

Conference Paper

Shelf Life of *Artocarpus lowii* King's Seeds And Its Viability

Frisca Damayanti and Fitri Fatma Wardani

Center for Plant Conservation Botanic Gardens – The Indonesian Institute of Science Jl. Ir. H. Juanda 13 Bogor, Indonesia 16003

Abstract

Artocarpus lowii King is a species of Moraceae family members. This species is widely utilized by people as food, medicine, and timber. *A. lowii* is propagated by seed. *A. lowii* seeds belong to the recalcitrant seeds, which have a short shelf life. Therefore, it is necessary to find the right storage method for storing *A. lowii* seeds, in order that *A. lowii* seed has longer shelf life. The purpose of this study was to determine the viability *A. lowii* with storage time treatments and find the efficient storage method. *A. lowii* seeds were stored by covering the seeds with mosses in a jar. It was taken 40 seeds every week for viability test. The 30 seeds have planted in the sand media and 10 seeds for grain moisture content calculations. Results of this study were water content of *A. lowii* seed on 0 wk to 7 wk increased, and the viability of *A. lowii* seeds have still high enough to 9 wk around 60%. Therefore, seed storage methods using mosses can be used as an alternative to extend the shelf life of *A. lowii* seed.

Corresponding Author:

Frisca Damayanti
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1. Introduction

Artocarpus lowii is one of the species in the Moraceae family. It is widely used by people as food, medicine, and timber [1]. For its potential benefits, it needs to be propagated to sustain its life cycle. Considering the decreased of cultivated land, one of the *Artocarpus* genus propagation method is by seed [2, 3]. *A. lowii* seeds belong to the recalcitrant seeds, which have a short shelf life [2]. Recalcitrant seeds tend to lose their viability over a longer storage time [4]. So after harvesting period, they should be treated immediately. Therefore, it is necessary to find appropriate and efficient storage method for *A. lowii* seeds, so they have a longer shelf life. The purposes of this research are to find an efficient storage method for *A. lowii* seeds and know its viability with various storage duration treatments.

2. Material and Methods

Artocarpus lowii seeds were taken from trees collection of Botanical Center for Plant Conservation—LIPI with physiological maturity condition. This research was conducted



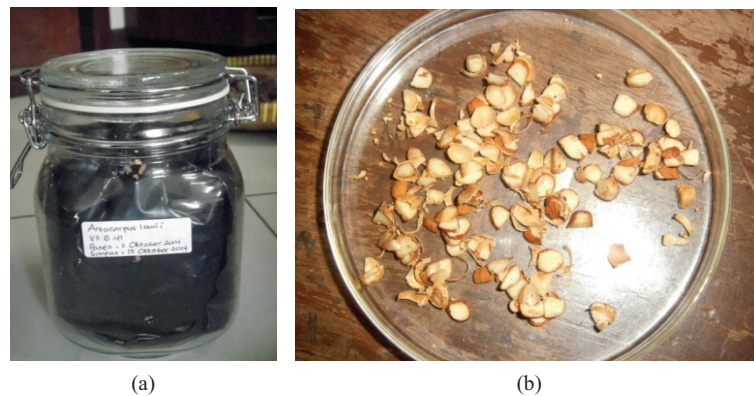


Figure 1: (a) Glass jar containing moss media; (b) Slice of *A. lowii* seeds.

in the Seeds Bank's greenhouse, Center for Plant Conservation Botanical Gardens—LIPI in October 2014 until December 2014.

The seeds that have been cleaned, stored in a glass jar containing moss. The seeds were stored for 3 mo. Every week the seed of *A. lowii* were taken 40 seeds, 30 seeds were germinated and 10 seeds were used to determinate the water content. Measurements of water content used drying method. Petri dish that will be used for the measurement of water content were heated in the oven 130°C for 30 min to 60 min. In other hand, the seeds were smashed or thinly sliced. Then the petri dish was weighed to get the weight of the cup (M_1). The sliced seeds were put into a petri dish to obtain the initial weight of the seeds (M_2). Then the seeds were put into the oven with the temperature 105°C for 18 h. After 18 h, the seeds and the petri dish were weighed to obtain the final weight of beans (M_3). Methods of storage treatment and measuring the water content refer to Figure 1. The water content can be obtained from the formula:

$$\text{Water content} = \frac{M_3 - M_1}{M_2 - M_1} \times 100\% \quad (1)$$

The experimental design of the research used completely randomized design (CRD) one factorial. Thirty seeds were germinated on the sand media every week. Parameters measured were seed viability and seedling characteristics. Seed viability parameters can be obtained from the formula:

$$\text{Viability} : \frac{\text{number of germinated seed}}{\text{number of planted seed}} \times 100\% \quad (2)$$

Seedling taken from each treatment were washed with water and dried, after that, seedling were characterized. Radicle length, epicotyl length, number of leaves, fresh weight and dry weight were measured. For the measurement of the final weight of seedlings, seedlings were put in the oven with a temperature 60°C for 72 h. Data were analysed using Analysis of Variance, the software used was Statistical Tool for Agricultural Research (STAR Nebula).

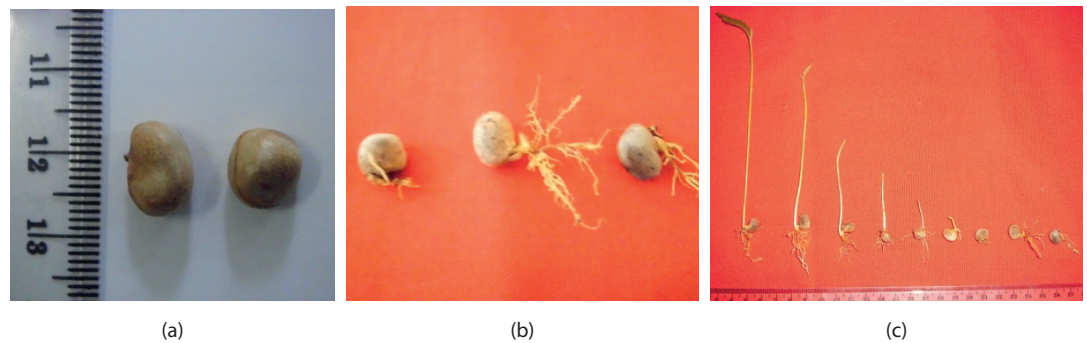


Figure 2: (a) *A. lowii* seeds; (b) Seed begin to germinate; (c) Germination pattern of *A. lowii*.

3. Result and Discussion

(A) *lowii* seed have round to oval shaped. The color of *A. lowii* seeds is brownish white. The average of weight was 0.3 g, 9.8 cm in length, and 6.1 cm in diameter. The seeds have water content about 27.25%. *A. lowii* seeds belong to the recalcitrant seeds [2]. Therefore, the aim of this research is to get efficient storage methods using moss to maintain its viability. The seeds, seeds begin to germinate and germination pattern of *A. lowii* refer to Figure 2.

The factors can maintain the viability of the seed during storage, especially in recalcitrant seeds, such as temperature, humidity, moisture content of the seeds and the container store [5]. According to King and Roberts [6], storage conditions that must be considered for recalcitrant seeds, such as preventing of drying, pressing microbial contamination, prevent germination and maintain an adequate supply of oxygen. *A. lowii* seeds stored in glass jars containing media moss to keep moisture of seeds. The humidity of storage container was high, it will maintain water levels in the seed.

Table 1 is showed that seed viability of *A. lowii* which stored in glass jar with moss media from 1 wk until 10 wk were still high. It indicates that the length of the seeds stored in glass jar containing moss does not affect the viability of the seed. The highest viability of *A. lowii* contained in seeds stored at the 4 wk. *A. lowii* seed viability did not decrease significantly until 10 wk. The viability of *A. lowii* seed had remained high due to the water content of seeds was still at high too. In addition, the seeds germinated in a suitable environment for growth, it germinated in greenhouse which the condition of light, temperature, oxygen, and water were well. According to Pennstate [7], the factors affecting germination are water, oxygen, temperature, and light.

The moisture content of *A. lowii* seed did not decrease on the treatment of seed storage, even the seed moisture content tended to increase from week to week. The high of water content in the seed because the seed of *A. lowii* was stored in sealed glass jars containing moss media that have a fairly high humidity.

Time	Water content (%)	Number of germination (seed)	Viability (%)
Wk-1	27.25d	22	73.33
Wk-2	28.71d	17	56.67
Wk-3	38.52bc	20	66.67
Wk-4	35.62cd	27	90.00
Wk-5	33.20d	25	83.33
Wk-6	34.47cd	24	80.00
Wk-7	41.16ab	19	63.33
Wk-8	42.07a	21	70.00
Wk-9	36.47cd	17	56.67
Wk-10	40.66ab	18	60.00

Information: The same letter indicates no significant difference in the level 5% at DMRT test.

TABLE 1: Water content and seed viability of *A. lowii*.

Time	Radicle (cm)	Epicotyl (cm)	Number of leave (unit)	Fresh weight (g)	Dried weight (g)
Wk-1	4.52	14.12	2.6b	0.81c	0.21abc
Wk-2	6.40	15.98	3b	1.13ab	0.27a
Wk-3	4.94	16.24	3b	0.92bc	0.21abc
Wk-4	5.10	16.40	2.8b	1.01abc	0.15cd
Wk-5	3.78	16.72	3b	0.70bc	0.14d
Wk-6	4.40	17.70	3.6a	1.30a	0.23ab
Wk-7	5.80	15.30	3b	0.96bc	0.21abc
Wk-8	4.80	14.50	3b	0.81cd	0.23ab
Wk-9	6.50	14.58	3b	0.96c	0.15cd
Wk-10	3.14	15.40	3b	0.87bc	0.18bcd

Information: The same letter indicates no significant difference in the level 5% at DMRT test.

TABLE 2: Characteristics of seedling *A. lowii*.

Moss is a medium which is derived from a kind of Bryophyte, namely Sphagnum. Moss is able to absorb water and retain water very well, and it is able to maintain the humidity in the media. Moss has much cavities, it has good drainage and aeration [8]. Therefore, the seeds were stored in a jar containing moss will retain moisture, the moisture content in the seeds is not reduced, and the seed viability remain high, despite it has been stored for 3 mo.

Table 2 is looked the characteristics of seedling that grows on time variety of planting. Radicle, epicotyl, number of leaves, fresh weight and dry weight quality was not decrease. It indicates that *A. lowii* treated seed storage duration had produced good

seedling results. Storage duration was not too affected in radicle, epicotyl length, number of leaves, fresh weight and dry weight.

4. Conclusion

From this study, it can be concluded that *A. lowii* seed had good viability even when it was given treatment storage duration, this is because the water content in seeds *A. lowii* was maintained up to the 10 wk of storage. The characteristic of seedling from each treatment was produced good seedlings. Therefore, giving moss in the storage store can be used as an alternative method of seed storage duration *A. lowii* that are recalcitrant seed.

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