

Effect of pre-germination treatments and storage conditions on germination of *Embelia ribes* Burm f. (*bidanga*) with special reference to Vrikshayurveda

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Abstract

Effect of pre-germination treatments on freshly harvested seeds and on stored seeds of *Embelia ribes* Burm. f., were investigated in this study integrating with Vrikshayurveda methods. Germination tests were done immediately after the pre-treatments for the freshly harvested seeds after decoating and for the seeds stored in low temperature (4°C) kept in earthen pot along with the seeds stored in ambient condition after three months of storage. All Seeds including control were subjected to four pre-germination treatments to enhance the germination percentage and maintain its viability. Pre-germination treatments showed significant differences in germination percentage. The highest germination percentage was observed in the seeds soaked in cow dung slurry for the fries (83.33%) and stored (43.33%) compared to control (38.33% and 16.5% respectively). Seeds of *E. ribes* being recalcitrant in nature poses storage problems. From this study it can be concluded that viability of *E. ribes* can be maintained after three months of storage in earthen pots and in low temperature. The versus about *E. ribes* as an important plant recommended in Surapalas Vrikshayurveda for ailing plants, propagation of plants and treatment of seeds was described in this paper.

Keywords: *Pre-germination treatments, Vrikshayurveda, Germination tests, Germination percentage.*

Introduction

Seed storage serves as a safe and relatively inexpensive method of plant genetic resources conservation. Since seed production is seasonal, and usage is continuous, safe storage must be provided for the seed produced until it is needed for successful establishment of plantations and multiplication purposes. Seeds of many species can be stored under cool and dry conditions. Farmers have had to maintain viable seeds from one growing season to the next (i.e. Short term seed storage, typically 3 to 9 months, but occasionally up to 18 months). It may also be desirable to maintain 'carry-overstock' for several years (medium-term seed storage, typically 18 months to 5 or 6 years). In both these cases, conventional practices have developed from previous experience of problems and

successes with seed storage (Hong and Ellis, 1996).

It is estimated that 60-70 per cent of food grains produced in the country is stored at home level in indigenous structures ranging from bamboo baskets to mud structures, gunny bags and modern bins (Kanwar and Sharma 2003; Channal *et al.*, 2006). Farmers and traditional grain processors have been evolving number of traditional practices through trial and error method, to avoid huge loss that are occurring in the stored pulse grains due to insect and pest infestation (Pushpamma and Rao, 1980). The present study was carried out with an objective to identify the best method of pre treatment to be adopted for seeds of *Embelia ribes* Burm f., to obtain maximum germination percentage, safe seed storage with special reference to Vrikshayurveda.

E.ribes Burm. f., a climbing shrub belonging to family Primulaceae is an important medicinal plant used in a number of traditional medicinal preparations. *E.ribes* which is authenticated as *Vidanga* is an essential ingredient of many formulations in Ayurveda (Anon., 2001). *E. ribes*, popularly known as 'Vidanga' or 'Vavding' in Ayurveda, is a Red-listed species. This species is reported to be vulnerable in the Western Ghats of Tamil Nadu and Karnataka states of India and at a lower risk in Kerala state of peninsular India (Ravikumar *et al.*, 2000). Its great demand in Ayurveda and the pharmaceutical industry (> 100 t/yr.) has imposed tremendous pressure on natural populations from the Western Ghats of India (Mhaskar *et al.*, 2011)

Vrikshayurveda mainly deals with various species of trees and their healthy growth and productivity. A text on Vrikshayurveda mentions about 170 species of plants, including herbs, shrubs and trees. There are 325 systematically arranged versus, beginning with a salutation to lord Ganesha, followed by glorification of trees, and composition on tree planting and production. Special references are made to procuring, preserving, and treatment of seeds and planting materials. The most noteworthy fact in Vrikshayurveda, however is that it applies

the *tridhatu theory* of Ayurveda (the science of life) to plants. *Kapha*, *Pitta* and *Vata* are treated as the basic components of plants, too as of humans and the theory that a balance of the three indicates health and imbalance caused due to vitiation of any one or more of them indicates disease is extended to plants too, justifying its title 'Vrikshayurveda'.

Materials and Methods

The berries of *E.ribes* were collected from Ponmudi, Thiruvananthapuram district, during June, 2012, depulped by rubbing the fruits on a rough surface after keeping the seeds in water for two days. Decoating is done by grinding the depulped seeds in mortar and pestle to remove the pulp. Then the seeds were sub-divided into two lots. Seed lot A was used to test germination after applying pre-germination treatments, while the seed lot B was used to test germination after three months of storage in cold storage room (4°C) after applying storage treatment. The seeds were kept in earthen pot, its mouth covered with gunny cloth and stored in the cold storage room.

Storage treatment based on Vrikshayurveda

Sprinkle cow's milk until all the seeds are wet > Mix thoroughly with fresh cow dung, so that a coating is made on all the seeds > Shade dry for 3-5 days



Fig 1: Fruits of *ribes*



Fig 2: Seeds of *ribes* stored in earthen pot

(until completely dry) > Mix profusely with honey and vidhanga powder > Shade dry again for 3-5 days until completely dry > Seeds are ready for storage.

Control: (T0) Seeds are stored without any treatment. Pre-sowing treatments given to *E. ribes* seeds in this study consists of control (T0-), seeds soaked in cow urine for 1 day (T1), seeds soaked in cow's milk for 1 day (T2), seeds soaked in dung slurry for 1 day (T3). Germination tests of fresh seeds and stored seeds (400 seeds – 4 replications of 100 seeds each) were sown under each treatment following Randomized Block Design. These were compared with control (T0) where no pre-treatment was given. Sowing was done in sterile vermiculite (Willan, 1985) medium taken in plastic trays. The trays were kept in KFRI laboratory at Peechi in Kerala state and the mediums used were maintained moist. Germination trials were conducted periodically for assessing the effect of pre-germination treatments by counting germinated seeds. Germination data was recorded from the date of sowing until germination ceased.

Results and Discussion

Effect of pre-germination treatments on germination:

Germination of the *E. ribes* seeds started 32 days after sowing and culminated after 123 days. Different treatments significantly affected the germination period for the species. Initial germination of fresh seeds (Seed lot A) were highest in T3 (83.33%) followed by T1 (47.5%) which was significantly higher than control (38.33%). The lowest germination percentage was recorded in T2 (30%). The germination is counted upto more than three months (123 days). The germination percentage of stored seeds (Seed lot B) was highest in T3 (43.33%), followed by T1 (35.5%) and T2 (22.2). Lowest germination percentage was recorded in control (16.5) which was similar to that of fresh seeds. In both germination tests (fresh and stored seeds) the seeds soaked in cow dung slurry for 24 hours, gave maximum result than the control. The seeds kept in ambient condition showed poor germination.

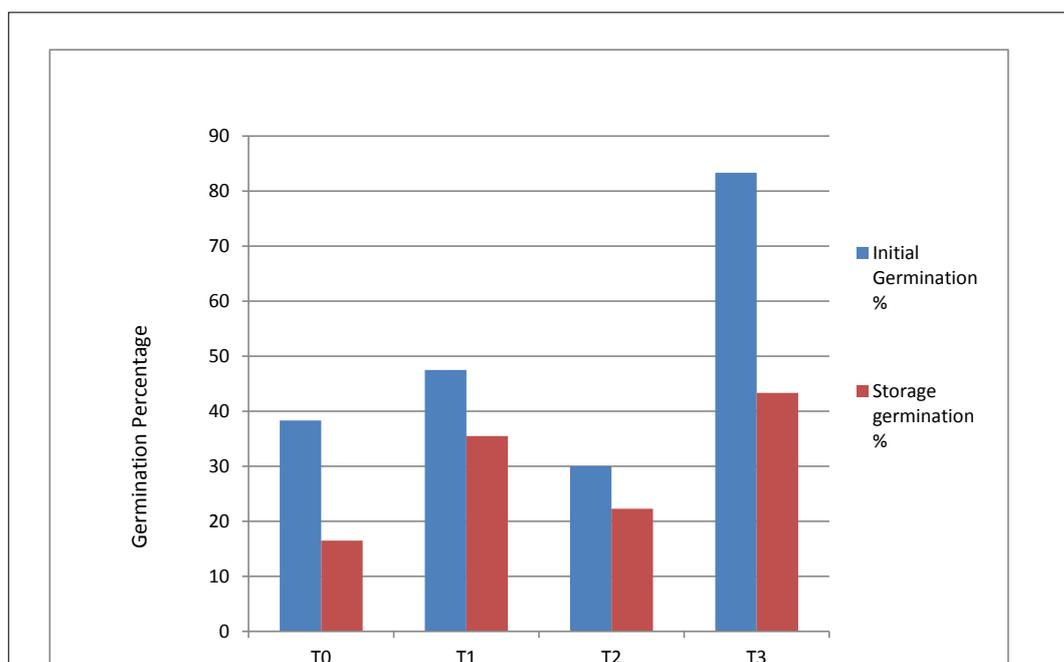


Fig 3: Effect of pre germination and germination % of fresh seeds and stored seeds of *ribes*

Natural regeneration of *E. ribes* is poor due to over-harvesting and exploitation, more fragmented population resulting in inbreeding, development of abortive embryos and the slow germination of fertile seeds which are small in size. On the other hand, artificial regeneration of this species is difficult due to its poor seed viability, low rate of germination and poor rooting from stem cuttings. However, lack of knowledge about its distribution, poor natural regeneration and unknown propagation techniques have resulted in the lack of availability of 'quality planting material' (QPM) for promoting cultivation (Anon, 2008). *E. ribes* is best propagated through seeds, though seed dormancy is the common factor that leads to long period for germination and low germination (Anon, 2011). The seed coats of *E. ribes* are very hard (Ved *et al.*, 2003). The present study investigated the most effective methods of enhancing germination of *E. ribes* through various pre-sowing treatments were examined. The present study explores the response of *E. ribes* seeds to various pre-sowing treatments as an attempt to produce quality planting stock and thus to enhance the cultivation protocol of this important plant. From the above results it can be concluded the viability and longevity can be maintained by storing the seeds in earthen pot and in low temperature.

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