extracted from chironji was 65.60 percent of dry kernel and consisted of 90.40 percent neutral lipids, 3.40 percent glycolipids and 6.20 percent phospholipids. The kernels are reported to be used by tribal of Gujarat as brain tonic. An ointment made out of the kernels is used to cure itches of the skin and to remove blemishes from the face. The bark furnishes a natural varnish and is used in tanning in Kerala. The leaves are reported to be valued for their tonic and cardiotonic properties and their powder is a common medicine for wounds.

In this regard, different seed treatments are being used for accelerating seed germination and seedling growth of chironji. GA_3 is used for weakening of the seed coat so that the radical of the seedling can come out through the seed coat. GA_3 induces the synthesis of amylase and other hydrolytic enzymes during the early stages of seed germination. GA_3 controls mobilization of starch which acts as a respiratory substrate leading to immediate enhancement in cell elongation. Gibberellins also help in enhancing the availability of reserved mineral elements which promote

the germination process.

Cow dung slurry voided by solid excreta of animals represents the digested and non-digested portion of the animal feed. It contains 70-80% water, admixed with digestive juices, tissues of alimentary canal, microbial cells. Cow dung slurry also contains some growth promoting substances like auxin, N, P, K, micronutrients and biodigestable enzymes which have been cause for softening of seed coat and thereby enhances seed germination and growth of seedlings (Raj *et al.*, 2014) [9].

Cow urine is also known as "*Gomutra".* Cow urine contains about 1.21% N, 0.01% P_2O_5 and 1.35% K_2O (Subramanian, 2005) [13] and also contains physiologically active substances *viz*., growth regulators, nutrients (Kamalam and Rajappan, 1989) [4] and trace elements (Munoz, 1988). Cow urine contains iron, urea, uric acid, estrogens and progesterone which affects the inhibitory responses to seed germination, shoot growth and seedling vigour.

Beejamrut is a technique of seed treatment from locally available ingredients. It protects the crop from harmful soil borne and seed borne pathogens during the initial stages of germination and establishment.

Materials and Methods

The present experiment was carried out during 2022-23 at College Farm, College of Horticulture, Sardarkrushinagar Dantiwada Agricultural University, Jagudan in propagation chamber. A completely randomized design was adopted with three replications. The experiment included fifteen treatments *viz.*,T_1: Absolute control; T_2: Water soaking for 24 hrs.; T_3: Hot water treatment (99±1 °C for 10 second); T_4: Hot water treatment (99±1 °C for 30 second); T_5: Mechanical scarification (break seed coat by hammering); T_6: H_2SO_4 @ 2.5% for 10 minute; T_7: H_2SO_4 @ 5% for 10 minute; T_8: GA_3 @ 200 ppm for 24 hrs.; T_9: GA_3 @ 400 ppm for 24 hrs.; T_{10}: Cow urine @ 10% for 24 hrs.; T_{11}: Cow urine @ 20% for 24 hrs.; T_{12}: Cow dung slurry @ 10% for 24 hrs.; T_{13}: Cow dung slurry @ 20% for 24 hrs.; T_{14}: *Beejamrut* @ 5% for 24 hrs.;T_{15}: *Beejamrut* @ 10% for 24 hours. Sowing were done just after the compilation of seed treatments. Sowing of seed in 20 cm × 15 cm size polythene bags, for improve the drainage, holes were made in polythene bags and filled with potting mixture which was prepared by mixing one part of soil, one part of sand and one part of well- rotted FYM at 1 cm depth and were kept in propagation chamber. The polythene bags were watered daily till final data were recorded. Observations were recorded daily on germination parameters. The date of first plumule emergence was recorded and computing the difference between date of sowing and plumule emergence was recorded as a number of days taken for germination. The germination percentage was calculated by using below formula:

$$\text{Germination percentage} = \frac{\text{Number of seeds germinated}}{\text{Total number of seeds sown}} \times 100$$

The data collected from the five labeled seedlings in each treatment in repetition were average and subjected statistical analysis (Panse and Sukhatme, 1985) [8].

Results and Discussion

Number of days taken for germination

The statistical analysed data presented in table 1, revealed that number of days taken for germination of chironji were significantly influenced by different pre sowing treatments. The seed subjected to significantly minimum number of days taken for germination (24.53 days) were recorded in treatment T_5 [Mechanical scarification (break seed coat by hammering)] which was statistically at par with T_8 (25.47 days) and T_9 (26.80 days). The maximum number of days taken for germination (39.53 days) was noted in absolute control (T_1).

It might be due to the fact that practice of mechanical scarification injured the seed coat thereby, it increased the permeability of air and water through seed, which ended up with the elongation of the embryonic axis and favours the early germination (Mahadev *et al.*, 2021) [6]. These results are conformation with Shukla and Solanki (2000) [12] and Sharma (2016) [11] in chironji.

Table 1: Effect of seed soaking treatment on number of days taken for germination of chironji

Treatment	Number of days taken for germination
T_1: Absolute control	39.53
T_2: Water soaking for 24 hrs.	34.00
T_3: Hot water treatment (99±1 °C for 10 second)	29.20
T_4: Hot water treatment (99±1 °C for 30 second)	29.47
T_5: Mechanical scarification (break seed coat by hammering)	24.53
T_6: H_2SO_4 @ 2.5% for 10 minute	29.87
T_7: H_2SO_4 @ 5% for 10 minute	28.73
T_8: GA_3 @ 200 ppm for 24 hrs.	25.47
T_9: GA_3 @ 400 ppm for 24 hrs.	26.80
T_{10}: Cow urine @ 10% for 24 hrs.	32.80
T_{11}: Cow urine @ 20% for 24 hrs.	33.67
T_{12}: Cow dung slurry @ 10% for 24 hrs.	31.98
T_{13}: Cow dung slurry @ 20% for 24 hrs.	33.93
T_{14}: *Beejamrut* @ 5% for 24 hrs.	31.00
T_{15}: *Beejamrut* @ 10% for 24 hrs.	32.07
S.Em. ±	1.01
C.D. at 5%	2.88
C.V.%	5.69

Germination percentage

A perusal of data presented in the table 2 reveals that the maximum germination percentage maximum germination percentage (63.67) were recorded in treatment T_5 [Mechanical scarification (break seed coat by hammering)] which was statistically at par with T_8 (62.50%) and T_9 (60.00%). The minimum germination percentage (36.67) was observed in absolute control (T_1).It might be due to higher germination

percentage is as result of mechanical scarification which facilited entry of water into the seed kernels. Similar results were reported by Hassen *et al.* (2005) [2] in ber; Saied *et al.* (2008) [10] in ber and Khobragade and Rai (2022) [5] in chironji.

Table 2: Effect of seed soaking treatments on germination percentage of chironji

Treatment	Germination percentage
T_1: Absolute control	36.67
T_2: Water soaking for 24 hrs.	40.00
T_3: Hot water treatment (99±1 °C for 10 second)	43.33
T_4: Hot water treatment (99±1 °C for 30 second)	38.33
T_5: Mechanical scarification (break seed coat by hammering)	63.67
T_6: H_2SO_4 @ 2.5% for 10 minute	41.67
T_7: H_2SO_4 @ 5% for 10 minute	45.00
T_8: GA_3 @ 200 ppm for 24 hrs.	62.50
T_9: GA_3 @ 400 ppm for 24 hrs.	60.00
T_{10}: Cow urine @ 10% for 24 hrs.	46.67
T_{11}: Cow urine @ 20% for 24 hrs.	48.33
T_{12}: Cow dung slurry @ 10% for 24 hrs.	50.00
T_{13}: Cow dung slurry @ 20% for 24 hrs.	43.33
T_{14}: *Beejamrut* @ 5% for 24 hrs.	46.67
T_{15}: *Beejamrut* @ 10% for 24 hrs.	48.33
S.Em. ±	1.39
C.D. at 5%	3.95
C.V.%	5.04

Conclusion

The present investigation can be concluded that among the different seed soaking treatments, mechanicalscarification (break seed coat by hammering) significantly exhibited maximum germination percentage along with minimum number of days taken for germination.

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