

Study of Different Methods of Seed Germination of *Luffa Acutangula* Var. *Amara*

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Abstract:

The utilization of cucurbits potential is increasing day by day, as a result natural habitats of cucurbits are depleting at faster rate. It is found that plant may grow exclusively in certain habitat and may produce high biomass. To understand these behaviour germination studies are must. Inadequate scientific data is available about propagation and germination of *Luffa acutangula* var. *amara*. This research work is carried to understand the process of germination of *Luffa amara* seeds by different methods. The present study deals with different physical, mechanical and chemical germination methods of *Luffa amara*. The maximum germination percentage is observed in seeds treated with 0.25M NaCl salt solution and it is about 91.60%. Though the germination percentage is 66.66, the initial vegetative growth is recorded highest in seeds treated with 0.050M salt solutions.

Key Words: Cucurbits, germination, *Luffa amara*, Physical method

Introduction:

Cucurbits is the group name for fruits of family Cucurbitaceae and these fruits make popular food crop plants and get place in the kitchen. Some of these species include gourds, pumpkins, squashes, and melons. Researchers are much interested in them as they having the extensive range of medicinal properties (Dhiman, et. al. 2012). Traditional medicines systems, particularly the Chinese and Ayurveda systems have been using various parts of cucurbit plants; including the seeds and the fruits. (Dhiman, et. al. 2012). Cucurbits are well documented for their food value and medicinal potential. Many wild potential cucurbits are also used in commercial trade. *Coccinia*, *Melothria*, *Momordica*, *Kedrostis*, *Luffa* etc. are high value medicinal cucurbits.

Luffa acutangula (L.) Roxb. var. *amara* (Roxb.) Clarke belonging to family Cucurbitaceae is an annual herb found in all parts of India, especially along the costal lines of

Maharashtra. (Chakravarty, 1982). *Luffa acutangula* var. *amara* is popularly known as 'KaduDodaka' or 'KaduTurai' in Marathi. All the plant parts are strictly bitter. It is exhaustively utilized for treating the diseases such as inflammation of joints, cataract, liver complaints etc. in folklore. The plant is used as a laxative, carminative and as emetic. It is used to cure *Vata*, *Kapha*, liver complaints, leucoderma, piles etc. (Chopra *et.al*, 1986). It is used as a bitter tonic (Biswas and Ghosh, 1973).

The present study deals with different physical, mechanical and chemical germination methods of *Luffa amara*

Materials and Methods:

The physical methods include Hot water treatment, soaking treatment. The chemical methods like treatment of different concentrations of GA, NaCl and Na₂SO₄ etc. and Mechanical methods including Nicking and scarification were done.

Germination study was done on 30 seeds per replicate for three replicates by using Petri plate method. Surface sterilization of seeds for 20 min in 20 % (v/v) sodium hypochlorite was done and washed with distilled water. (Ruiz-Carrasco et al., 2011; Burrieza et al., 2012).

The 30 seeds were placed on wet germination paper and plates were kept in dark at room temperature. Number of germinated seeds were recorded. (Table 1) Results were compared with control set, where seeds were germinated without any treatment. The germination percentage, Average root and shoot lengths and number of leaves were recorded.

Results and Discussion:

Seed embryo is enclosed in protective outer covering of seed coat. Seeds play important role in establishment of flowering plants. Seed germination is the sum of all the physiological processes occurring inside the seed which starts with imbibition of water and ends with protrusions of embryonic shoot (Evenari, 1961), seed coat prevents the water to enter inside and act as main barrier. In cucurbits endogenous growth inhibitors, growth promoters and physical factors were found to influence the seed germination (Sen ,1982). In some cucurbit species, because of hard and impermeable seed coat seeds cannot germinate even in favourable environments. (Bradbeer,1988). The seed coat of smooth luffa is thick and hard, and has phenolic compounds including pectin and suberin which restrict water uptake into the seed(Doijode,2001).

The results of different seed germination practises reveal that, in controlled condition the germination percentage of seeds was about 83.33%. whereas for nicked seeds and treatment of

400ppm of GA, the germination percentage was same and it was 80%. The overall initial vegetative growth for both control and nicking were nearly same. The maximum germination percentage was observed in seeds treated with 0.25M NaCl salt solution and it was 91.60%. Though the germination percentage was 66.66, the initial vegetative growth was recorded maximum in seeds treated with 0.050M salt solutions. The shoot, root lengths and number of leaves were recorded highest as compared to control set and other treatments of germination.

On the contrary the least vegetative growth was seen in 0.050M Na₂SO₄ solution and this behaviour was unpredictable and needs further detailed study. It may suggest plant species requires more chloride salinity. As the *Luffa acutangula* var. *amara* is located along the seashore, the slight salinity may favour the germination or overall vegetative growth of plant.

Almost no germination was observed in seeds treated with 0.1M, 0.2M and 0.3M salt solutions of Na₂SO₄. The germination percentage was least in 0.3 M NaCl treatment 47 and it was only 3.33%. The least percentage of survival was also observed in it. The growth was stunted after 15 days in it. It was also observed that soaking of seeds before germination in cold water for about 24 to 36 hours inhibited the germination percentage, but the vegetative growth was not much affected. The enzymatic activity and physiological response may hamper germination. Table 5, shows the results of different seed treatments and their effect on seed germination of *Luffa amara*. Plate 1, showing sample sets of germinated seeds by different mechanical methods.

Conclusion:

In controlled condition the germination percentage is much significant and so no need of in vitro methods of propagations. In control the germination is 83.33%. whereas in nicked seeds and treatment of 400ppm of GA, the germination percentages are same and it is 80% for each. The overall initial vegetative growth for both control and nicking are nearly same. The maximum germination percentage is observed in seeds treated with 0.25M NaCl salt solution and it is about 91.60%. Though the germination percentage is 66.66, the initial vegetative growth is recorded highest in seeds treated with 0.050M salt solutions. It indicates that, slight salinity of NaCl favours the germination percentage and overall growth of seedlings. Almost no germination is observed in seeds treated with 0.1M, 0.2M and 0.3M salt solutions of Na₂SO₄. It can be concluding that Na₂SO₄ was more toxic than iso-osmotic solutions of NaCl.

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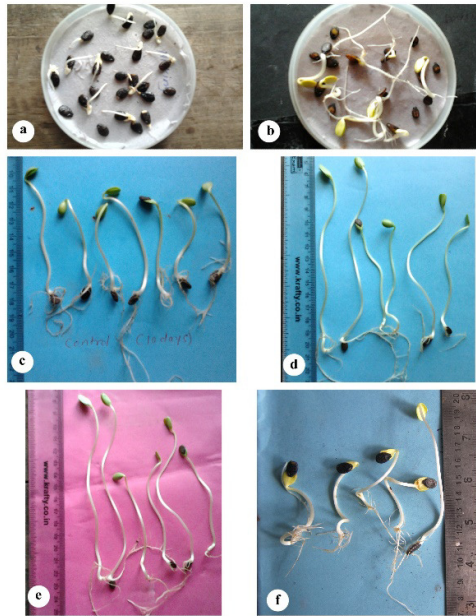
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Table !: Effect of different treatments on seed Germination of *L. amara*

Sr.no.	Treatment of Germination	Germination Percentage	Avg. root Length(Lr)	Avg. shoot length(Ls)	Avg. No of leaves
1	Control	83.33	7.115	12.2 4	04.56
2	Nicking	80.00	7.679	11.196	04.708
3	Scarification	26.66	5.70	7.962	03.50
4	GA100ppm	13.33	3.65	5.25	03.75
	GA 200ppm	30.00	5.02	07.09	03.66
	GA 300 ppm	46.66	5.28	08.065	03.92
	GA 400 ppm	80.00	8.796	12.016	04.50
5	NaCl 0.025M	90.00	7.871	18.91	04.60
	NaCl 0.050M	66.66	9.995	22.625	05.90
	NaCl 0.1M	60.00	7.395	13.138	03.66
	NaCl 0.2M	26.66	5.437	04.051	03.37
	NaCl 0.3M	03.33	4.8	05.80	03.00
6	Na ₂ SO ₄ 0.025M	20.00	6.30	10.26	03.66
	Na ₂ SO ₄ 0.050M	13.33	2.27	05.15	03.50
	Na ₂ SO ₄ 0.1M	00.00	0.00	0.00	0.00
	Na ₂ SO ₄ 0.2M	00.00	0.00	0.00	0.00
	Na ₂ SO ₄ 0.3M	00.00	0.00	0.00	0.00
7	Hot water soaking 10 min	06.66	4.55	06.65	3.00
8	Soaking in cold water 12hrs	26.66	7.387	09.70	03.62
	Soaking in cold water 24 hrs	03.33	7.50	04.20	3.00
	Soaking in cold water 36 hrs	03.33	7.00	3.50	3.00

Plate 1: Germinated seeds of *Luffa amara* by different treatments.



a. Germinated seeds (control) b. seedlings (Control) c. Seedling (control) d. Seedlings (scarification)
e. Seedlings (Nicking) f. Seedling(GA 400 ppm)