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# Seed Germination Dynamics of *Ipomoea mauritiana* (Kiribadu) as Influenced by Soaking Period and Sowing Media

N.D.N. Priyadarshani
Department of Crop Science, Faculty of Agriculture, University of Ruhana, Sri Lanka
nilukanakandala@gmail.com

**Abstract:** *Ipomoea mauritiana* (Kiribadu) is a very important medicinal plant. Tuberous roots of *Ipomoea mauritiana* use for herbal preparation in indigenous medicine for the diabetes, rashes, abdominal disorders and catarrhs. It also use for the treatments in bone damage, as a regulator of menstrual functions and nutritive substitute for cod liver oil. *Ipomoea mauritiana* seeds contain hard seed coat and therefore, seed germination is poor under natural condition as well as takes long time for germination. Present study was an attempt to expedite the *Ipomoea mauritiana* seed germination through different treatments. For this purpose, two separate experiments were set up at the Department of Crop Science, Faculty of Agriculture, University of Ruhuna. In Experiment-I, four different soaking periods (i.e., 6, 12, 18, 24 hrs) alone with a control and five replicates were used to determine best soaking period for germination of *Ipomoea mauritiana* seeds. Numbers of germinated seeds were counted daily to determine germination percentage and time taken for germination. In Experiment-II, four different potting mixtures (i.e. sand, coir dust, top soil and coir dust: top soil 1:1) and five replicates were used to select the best sowing media for *Ipomoea mauritiana* seed germination. Results revealed that, the highest germination percentage (90%) and rapid germination were observed in seeds soaked in water for 18 hrs. Fungus attack was observed in seeds soaked in 24 hrs. Coir dust media was shown rapid and higher germination (81%) followed by coir dust: top soil (1:1) media (78%). Therefore, seeds soaked in water for 18 hrs and planted in coir dust media appeared to be most promising treatments to obtain rapid and highest germination percentage of *Ipomoea mauritiana* seeds.

**Keywords:** *Ipomoea mauritiana*, Medicinal plant, Seed germination, Sowing media.

## I. Introduction

Kiribadu (*Ipomoea mauritiana*) (family-Convolvulaceae) is an important medicinal herb used in indigenous medicine to treat variety of diseases and disorders. This is introduced to species in Sri Lanka and cultivated in low country wet zone. Kiribadu is perennial twiner having tuberous root system (yam) and root contains starch, oxidized sugar, tannins, resins, some energetic chemical compounds. Yams are very nutritive and therefore, it use as a substitute for cod liver oil [3]. Yams are useful in the prevention and cure of urine troubles, diabetes, rashes, abdominal disorders, catarrhs, bone damages, Bright's disease, acute and chronic pyelitis, cystitis, gonorrhoea and strangury like health related problems. Yams also used to prepare uterine tonic to regulate the menstrual activities, macerated in its own juice and taken with milk and cow ghee, it increases sexual vigour and counteracts sterility. It has anti rheumatic properties of much value and gives relief from both acute and chronic rheumatism [3]. Kiribadu bear flowers during April, May and September. Single Kiribadu fruit contain two to four seeds and both seeds and fruits turn black in colour when it matures. Kiribadu yams have great demand in indigenous medicine and commercial cultivation of Kiribadu can generate greater income. Therefore, it is important to develop rapid and

cost effective propagation technique for *Ipomoea mauritiana*. This plant can be propagated through seeds. When seeds turn in to maturity, seeds become hard material. Seed coats also turn in to hard. Seed germination is poor under natural condition. Time taken for seed germination is also high and availability of *Ipomoea mauritiana* seeds are very low. Therefore, it is very important to utilize available seeds in a proper way. Development of simple and cost effective seed propagation method is very important. For this purpose two separate experiments were set up to determine most appropriate seed soaking period and sowing media for *Ipomoea mauritiana* seed germination.

## II. Materials and Methods

Experiments were conducted at the Department of Crop Science, Faculty of Agriculture, University of Ruhuna. Seeds were obtained from brown coloured matured fruits from mother stock maintained at the medicinal plant garden, Faculty of Agriculture, University of Ruhuna.

Experiment-I was set up to determine most appropriate soaking period for Kiribadu seed germination. In this experiment, four different soaking periods (i.e., 6, 12, 18, 24 hours) along with control were used as different treatments. Petri dishes with moist filter paper used and each petri dish contains ten kiribadu seeds. Three drops of $CuSO_4$ were applied to each petri dish at the beginning to prevent fungal diseases and filter papers were moist daily. Treatments were arranged in Completely Randomized Design (CRD) with five replicates. The percentage of data on germination and time taken for germination were recorded daily.

Experiment-II was set up to determine best sowing media for *Ipomoea mauritiana* seed germination. Seeds soaked in water for period of 18 hours (best soaking period from experiment I) were used. Four different potting mixtures (i.e., sand, coir dust, top soil and coir dust: top soil 1:1) with five replicates were arranged in Completely Randomized Design (CRD) and data on germination percentage, seedling height (cm) and number of leaves were collected. Numbers of germinated seeds were recorded at two weeks after seed sowing and data on plant height and number of leaves were taken at two months after seed sowing. Data were subjected to angular transformation and Analysis of Variance (ANOVA) with Statistical Analysis System (SAS) was used to analyse the data.

## III. Results

Experiment-I: Rapid and higher germination percentage (90.9%) was observed in seeds soaked in water for 18 hour period compared to other treatments. Seeds, soaked for 18 hours period started to germinate, following day, while seeds in control started to germinate at five days and it was recorded very poor germination percentage (13.6%). Fungal attacks were observed in seeds soaked in water for 24 hours (See Figure 1).

Higher seed germination percentage was recorded in seeds soaked in 18 hours at six days after treatment (82.6%) closely followed by seeds soaked in water for 24 hours (70.3%). Furthermore, there was no significant difference between seeds soaked for 24 hours and 18 hours (See Figure 2).

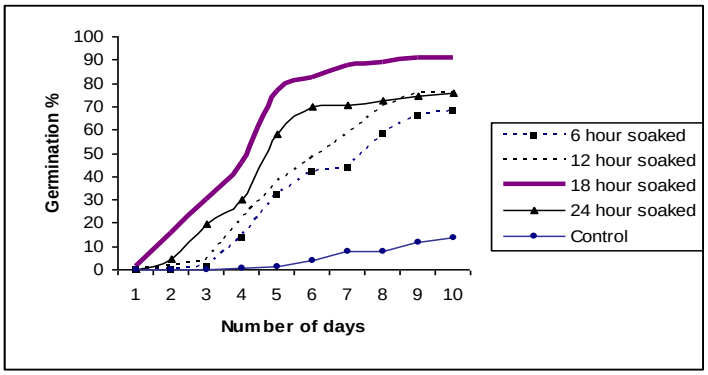


**Figure 1:** Changes of seed germination percentage as affected by different soaking periods. Means with the same letter are not significantly different at p≤0.05.

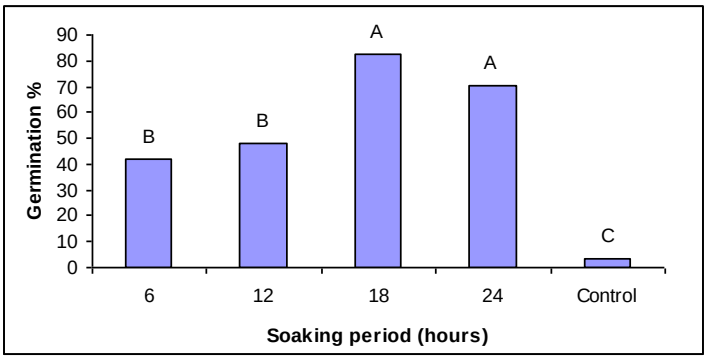


**Figure 2:** Seed germination percentage as affected by different soaking periods (at six days after seed treatments). Means with the same letter are not significantly different at p≤0.05.

Significantly higher ($p<0.05$) germination percentage was observed in 18 hours water soaked treatments at 8 and 10 days. Germination percentage of 18 hours water soaked seeds showed significant difference ($p<0.05$) from all other treatments. However, there were no significant difference among 6, 12 and 24 hours water soaking periods at 8 and 10 days after pretreatment of seeds (See Figure 3).

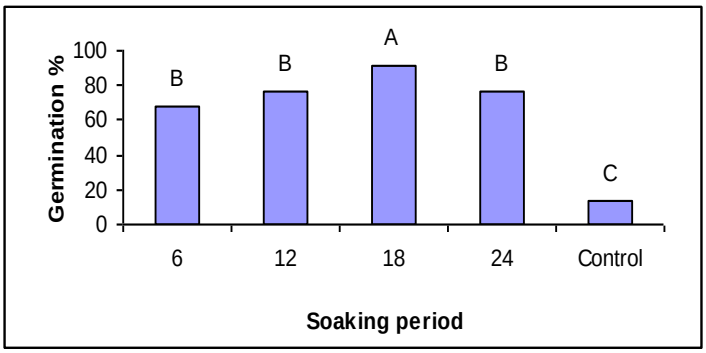


**Figure 3:** Seed germination percentage as affected by different soaking periods (at 10 days after seed treatments). Means with the same letter are not significantly different at p≤0.05.

Higher seed germination percentage and less time taken for germination were observed in seeds soaked in 18 hour period whereas, control treatment showed poor germination percentage and longer time taken for germination.

Experiment-II: Different potting media showed significant impact on germination percentage, seedling height and number of leaves. Higher germination percentage (81%) and rapid germination was observed in coir dust media. On the other hand, sand media showed poor germination percentage (23%) and longer time for germination (See Figure 4).

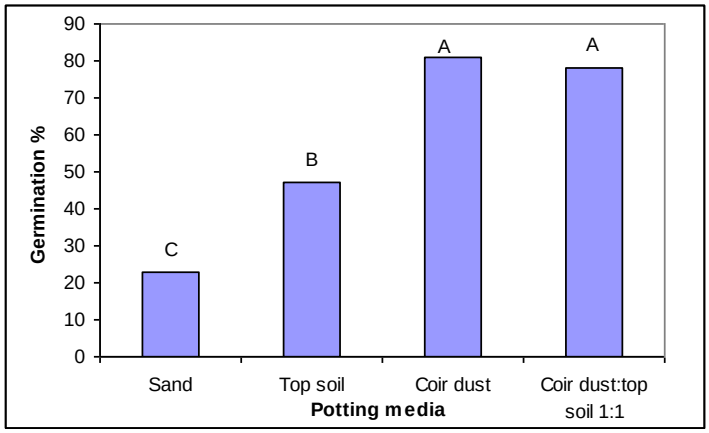


**Figure 4:** Changes of seed germination % of *Ipomoea mauritiana* as affected by different potting media
Means with the same letter are not significantly different at p≤0.05.

Coir dust media showed significantly ($p<0.05$) higher seedling height (5.2cm) compared to all other treatments at two months after seeds sowing (See Figure 5).

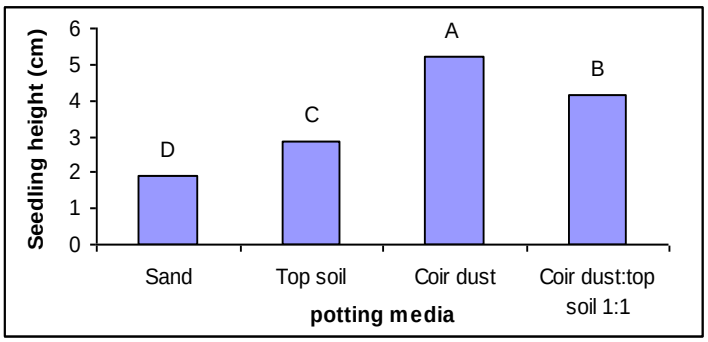


**Figure 5:** Changes of seedling height (cm) of *Ipomoea mauritiana* as affected by different potting media. Means with the same letter are not significantly different at p≤0.05.

Significantly higher ($p<0.05$) numbers of leaves were recorded in coir dust media (5.6) closely followed by coir dust: top soil (1:1) media (4.4) at two months after planting (See Figure 6). Results revealed that higher germination percentage, seedling height and numbers of leaves were recorded in coir dust media, while the lowest values for these parameters were recorded in media containing sand.

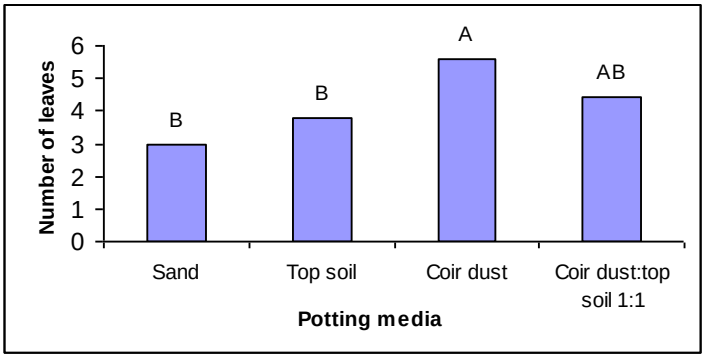


**Figure 6:** Changes of number of leaves of *Ipomoea mauritiana* as affected by different potting media at two months after seed sowing. Means with the same letter are not significantly different at $p \leq 0.05$.

## IV. Discussion

When seeds over soaked (i.e., 24 hours soaking period), starch, oxidized sugars in seeds may be hydrolyzed and crate favourable environment for fungal growth. This may be the reason to observe fungal growth in 24 hours water soaked seeds.

Coir dust media can retain adequate moisture and aeration. Coir dust with strong capillarity provides more uniform moisture conditions for roots. They are able to increase aeration in the base of the mix and reduce drying of the surface by lifting moisture higher in the pot. This increases the volume of the mix that is suitable for root development [2]. This may be the reason for better performances observed in the media containing coir dust.

## V. Conclusion

Seeds soaked in water for 18hrs and seeds sowing in coir dust media appeared to be most promising treatments to obtain rapid and the highest germination percentage as well as better seedling growth of *Ipomoea mauritiana*.

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