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Ex-situ Conservation of *Endospermum malaccense* (Sesendok): Tree Selection, Wilding Handling and Seed Germination

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Abstract

Endospermum malaccense or locally known as Sesendok is one of the timber species belong to the family of Euphorbiaceae. It has a good characteristic in term of growth performance and wood properties similar with rubberwood. From the previous research, it has the potential to be a timber replacement to the rubberwood since the resource of rubberwood is decreasing. Therefore, the conservation of the superior genotype of Sesendok is necessary to take place in order to preserve the gene source of superior genotype. The process to conduct the ex-situ conservation must follow the scientific procedure to ensure the material taken can survive in the new environment. The selection of the Sesendok was conducted at three different populations. The selection of superior mother trees was based on the phenotypic and also wood properties. The establishment of ex-situ conservation (germplasm) for Sesendok will ensure the gene bank material resources keep well conserve. The result of survival rate for the wilding varies from 5% to 30% based on the height and size of the wilding. While for the seeds collected, germination rate varies from 80-95%. Ex-situ conservation and planting of Sesendok in large scale would be the answer to preserve the selected genotype for future breeding program and ensure sustainable supply of raw material to the industries.

1. Introduction

Endospermum malaccense or locally known as Sesendok is one of the timber species that belong to the family of Euphorbiaceae. It is a dioecious large tree and it was among the most important species in the inland forest [1]. Sesendok can grow up to 40 meters and can achieve 3 meter dbh. Timber from sesendok shows the good wood characteristic as like rubber wood and it also had high growth rates. It can be a new species for forest plantation and can grow in the open area [2]. It believes can be a replacement to the rubber wood since the demand for rubber wood is keep increasing while the resources of rubber wood keep decreasing [3].

There are two variety of sesendok. It has the different in term of leaf shape and genetic. The variety A has the smaller seed than variety B. But from the germination test, the variety B had shown better result than variety A. In this study, variety B is being

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chosen due to the ability to germinate and has a better survival for the wilding [4].

There are needs to conserve a valuable tree for the future needs. The ultimate approach to conserve the timber is trough ex-situ conservation. The continuous logging of natural forest is also threatening the supply of the tree in the future [5]. Ex-situ conservation of wild plant species such as sesendok through seed banking is currently being recommended as a conservation strategy to help preserve the biological and genetic diversity of wild plants [6]. Therefore the ex-situ conservation had been taken for sesendok in order to provide the best planting stock to the forest plantation. Ex-situ conservation is a method to help preserve the biological and genetic diversity of wild plants. It is important to be done for the indigenous species that have potential as a planting material to the forest plantation. It must follow the well built strategy to help preserve the biological and genetic diversity of wild plants [6]. Ex-situ conservation involves in sampling, transfer and storage of the selected species from the wild to the new environment, [7].

The collection of sesendok needs to be managed carefully according to strict scientific and horticultural standards to ensure their value for conservation purposes [8]. It is include the handling method from the forest stand to the ex-situ site. The success of the establishment ex-situ conservation depend on the selection of the tree, the method on how we take the sample, sample propagation (include seed germination), and also the setup of germplasm.

2. Materials and Methods

2.1. Identifying the Population

Based on the RMK-10 fund, three site of population were selected to make the inventory of the sesendok. The three site populations were Lentang Forest Reserve, Ulu Tranum Forest Reserve and Gunung Tampin Forest Reserve. The selection of the population was based on the abundance of the sesendok on the particular site. There are two variety of sesendok. The variety B is preferred than variety A based on the wood density and the viability of the seed [4].

2.2. Selection of the Superior Mother Tree

The criteria for the sesendok to be selected as the superior mother tree were based on the tree scoring and also the wood density-fiber length features. For the tree scoring, it has the percentage of contribution in every feature. The highest score will show the best appearance and characteristic. First is the straightness of the tree. It contributes 30% of the scoring. Next is height which contributes 20%. 15% is for bole shape. Dbh contributes 10%. While the clear bole height, size of diameter crown, branch size and degree of the branch, which are contribute 5% respectively. Lastly, 2.5% for forking shape and 2.5% for dominant crown class. The sum of the score for respective tree will show the selection result. The tree with the higher score will be chose. For the wood density-fiber length properties, the samples were taken by using the wood corer and wood chisel. All the samples will be analyzed and compare among the tree. High wood density and good fiber length are also the criteria to be considered for selecting the tree.

2.3. Seeds or Wildings Collection and Handling

Seed and the shoot were collected by climbing the tree. It is necessary to get the fresh matured seed and fresh shoot to ensure the seeds and shoot are not being rotten and wilt. The seed and shoot collected were kept in plastic bag and tied. While for the wilding, it needs to be handle properly because it is still fragile and the root is very sensitive. The wilding needs to be taking out from the ground with the soil without disturbing the root. After that, it needs to be put into the plastic bag or the container. All the samples were put into the cool box to keep the freshness. Each bag contain with the sample must not too full to avoid the sample to be broken. This is very important to avoid dehydration to the sample [9].

2.4. Nursery Stage

Seeds were sown in the germination bed. After the seeds had germinated, all the seedlings will be transplant into polybag contain mixture media (soil, sand, compost). Cuttings were propagated in the cutting bed as soon as possible to maintain the freshness of cutting. The rooting medium on the cutting bed is river sand and the rooting hormone also applied to the cutting [10].

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3. Results and Discussion

From the inventory of the trees, the selection was based on the tree scoring and wood density-fiber length. The score for selected trees is in range of 80-90%. 30 stands were selected based on the scoring. Most of the sesendok show a good characteristic in term of straightness and size. It is also have a good growth performance for planted in a field [2.11]. According to the [3] sesendok is extremely easy to be treated with chemicals (fire retardants or wood preservers) and it has excellent working properties nailing. These characteristics make the sesendok suitable to be used as a material for producing fabrication of wood furniture or wood-based products such particleboard, plywood and veneer. Since these trees were located at the natural forest, the height of the trees had to be concerned. The height of the trees can up to 30-40 meters. Thus, the uses of climbers are needed to collect the samples [12].

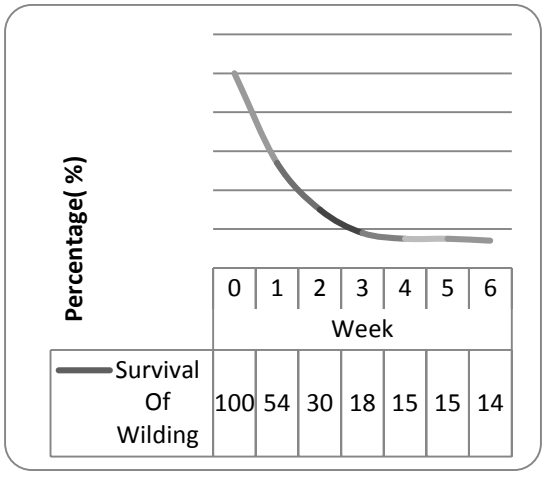

Figure 1: Survival of wilding sesendok.

Ex-situ conservation through wilding collection gives a low survival rate [13]. There is only 5% of survival for the wilding collection for the two-leaf stage wilding. While for the 20 cm and above, the survival rate was 10-20% (refer with: Fig. 1). Low survival rate for wilding was probably due to several factors. The root system for two-leaf stage wilding is very fragile, has less root hairs, easily dehydrated and hence poor recovery after being potted. It is also observed that they were prone to insect attack due to the palatability of young plants. It is also poses high sensitivity for adaptation to the new environment.

While for the seeds collected, germination rate varied from 80-95% (refer with: Fig. 2). Selecting high quality seed prior to sowing could improve germination rate. [9] The seeds start to germinate after three to eight weeks and it continues until all the viable seeds germinate. The seeds need time to soften and break the outer coat. From the graph, it needs 3 weeks to germinate rapidly after the outer coat is broken. [14] Further research need to be done to fasten the time for the seed to germinate without remove the outer coat.

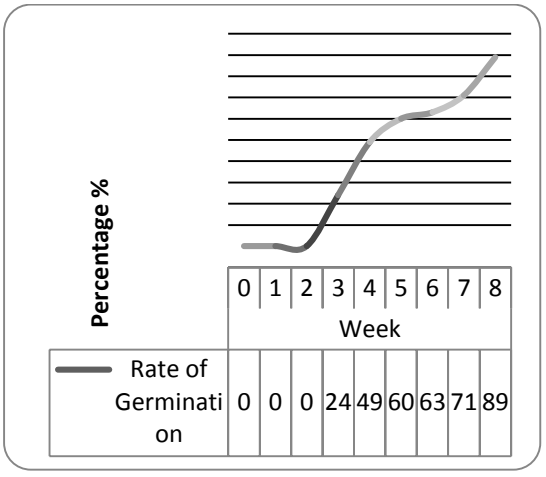

Figure 2: Rate of Germination sesendok.

4. Conclusion

Good handling and management of the wildings and seeds after harvesting from the forest is vital to ensure success in ex-situ conservation. Shoot cutting need to be planted as soon as possible to avoid the dehydrated of the cell. The samples for tissue culture were also need to be treated in a proper way to avoid the sample dehydrated and contaminate.

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