

Title of the technology

Seed germination protocol for *Capparis decidua*

A: Nature of technology

Process technology

B: Process in brief

Capparis decidua (Forsk.) Edgew. belongs to family Capparidaceae. It is a multipurpose woody plant growing wild in arid regions. Unripened fruits are used for making prickles and dry vegetables. New branches are eaten by goats and cattles. It is termite resistant plant used for agriculture implements and fire wood. It is an excellent soil binder species of the Indian Thar desert. The population is declining at an alarming rate due to overexploitation and damage to its habitat. The plant is much branched, leafless, small tree or a glabrous shrub. Fruit berry, ovoid to subglobose, 0.5-1.4 mm in diameter, many seeded, beaked. Flowering- Mar-Apr and also Oct-Nov. Fruiting- May-Nov or Dec. The plant flowers profusely in the post monsoon period. Natural regeneration is through seeds, but the hostile environmental conditions of arid region limits the establishment of new seedlings. Its natural regeneration may also be affected due to peculiar seed characteristics, which are short-lived as well as deeply dormant. Under laboratory conditions, the seeds exhibited poor germination leading us to know possible causes and to develop suitable treatment to enhance germination. *Capparis decidua* is a slow growing species. It is mainly propagated through seeds. However, seed germination is very poor and varies from no germination to 2 percent only. State forest department is unable to raise nursery of this species as germination percentage is very low.

Process developed

Ripe fruits of *C. decidua* were collected from Jodhpur and seeds were extracted by depulping. Seeds were dried under fan for 48 hrs before study was initiated.

Preparation of aqueous extract and bioassay: Seeds of *C. decidua* were powdered and soaked 20 g in 100 ml distilled water to obtain 20 % concentration. The residue was filtered and the supernatant was used as an aqueous extract and further diluted in to obtain 10, 8 and 6.7 % concentrations. Towel germination paper lined in glass petridishes was moistened by the extracts prepared as above and seeds of a non-dormant local variety of wheat (*Triticum aestivum*) were

sown for bioassay. In the experiment, different seed parts like seed coat, cotyledons, and embryo were separated and extract (10%) was prepared as above. Seeds of *T. aestivum* were soaked in the solution for 30 minutes before sowing. In both the experiments a control set was used and all the germination tests were conducted in four replications of 50 seeds each. A seed was considered germinated, when radicle and plumule both attained at least one-centimeter length. Germination was recorded after every eight hours till the completion of germination and distilled water was used for subsequent watering whenever required.

Treatments and germination test of C. decidua seeds: The seeds of *C. decidua* were given various treatments before sowing. Seeds were scarified by nicking at the cotyledonary end. For chilling treatments, moistened seeds were rolled in wet towel paper and kept at 3-5°C for two weeks. Seeds were soaked in sulphuric acid (99.8%) for three minutes. Towel germination paper lined in glass petridishes was moistened with different concentrations of GA₃ before placing seeds and subsequent moistening was maintained by distilled water. All the treatments consisted of four replicates and each replicate was of 50 seeds. Germination was counted daily till 21 days. The seeds of wheat exhibited no significant decline in germination percent, which ranged between 91.5-93.5 % when treated with different concentrations of the extract. This indicated that in *Capparis decidua* seed coat dormancy is absent. Seeds of *C. decidua* exhibited only 1 % germination under control conditions. The germination was increased to 39.5 % in seeds scarified by nicking. Seeds scarified with sulphuric acid showed only 10.5% germination. The seeds treated with GA₃ (200 ppm) enhanced germination to 26.5%, but showed significant increase in seeds scarified by nicking prior to treatment. The seeds treated with 50 and 100ppm GA₃ showed gradual increase in germination (49.5 and 52%, respectively) but remained at par with the scarified seeds. At 200 ppm the germination increased significantly to 74.5%. Higher concentrations of 400, 700, and 1000 ppm not only failed to increase germination, but also significantly declined it, though all three remained at par with each other. The seeds scarified by sulphuric acid before application of GA₃ gave 21.5 % germination (Fig. 1).

Chilling seeds for two weeks failed to improve germination and remained at par with the control. Chilling with GA₃ (25.5 %) also remained at par with GA₃ alone. Seeds scarified before chilling reduced germination to 19.0 %. The seeds scarified and treated with GA₃ prior to chilling, however, gave 54.0% germination. Protocol developed for seed processing, pre-treatment and germination will be highly useful for SFDs and farmers for raising planting material of *C. deciduas* for afforestation and plantations.



Fig. 1. Seed germination in *Capparis decidua* (Forsk.) Edgew

C: Beneficiaries of the technology

1. Prominent beneficiaries/ user groups

State Forest Department and Farmers

2. No. of clients to whom technology has been transferred

This technology is a process technology to enhance seed germination tremendously. Seed germination by way of applying this technology has increased from 1 percent to 74.5 percent. This report has been sent to State Forest Department.

3. Potential for further dissemination (As the case may be)

Not applicable as results were presented in the training programmes, workshops and through hands-on trainings and publication. *C. decidua* has been found to be one of the best species for shade and shelter belts to check the movement of sand in the Thar desert. As it is drought resistant and withstands neglect, this species could be particularly useful in arid areas as a live hedge providing edible fruits.

Publication

1. D. Kumar and D.K. Mishra (2008). Studies on seed germination in *Capparis decidua* (Forsk.) Edgew: A tree of hot desert. *Indian Forester*, 134(4): 500-504.

D: Economic significance

1. Potential to address livelihood issues and generate additional income

The fruits are consumed by humans and animals. Fodder is browsed by animals and is probably its most important asset. Its nutritional value is low. The plant is also used for charcoal and firewood in its native range. The wood is very hard and used to make water pipes and water troughs. The very bitter roots are used in the Indian and Farsi pharmacopoeia and the root bark is used to cure swollen joints. *C. decidua* has been found to be one of the best species for shelter belts to check the movement of sand in the Thar desert. It is also used as a shade tree and drought resistant and withstands neglect; this species could be particularly useful in arid areas as a live hedge providing edible fruits. Thus, this has potential to generate additional incomes to farmers if planted on bunds of their fields.

2. Productivity enhancement and economic benefits over replaced technology

Earlier no technology was available for seed germination of *Capparis decidua*. Developed technology has proved very useful for nursery raising of this species. This species is very hardy and soil binder and proven species for sand dune stabilization. Certainly by raising this species, biodiversity, productivity and economic benefits can be enhanced.

3. Impact of the technology

Not yet evaluated

E. Developed by {Name of Scientist(s)/officers(s)}

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