VEGETATIVE PROPAGATION OF SELECTED BALETE SPECIES IN ARGAO, CEBU

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ABSTRACT

The study was centered on vegetative propagation of four Balete (Ficus) species in Argao, Cebu using marcotting and cuttings, as a step to growing Balete stocks to reforest denuded areas in Argao. Marcotted branches (up to 1cm dia.) were wrapped immediately after bark removal while cuttings of various sizes (1cm, 0.5cm diameter and terminal branches or twigs) at 25cm length were planted in shaded outdoor conditions and inside an improvised chamber. After series of experiments, results showed that Balete is more suitable for marcotting than the use of cuttings even with the application of Naphthalene Acetic Acid (NAA) on the latter. Rooting of marcotted branches vary with species. The earliest roots developed were observed on the 13th day of the 50-day observation period. Two species had 100% rooting success while the other two had only 46% and 38%, respectively. It is recommended that Balete be propagated through marcotting though other methods of growing cuttings should be explored, especially with collection of cuttings at the different times in a year.

Keywords: Balete, vegetative propagation, marcotting, cutting

INTRODUCTION

Balete (*Ficus sp.*) also known as fig belongs to family *Moraceae.* The genus *Ficus* is considered as one of the most widely distributed genera in the tropics (Felton *et al*., 2013). In the Philippines, Rojo (1999) listed 10 species of *Balete*. Many species of *Ficus* naturally grow in the forests but the mechanisms of their growth from seeds as well as through vegetative means are not very well explored because this group of plants do not posses good characteristics for timber due to its highly branched trunk, although in Bolivia some *Ficus* are subjected to cutting for timber because of their free-standing stems (Felton *et al*., 2013). The species can be found in a wide range of soil conditions and it has been observed to survive even on rocky substrates. One characteristic unique for Balete is being parasitic. Balete can grow on tree trunks where seeds germinate after being deposited through fecal droppings of frugivorous animals. As the tree anchors its roots on the ground and outgrows the host, the latter is killed.

Although Balete species have less economic importance due to poor stem characteristics, their ecological value is also very enormous because they provide food to many species of wildlife. Reports have shown that more than a thousand species of wildlife depend on the genus *Ficus* for food. Frugivorous birds and bats are known to feed on fruits of Balete (Ingle, 2003). Alburo (2009) also found out that flying foxes feed on Balete trees at night.

Other animals that feast on ripe Balete fruits include monkeys and some species of insects, which make these trees as keystone species.

Although normally left during logging activities, they also face danger of being cut when logged areas are converted into farmlands. The ecological importance of Balete and the large gap there is in its planting stock production, this study evaluated the possibilities of growing Balete through vegetative means using marcotting and cuttings. The study was conducted Propagate Balete using marcotting and cuttings and Determine which between marcotting and the use cuttings has higher success rates on vegetative propagation of Balete species.

Significance of the study

The study is viewed to help increase natural forest fragments in the area, which can provide food to frugivorous birds and bats. As the area is developed, it will help connect the natural forest fragments in the mountain range of Babayongan and Bulak in Dalaguete to Mount Lantoy in Argao, which form part of the New Conservation Areas of the country (DENR, 2012). Mount Lantoy is identified as an Important Bird Area (IBA) due to the presence of Cebu's endemic birds namely; Cebu flowerpecker (*Diceaum quadricolor*) and Black shama (*Copsychus cebuensis*) (Mallari *et. al*., 2001). Most recently, the Cebu Hawk Owl, a new species endemic to Cebu was also found in Mount Lantoy's lower eastern slope in Catang, Argao (Jakosalem *et al*., 2012).

MATERIALS AND METHODS

The study generally used two asexual propagation techniques namely marcotting and cutting. Branches with approximate diameter of 1cm or less were used in the propagation. The study used three species including an ornamental fig growing inside the campus. The selection of two other species was based on their abundance or availability in the area. Mother trees selected were found in the lowland of Argao (at CTU campus and near the public market) and in the barangays of Canbantug and Cansuje were Balete grow abundantly.

Marcotting. Four species of Balete were studied as to their response to marcotting as a method of asexual propagation. Selected Balete branches from 0.5 to 1.0cm diameter were girdled approximately 2-3cm. Moist soils was immediately placed at the girdled portion of the branch and then wrapped with transparent plastic. Marcotted branches were periodically inspected if roots have developed. Marcotted branches were cut and finally inspected after 50 days of marcotting. Rooted branches were transplanted in a 12.7X17.78cm polyethylene bags. Unnecessary branches were trimmed leaving only approximately 50cm long and roughly two-thirds of the leaves were also removed to reduce transpiration of marcots. Newly potted plants were placed under shady area for 2-3 weeks to minimize transpiration. Watering was made as the need arose. On the fourth week, plants were exposed to more sunlight for hardening. Watering is made minimal to condition the plants to adversities of weather conditions in the planting site (Milan, 2009).

Cuttings. Cuttings used were approximately 25cm long and of three size categories namely 1cm, 0.5cm and terminal branches (twigs). Series of experimentation were made such as the use Naphthalene Acetic Acid (NAA) at pure concentrate of ANAA to facilitate root development as well as the use of an improvised propagation chamber that would reduce transpiration.

In experiment 1, a comparative performance of two sizes of cuttings (1cm and 0.5cm) treated with NAA and control was conducted. The experiment was placed under the tree canopy, where treatments are not directly affected by sunlight but are exposed to heavy rainfall, if it occurs. In the experiment 2, NAA was still applied but three sizes of branches were used namely 1cm, 0.5cm and the terminal branches or twigs. In this experiment the set-ups were placed under a roofed area. Sun rays hit the treatments early in the morning but the treatments are protected from direct impact of rainfall. In experiment 3, the same variables in the second experiment were used but the treatments were placed inside an improvised propagation chamber. The chambers are exposed to sunlight about six hours a day.

Experimental Design

In marcotting, only a simple comparison of the three species being marcotted was the goal. However, in the use of cuttings, the series of experiments used Complete Randomized Design (CRD). All the experiments were replicated three times. The number of cuttings used per replication was 20 for experiment 1 and only 15 in experiments 2 and 3 because of the availability of cuttings as they were collected from the same mother tree. In experiment 1, the parameters considered were the species which include B1 = ornamental balete (fig) at CTU; B2 = balete growing the market; B3 = Balete growing in Canbantug and Cansuje; the size of branch namely Br1 = bigger branch (1cm dia.) and Br2 = smaller branch (0.5cm dia.); and the application NAA such that T_0 = no soaking in NAA and T_1 = soaking in NAA (pure concentrate of ANAA). In experiment 2 NAA was still used but only the terminal branches or twigs (Br3) were used. Finally, in experiment 3, all the three branches (Br1, Br2 and Br3) and NAA were used.

Collection and analysis of data

Data were collected using frequency counts and observations. Specifically data include the period for root development, the stress symptoms of marcotted branches and the degree of success in marcotting. Moreover, the survival rates were noted on the use of cuttings in propagation. Frequencies and percentages were used in presentation and analysis of data. ANOVA was not used in data analysis on two grounds (1) it seemed impractical to assign replications of marcotted branches per species because the number of branches marcotted per tree varies depending on which branches can be used; and (2) the survival of cuttings was very low with zero on most replicates.

RESULTS AND DISCUSSION

Marcotting

From the four species marcotted results showed variability of species response to marcotting (Table 1). Balete 1 and Balete 2 both have excellent

response to marcotting with all the branches rooted after 50 days. The other two species had success rates of less than 50%. Balete 4 got 46.5% while Balete 3 obtained the least with only 37.8%. Periodic monitoring of marcotted branches further revealed that Balete 1 is the easiest to propagate through marcotting with the roots becoming evident on the 13th day. On the other hand, only one marcotted branch of Balete 2 showed roots two weeks after marcotting. Balete 3 and 4 both have not exhibited root formation after two weeks instead, some branches of Balete 3 displayed signs of stress and weakening with some leaves turning to yellow. When the marcots were finally harvested, almost half of B3 branches died while that of Balete 4 was 30%. Further, about one-fourth of Balete 4 and 15% of Balete 3 did not form roots.

The rooting performance of Balete appeared to have been possibly influenced by water because the period when branches were marcotted was at the peak of summer season in the area (April 17-19, 2013), although upon inspection 15 days after marcotting the soils used to wrap the girdled branches were still moist. Both Balete 1 and Balete 2 are located in the lowland area while Balete 3 and 4 are both located in the upland. The extreme dry days would still have had negative impacts on the branches. The rooting performance of the four species could also be just the natural response to marcotting since not a single vegetative propagation technique works for all plant species. For asexual propagation of cashew nuts for example, Valsalakumari *et al*., 1985 discovered that varying performance the species to vegetative propagation varies at different times of the year to activity of the shoots and the season. In their investigation the months of February to April are better for air layering because the shoots are active while grafting and budding had better results during monsoon season.

Table1. Success rates (%) of the four balete species 50 days after marcotting.

Species	Rooted	Dead	No Roots
B1	100	0	0
B2	100	0	0
B3	37.8	47.3	14.9
B4	46.5	30.2	23.3

Cuttings

The use of cuttings in the propagation of Balete showed very low survival (Table 2). After three experiments, which were conducted from April to July, results remained unpromising to grow balete cuttings. This however suggests that further testing can be made covering the remaining periods of the year because in some plants propagated by cuttings, shoot development, cutting vigor and number of leaves are significantly affected by the periods when cuttings were collected (Haile *et al*., 2011).

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Table 2. Total survival rates of cuttings (frequencies) in different experiments.

Treatments	Conditions under consideration		
	Experiment 1	Experiment 2	Experiment 3
B1Br1T0	0	not applied	0
B1Br2T0	0	not applied	0
B1Br3T0	not applied	1	0
B1Br1T1	3	not applied	0
B1Br2T1	1	not applied	0
B1Br3T1	not applied	0	0
B2Br1T0	1	not applied	0
B2Br2T0	0	not applied	0
B2Br3T0	not applied	0	0
B2Br1T1	8	not applied	0
B2Br2T1	1	not applied	0
B2Br3T1	not applied	0	0
B3Br1T0	0	not applied	0
B3Br2T0	0	not applied	0
B3Br3T0	not applied	0	0
B3Br1T1	0	not applied	0
B3Br2T1	0	not applied	0
B3Br3T1	not applied	0	0

CONCLUSION

Based on the results of the study, the following generalizations are drawn:
1. Balete can be asexually propagated using marcotting.
2. Different species of Balete have varied rooting success when marcotted.

RECOMMENDATIONS

It is suggested that further investigations should be made with due consideration on some factors not focused on this study:
1. Marcotting of Balete branches should also be done at different times of the year to verify if season or water stress has strong influence on rooting success.
2. Sterilize soil media and apply fungicide to verify if cuttings can be used to propagate Balete.
3. Placement of propagated cuttings inside a standard propagation chamber where conditions are highly controlled.

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