

## **VIABILITY OF CRITICALLY ENDANGERED CEBU CINNAMON SEEDS (*Cinnamomum cebuense* L.)**

Lillo EP and Alcazar SMT  
Cebu Technology University-Argao Campus

### **ABSTRACT**

The study aimed to determine the viability of the seeds of the critically endangered Cebu Cinnamon (*Cinnamomum cebuense* L.) species. The collected seeds were air-dried and stored in a closed container. The stored seeds were sowed in the seed box at an interval of one week. This study consists of nine (9) treatments with three (3) replications, laid out in a Randomized Complete Block Design and analyzed using ANOVA at 5 percent level of significance.

Results show that there is a significant difference among the treatments. For Treatment control (To) the seeds were sown directly to the soil medium after air drying. In this treatment many seeds have germinated. The result implies that Cebu Cinnamon seeds should be sown directly to the soil medium right after air drying rather than storing it in the container. The seeds that have germinated were considered as viable. Cebu cinnamon was very sensitive to temperature changes.

The seeds of Cebu Cinnamon species should be collected when they are matured to ensure their viability, thus promote higher rate of germination. Conservation and protection of the Cebu Cinnamon species must be considered one of the priorities species of the government and other stakeholders because there are much less of the species that are left on the island.

Key words: seed germination, endemic, conservation, seed sowing

### **INTRODUCTION**

The Cebu Cinnamon tree (*Cinnamomum cebuense* L.) is a species endemic to Cebu Island, Philippines. It was first discovered in Cantipla, Cebu in mid 1980's and was described by Kostermanns in 1986. The tree is endemic to the Island of Cebu but several trees are found in the neighboring islands of Camotes and Siquijor. The species is listed by the International Union for the Conservation of Nature (IUCN) as one of the most critically endangered plant species in the world being found only in the island of Cebu. This species was once abundantly growing on Cebu's forest but expansion of clearings and intentional cutting for construction and other purposes have brought its status to an alarming level for conservation. Forest degradation in Cebu dates back during the Spanish period when the island was one of the places used for ship building (Vitug, 1993). With the growing population, expanding clearing for agricultural development has led to further forest destruction. Forest cover in Cebu is one of the most badly degraded vegetation in the Philippines. Satellite photos have shown in 1998 that almost zero percent of Cebu's forest is left (SSC). This development has put too much endangerment particularly to those species or subspecies of plants and other wildlife in the island.

The prevalent practice of stripping its bark for medicinal use also poses a threat to its survival, as this may lead to infection or death if the tree is ring-barked. The bark of the tree has medicinal properties. It is used by local residents as remedy for stomach ache whereby the bark is either chewed directly or boiled with a glass of water before intake. No other uses have been reported by the local residents; however the leaves of the tree may be a potential source of spice as with other closely related species. In a study published by researchers at the U.S. Department of Agriculture in Maryland, cinnamon reduced the proliferation of leukemia and lymphoma cancer cells.

However, based on personal communication from the Cebu Biodiversity Conservation Foundation, Incorporated (CBCFI), Cebu cinnamon will only bear fruits once every two years. This situation contributed much to the problem of conserving and protecting the species. So there's a need for the seeds of cebu cinnamon to be stored if they are not yet ready for planting. Storage may be defined as the preservation of viable seeds from the time of collection until they are required for sowing (Holmes and Buszewicz 1958).

The seeds for a forestation can be sown immediately after collection, no storage is needed. The best sowing date for a given species being raised in a nursery depends on (a) The anticipated date of planting, itself dependent on seasonal climate, (b) The time needed in the nursery for planting stock of that species to reach the right size for out-planting. Only rarely does best sowing date coincide with the best date for seed collection. The period for which seed can remain viable without germinating is greatly affected by its quality at the time of collection, its treatment between collection and storage and the conditions in which it is stored. Nevertheless, seed longevity varies enormously from species to species even if they are given identical treatment and storage conditions. Ewart (1908) divided seeds into three biological classes according to the time for which they are capable of retaining viability under "good" storage conditions.

Recent investigation showed that the remaining fruiting trees of Cebu cinnamon in Cebu province are less than 50 individuals, which are only found in Central Cebu National Park, Nug –as in Alcoy and in the municipality of Dalaguete (personal communication). The difficulty of propagating Cebu cinnamon is a big problem to nursery managers. In fact, there is no sufficient information on its seed technology that is established yet. Efforts to generate knowledge on its propagation are therefore imperative; hence, this study was conducted to determine the viability of the seeds of critically endangered Cebu Cinnamon seeds (*Cinnamomum cebuense* L).

## **MATERIALS AND METHODS**

### **Environment**

The study was conducted in Cebu Technological University Argao, Campus central nursery located at the town of Argao, Cebu Province (Figure 1). The nursery has the existing green house and plots designed specifically for the study.



Figure 1. Map of Cebu showing the study area at the town of Argao, Cebu Province

### Seed Collection

Seeds were collected from Cebu cinnamon mother trees found in Nug –as, Alcoy, Cebu. Collected fruits were placed in a plastic container. Seeds were extracted from its fruits by maceration method. Extracted seeds were placed in a basin with water to remove the pericarp. The seeds were air dried at room temperature for three (3) hours. Dried seeds were placed in a closed plastic container in accordance with the number of weeks as specified in each treatment. One hundred pieces of dried Cebu Cinnamon seeds were placed in each treatment. Stored seeds were soaked for four (4) hours before sowing in the seed box.

### Seed Sowing

Mixture of 50 percent garden soil and 50 percent rice hull was placed in a 40 cm x 60 cm seed box as soil medium. Stored Cinnamon seeds were sown in the seed box and allowed to germinate for several number of days or month. Watering of seeds was done only if the soil is already dry to avoid damping off. Data on the number of seeds germinated was recorded every day.

### Research Design and Statistical Analysis

The study was conducted using the Randomized Complete Block Design (RCBD) which consisted of 9 treatments, as follows: To, (right after air drying); T1, (one week after drying); T2, (two weeks after drying); T3, (three weeks after drying); T4, (four weeks drying); T5, (five weeks after drying); T6, (six weeks after drying); T7, (seven weeks after drying); T8, (eight weeks after drying) with 3 replications. Data gathered were statistically treated using ANOVA at 5 percent

level of significance and further treated with Duncan's Multiple Range Test DMRT) to determine the sample that has significant difference among samples.

## RESULTS AND DISCUSSION

### Viability of Cebu Cinnamon Seeds

The germination of stored Cebu Cinnamon seeds are shown in Table 1. Germination of seeds occurred only in To, T1 and T2. No seed germination was recorded in T3 to T8. In control treatment (To) out of 100 seeds sown, only 17 seeds have germinated or 5.67 percent, 6 in T1 and only one (1) seed germinated in T2. The number of seeds germinated is only the seeds which could be considered as viable.

Based on ANOVA at five (5) percent level of significance, there is a highly significant difference among the treatments. Treatment control (To- right after drying) is highly significant compared with T1, T2 and the rest of the treatments. The result implies that the seeds of Cebu cinnamon must be sown directly in the seedbed right after air drying rather than storing them. According to Vander Pijl (1972) majority of the forest tree species have a comparatively short interval between seed – drop and germination, and in tropical species, germination is often extremely rapid.

Cebu cinnamon species has larger seeds with thinner seed coat. Therefore, it is expected that the species may have a rapid germination after it shortly drops into the ground. In addition, if the seeds stay longer in the soil, they may be sources of food to animals such as rats and other organisms because of its large size and thinner seed coat.

Empirical observation has noted that right after the seeds were dried at room temperature, they gradually split and wilt. The embryo of the Cebu cinnamon seeds becomes black then gradually rotten. These characteristics are the major problems that affect their viability. In addition, some of the seeds collected were already over matured and some contain dark spots in the seed surface which further causes for the minimal germination percentage. The seeds in treatment (T3) to treatment (T8) that are stored in containers for a certain number of weeks have exhibited rapid discoloration with several dark spots on its surface, shrinkage and splitting were also observed. These seemed to indicate a reduced viability of the seeds.

According to King and Roberts (1979), most short-lived recalcitrant tropical species are constituents of the moist tropical forests, where conditions conducive to immediate germination (high humidity and high temperature) are prevalent throughout the year.

Table 1. Seeds Viability of Cebu Cinnamon Species

Treatment	Total	Seeds Viability (%)
To (right after air drying)	17	5.67
T1 (stored for one week after drying)	6	2
T2 (stored for two week after drying)	1	0.33
T3 (stored for three week after drying)	0	0
T4 (stored for four week after drying)	0	0
T5 (stored for five week after drying)	0	0
T6 (stored for six week after drying)	0	0
T7 (stored for seven week after drying)	0	0
T8 (stored for eight week after drying)	0	0
Grand Total	24	8

Note: seed viability is measured based on the number of seeds germinated.

## CONCLUSION

Based on the results of the study, Cebu Cinnamon seeds should be sown directly in the soil medium right after drying to ensure increased viability; thus promote higher percentage of germination rather than storing them in a container for a longer period of time since they are very sensitive to temperature changes.

## RECOMMENDATIONS

Further studies are needed in order to verify the period of storing the seeds of Cebu Cinnamon species, its maturity when collected, and the adaptability of the plant in open and degraded forest.

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