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Germination of Kamagong (*Diospyros blancoi* A. DC) seed soaked in different levels of Alpha Naphthalene Acetic Acid (ANAA)

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Abstract

Kamagong (*Diospyros blancoi* A. DC) is a commercially significant species that have been listed as critically endangered in the country due to unreported logging and overuse of this native trees. In this study, different levels of alpha naphthalene acetic acid were used to soaked the *D. blancoi* seeds and determine its germination. The study laid out in Complete Randomized Design (CRD) with four treatments (0 ml, 5 ml, 10 ml, and 15 ml) of levels of ANAA and replicated three (3) times. Each treatment comprises of 30 seeds with10 seeds per replication. Over a number of weeks of observation, germination percentage and germination rate were used as a parameter in determining germination. The study results a highly significant difference in treatment 2 (5 ml of ANAA) yielded the highest germination percent and mean germination rate with Pr (>F) values of 0.0131 and 0.0099 respectively. Hence, the study concluded that germination of *D. blancoi* seeds using ANAA produced a good result at the concentration levels of 5 ml. Furthermore, this concentration is recommended for seed germination of *D. blancoi*.

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Introduction

Diospyros blancoi A. DC. commonly known as Velvet Apple, Velvet Persimmon, Kamagong from the genus *Diospyros* of ebony trees and persimmons (Lim, 2011). It produces edible fruit with fur-like covering skin that turns into color purple or maroon. The fruit has a soft, creamy, pink flesh, with a taste and aroma comparable to peaches (Pobar, 2013). In the Philippines, the smooth and sturdy wood of *D. blancoi* is used for manufacturing handicraft, carving and distinct type of furniture due also to its known dark color. In addition, Kamagong is also popular for martial implements such as bokkens and eskrima sticks (Hung *et al*., 2016).

It has been demonstrated that the leaves of Velvet Apple trees contain fatty esters of α- and β-amyrin as well as isoarborinol methyl ether. The α- and β-amyrin is known to have a property of antimicrobial activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans*, *Staphylococcus aureus*, and *Trichophyton mentagrophytes* but noticed as not beneficial versus *Bacillus subtilis* and *Aspergillus niger*. Additionally, the distinct amyrin mixture showed analgesic and anti-inflammatory abilities (Ragasa *et al*., 2009).

The alarming rate of habitat loss due to diminishing forest cover has led to a critical endangerment of native tree. Among these threatened species is *D. blancoi* A. DC, commonly known as Kamagong, an indigenous, slow-growing tree of the Philippines (Morada and Santos, 2023). Recognized for its valuable wood, Kamagong has been heavily logged, resulting in its classification as a critically endangered species by the Department of Environment and Natural Resources (DENR DAO 2007-1). In response to this urgent conservation need, this study investigates the germination of Kamagong seeds when soaked in varying concentrations of Alpha Naphthalene Acetic Acid (ANAA). The objective is to enhance the propagation and survival of this vital native tree species, contributing to its preservation and the restoration of the Philippines' forest biodiversity.

Specifically, this study sought to:

1. Determine the germination of Kamagong (*Diospyros blancoi* A. DC) seeds in terms of germination percent and mean germination rate.
2. Determine which levels of Alpha Naphthalene Acetic Acid (ANAA) yielded the highest germination percent and mean germination rate of *D. blancoi* seeds.
3. Determine the significant difference on the germination of *D. blancoi* seeds treated with different levels of Alpha Naphthalene Acetic Acid (ANAA).

Materials and methods

Description of the study area

The study was carried out at Barangay Tulungatung, Zamboanga City, Philippines. The area has an elevation of 16.6 meters above sea level and located between 6° 58' North and 121° 58' East (Tulungatung, Zamboanga City Profile – PhilAtlas, 1990). The area is seventeen (17) kilometers away from the city proper and experiencing an average temperature from 30.86 to 33.61 degree Celsius, 1.4 mm average mean rainfall while the area composed of different vegetation from trees, bushes to grass (Yeo, n.d.).

Research design

The study was laid out in a Complete Randomized Design (CRD) with four treatments such as Treatment 1 (control), Treatment 2 (5 ml), Treatment 3 (10 ml), and Treatment 4 (15 ml) respectively, and replicated three times. Each treatment corresponds to the level of Alpha Naphthalene Acetic Acid (ANAA) where the seed soaked. Simple random sampling was used by draw lots to give equal chances on all screen seeds to utilized in the study.

Preparation of seeds, soil and potting

The seeds of *D. blancoi* were collected from the natural forest area of Davao City, Philippines. The selection of mother tree was considered in terms of phenotypically superior to ensure the better quality of trees to produce. The collected seed were screen through simple seed viability test. All seeds were placed in a pail of water, then seeds that sank were

considered the viable while all floating seeds were discarded for the reason that might have a greater chance not to germinate.

Garden soil was utilized in this study. The soil was filtered and cleaned in a big cooking strainer and have been sun dried for two days. After cleaning and drying, these were placed and equally distributed in all twelve (12) trays. Trays size is equivalent to fourteen inches in length and six inches in width. Each tray with soil was composed of 10 seeds sown in it.

Preparation of ANAA and seed soaking

The water used in the mixture and preparation of different levels of ANAA was distilled water. This also applied for control group. Two (2) liters of distilled water is used per treatment and replication that were composed of different levels of Alpha Naphthalene Acetic Acid such as the 5 ml, 10 ml, and 15 ml. The mixing of two liters water in the growth hormones (ANAA) was instructed and followed in the manual of ANAA product to attain the specific levels of its concentration. Once the mixture done, these labeled according to its levels of concentration as applied in this study.

After the preparation of different levels of ANAA, the seeds were then soaked in control (tap water), 5 ml, 10 ml, and 15 ml respectively. The duration of soaking lasted for thirty minutes for all the treatments including the control group, then treated seeds were immediately sown in the different trays containing garden soil.

Data collection and analysis

To determine the germination of Kamagong (*D. blancoi*) seeds the data were collected every day. All the development for seeds were being noted and recorded. The records were tabulated and presented for data analysis.

All data were arranged and analyzed statistically using Analysis of Variance (ANOVA) arranged in a completely randomized design (CRD) using the STAR (Statistical Toll for Agricultural Research) software. Significant differences among treatment means were analyzed using the .05% level of significance. The following formula were used:

GP = Germination percentage at the end of the test, DGs = Daily germination speed, obtained by dividing the cumulative germination percentage by the number of days since sowing, N = the number of daily counts, starting from the date of first germination and 10 = Constant

Mean germination rate (MGR) was calculated as MGR = $\sum F / \sum FX$ where F = Number of germinated seeds on a particular day and X = Number of days taken for seeds to germinate.

Results and discussion

Germination percentage

Diospyros blancoi seeds yielded the highest germination of 70% when treated with 5 ml (treatment 2) compared to all other treatment applied. This show that lower concentration of ANAA specifically at 5 ml give the best performance in germination percentage. Then followed by treatment 1 (control group) obtain 56.67% while seed treated with 10 and 15 ml (treatment 3 and 4) produced the lowest germination percentage of 53.33% and 33.33% correspondingly. This indicates that there is a significant difference between the treatment applied in the analysis of variance where Pr (>F) value is 0.0131 (Table 1) which is lower than the significant level of 0.05 as commonly applied for statistical significance in scientific research studies. It implies that the application of ANAA in a small amount of concentration helped the germination process of the seeds by soaking for certain duration. Thus, findings suggested that a 5 ml treatment was the most effective among the tested concentration for promoting the germination of *D. blancoi* seeds. 5 ml amount of concentration is an optimal point where the treatment positively influences germination, beyond which as in the case with 15 ml the effect becomes unfavorable.

Table 1. Analysis of variance for germination percentage

	DF	Sum of Square	Mean Square	F value	Pr (>F)
Treatments	3	2066.6667	688.8889	6.89	0.0131
Error	8	800	100		
Total	11	2866.6667			

Table 2. Analysis of variance for mean germination rate of the *D. blancio* A. DC seeds

Source	DF	Sum of Square	Mean Square	F value	Pr (>F)
Treatments	3	0.0982	70.327	7.62	0.0099
Error	8	0.0344	0.0043		
Total	11	0.1325			

Mean germination rate

The result for mean germination, the seed treated with 5 ml (treatment 2) had produced the highest rate of 0.4, while this followed by untreated seeds generating 0.29 rate of mean germination. Thus, T3 (10ml) and T4 (15 ml) only produced a rate of 0.21 and 0.15 respectively, while the latter as the lowest mean germination rate in the study. Furthermore, the findings suggested that the optimal concentration of ANAA (5ml) optimized the germination rate of *D. blancoi* seeds, whereas a concentration of 15 ml and above may disrupt the germination process of the seed. This emphasized the relationship between the levels of concentration of growth promoters and the physiological response of seeds and their growth development. Hence not all seeds can positively respond to ANAA concentrations like in Loquat (*Eriobotrya japonica*) seeds where ANAA chemically thinned the seeds which causes ovule or embryo abortion and inhibits fruit set and ovule fertilization (Chen,2023).

Moreover, the results exhibited a highly significant difference at 0.05 level of standard level of significance difference generating Pr (>F) value of 0.099 (Table 2). This means that a difference in germination rates among the treatments is not due to a random chance, but the effect of ANAA levels of concentration in hastening the germination rate of seeds. The findings emphasized the significance of understanding what plant hormones such as ANAA affect seed germination. Growth hormones can increase germination rates considerably, but their effects are dependent on the levels of concentration applied, meaning that too little or too much of them may be unfavorable to the growth development of the seeds.

Conclusion

Based on the result of the study, the following conclusions were given:

1. The germination of Kamagong (*Diospyros blancoi* A. DC) seeds using Alpha Naphthalene Acetic Acid (ANAA) produced a good result at the concentration level of 5 ml (T2) for both parameters such as germination percentage and mean germination rate.
2. The use of Alpha Naphthalene Acetic Acid (ANAA) at 15 ml (T4) and beyond had the unfavorable yield for germination rate.
3. The right amount of concentration of growth hormones effectively hastens the germination and growth development of the seed.

Recommendation

Based on the outcome of the study, the researcher recommends the following:

1. The application of 5 ml level of ANAA concentration is recommended for seeds germination of *Diospyros blancoi* A. DC;
2. Consider using other parameter to observe further its growth development as response to 5 ml level of ANAA concentration; and
3. Further research may conduct similar to this study applying to other similar seed structure or other species while extending the observation period.

References

Chen SY, Huang PH, Shih MK, Wu CC, Hsieh CW, Chen MH, Hou CY. 2023. Functional evaluation of loquat (*Eriobotrya japonica* Lindl.) flower water extracts and its potential use in tea. Journal of Food Processing and Preservation **2023**, 1–11. https://doi.org/10.1155/2023/1188178

Department of Environment and Natural Resources [DENR]. 2017. Updated national list of threatened Philippine plants and their categories. https://elibrary.bmb.gov.ph/elibrary/wp-content/uploads/2023/05/dao2017-11.pdf (Retrieved July 29, 2024)

Hung SF, Roan SF, Chang TL, King HB, Chen IZ. 2016. Analysis of aroma compounds and nutrient contents of mabolo (*Diospyros blancoi* A. DC.), an ethnobotanical fruit of Austronesian Taiwan. Journal of Food and Drug Analysis **24**(1), 83–89. https://doi.org/10.1016/j.jfda.2015.08.004

Lim TK. 2011. *Diospyros blancoi* . In Springer eBooks, 421–424. https://doi.org/10.1007/978-94-007-1764-0_56

Morada JG, Santos RA. 2023. Declining suitable areas of the threatened Philippine native medicinal tree Kamagong (*Diospyros blancoi* A. DC.: Ebenaceae) in response to changing climates. Doctoral dissertation. http://dspace.cas.upm.edu.ph:8080/xmlui/handle/123456789/2665

PhilAtlas. 1990. Tulungtung, Zamboanga City. https://www.philatlas.com/mindanao/r09/zamboanga-city/tulungatung.html (Retrieved June 11, 2024)

Pobar R. 2013. Enhancing the use of value-added products from underutilized fruit of the endangered mabolo (*Diospyros blancoi*) tree. International Journal of Environmental and Rural Development **4**(1). https://iserd.net/ijerd41/41100.pdf

Ragasa CY, Puno MRA, Sengson JMAP, Shen C, Rideout JA, Raga DD. 2009. Bioactive triterpenes from *Diospyros blancoi* . Natural Product Research **23**(13), 1252–1258. https://doi.org/10.1080/14786410902951054

Yeo RA. n.d. Critique Tulungatong (Yeo). Scribd. https://www.scribd.com/document/526123714/Critique-Tulungatong-Yeo