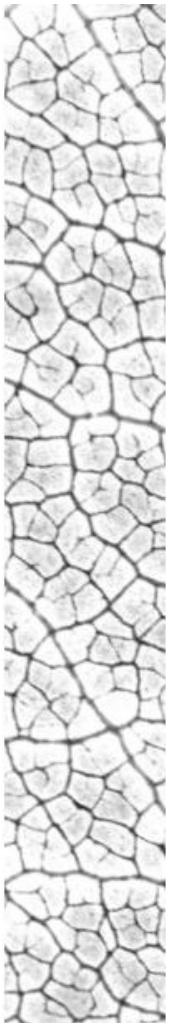

EurAsian Journal of BioSciences
Eurasia J Biosci 14, 81-83 (2020)

Breaking dormancy of seeds (*Enterolobium cyclocarpum* Grieb) using AC water media

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Abstract
Generative propagation using seed media, especially sengon buto (*Enterolobium cyclocarpum* Griseb), has many obstacles associated with low germination. Information about the right treatment of breaking the dormancy (PD) is very necessary. This study aims to describe the percentage rate of breaking dormancy. In this study, seed samples were treated by selecting seed weighting > 90 grams, seed solarization, soaking using AC water media with different length of time: PD 24 hours, PD 48 hours, PD 72 hours and PD 96 hours. Reaction of seed weight to media soaking time would be analyzed. The use of AC water media, different soaking time and seed weight resulted in a rate of percentage of seed dormancy breaking of 73%-87%, the best time to soak the seeds were 2-3 days and there was an increase in seed mass. The perfection of the physical shape of the seeds, the accuracy of the time to soak the seeds and the weight of the seeds had a positive effect for the rate of percentage of dormancy breaking.

Keywords: seed *Enterolobium cyclocarpum* Griseb, AC water, dormancy, seed mass

Sukariyan, Marjenah, Wawan Kustiawan, Wahjuni Hartati (2020) Breaking dormancy of seeds (*Enterolobium cyclocarpum* Grieb) using ac water media. Eurasia J Biosci 14: 81-83.

INTRODUCTION

Generative propagation of plants using seeds must go through a series of treatment processes (Bajang et al. 2015). Dormancy in each individual seed plant has different characteristics among others, from the size of the seeds, the thickness of the seed coat, the quality of seeds, the initial treatment of seeds and the external environment which greatly affects the process of breaking a seed dormancy (Utami et al. 2007). Water has an important role in activating embryonic cells in the seeds, softening causing the embryo to expand at the point of growth (Ai S.N et al., 2010; Batukaev et al. 2019, Ugbede Itodo 2019, El-Shahabyet al. 2019).

Based on the results Chacko et al (1997), Sengon Buto seed (*Enterolobium cyclocarpum* Griseb) germination percentage (13%-31%). Furthermore Mahendra (2018), the depth of planting sengon buto seeds (*Enterolobium cyclocarpum* Griseb) with weights> 0.90 grams and above, gave a significant effect of germination growth. The sengon buto plant (*Enterolobium cyclocarpum* Griseb) is a fast-growing tree, including in the family Fabaceae, having seeds with thick skin, so it has obstacles in generative plant propagation. The thick condition of the seed coat is suspected to prevent the embryo from germinating (the seed experiences dormancy). Sengon buto seeds are 1.1-2 cm long and 0.8-1.3 cm in diameter with hard skin (Nurhasybi et al., 2010). From the description above shows sengon buto seeds (*Enterolobium cyclocarpum* Griseb) in the process of generative propagation of plants experiencing many obstacles.

The information about the treatment of the process of breaking dormancy on sengon buto seeds is needed to produce the maximum percentage of germination. Therefore a study of breaking down sengon buto seed dormancy (*Enterolobium cyclocarpum* Griseb) using AC water as a media to accelerate germination.

METHODS

Samarinda, Polytechnic Silviculture Forest Laboratory. The research material was sengon buto seed (*Enterolobium cyclocarpum* Griseb) which was selected for seed weighting > 90 gram to be seeded and carried out solarization. Breaking of seed dormancy, first by using AC water with different times, namely: 1. AC water for 24 hours, 2. AC water for 48 hours, 3. AC water for 72 hours and 4.The AC water for 96 hours. Data analysis was carried out descriptively.

Received: September 2019
Accepted: January 2020
Printed: February 2020

Table 1. Percentage of seed dormancy breaking (*Enterolobium cyclocarpum* Griseb) weighting >90 grams with perfect shape

Soak Time (Hours)	Percentage Dormancy		
	Healthy Seeds	Fixed seeds	Rotten seeds
24	23	77	0
48	73	27	0
72	87	10	3
96	80	0	20

Table 2. Percentage of seed dormancy breaking of (*Enterolobium cyclocarpum* Griseb) weighting > 90 gram BSC with imperfect shape and weighting <90 grams SSC

Parameter	Percentage Dormancy		
	Healthy Seeds	Fixed seeds	Rotten seeds
Big Seed Control (BSC)	10	57	33
Small Seed Control (SSC)	8	47	45

Table 3. Correlation of soak time with (*Enterolobium cyclocarpum* Griseb) seed mass

Parameter	Soak Time (Hours)			
	24	48	72	96
Early seed mass	35.25	35.24	34.19	34.69
Final seed mass	46.74	63.84	69.24	61.09
Average early seed mass	1.18	1.17	1.14	1.16
Average final seed mass	1.56	2.13	2.39	2.55

Fig. 1. Breaking of (*Enterolobium cyclocarpum* Griseb) seed dormancy

RESULTS

Breaking dormancy (PD) seeds (*Enterolobium cyclocarpum* Griseb) used AC water media with different soaking times resulting percentage and mass of the seed as shown in **Tables 1**-**3** and **Fig. 1**.

DISCUSSION

In **Table 1** the percentage of the breaking of sengon buto seed dormancy (*Enterolobium cyclocarpum* Griseb) used AC water media with different soak times, showing the effect of increasing the percentage of breaking dormancy into sprouts. The increase illustrates in the seed that there was an event of enlarged the physical shape of the seed up to 2 times from the initial physical form or the occurrence of seed imbibition is the entry seed through the pores, the seed coat softening, enlarges and embryonic cell growth occurs.

The percentage of PD of (*Enterolobium cyclocarpum* Griseb) seed with weighting > 90 grams and perfect physical form from the results of soak experiments using AC water media with different lengths of time, PD 24 hours the physical condition of seeds underwent 2 changes, 23% healthy seeds (imbibition) and 77% fixed seeds (no change), PD 48 hours the physical condition of the seeds undergoes 2 changes, 73% healthy seeds and there were some seeds that had breaking the seed skin and 27% fixed seeds, PD 72 hours the physical condition of the seeds undergoes 3 changes, 87% healthy seeds and some open seeds of the skin, 10% of healthy seeds and 3% of seeds had rotten and PD 96 hours of physical condition of seeds undergoing 2 changes, namely 80% of healthy seeds and 20% of rotten seeds.

In **Tables 1** and **2** showed the correlation of dormancy breaking (PD) events with a long soak time of 24 hours a percentage of 23% with a total mass of seeds 46.74 grams and average mass of seeds 1.56 grams, 48 hours percentage of 73% with total seed mass 63.84 gram and average seed mass 2.13, 72 hours percentage of 87% with total seed mass 69.24 grams and average seed mass of 2.39, 96 hours percentage of 80% with total seed mass 61.09 grams and average seed mass 2.55.

In **Table 2** the percentage of PD of (*Enterolobium cyclocarpum* Griseb) seed with weighting > 90 grams and perfect physical form from the results of soaking experiments by using AC water media with different lengths of time, PD 24 hours the physical condition of seeds underwent 2 changes, 23% healthy seeds (imbibition) and 77% fixed seeds (no change), PD 48 hours the physical condition of the seeds underwent 3 changes, 73% healthy seeds and there are some seeds that have breaking the seed skin and 27% fixed seeds, PD 72 hours the physical condition of the seeds underwent 3 changes, 87% healthy seeds and some open seeds of the skin, 10% of healthy seeds and 3% of seeds have rotten and PD 96 hours of physical condition of seeds undergoing 3 changes, namely 80% of healthy seeds, 0% fixed, 20% of rotten seeds. The percentage of PD of (*Enterolobium cyclocarpum* Griseb) seed as BSC with imperfect shape weighing> 90 grams, seeds undergoing 3 changes in physical form namely 6% healthy seeds, 56% fixed seeds and 36% rotten seeds, while on seed percentage SSC with seed weight <90 grams, the seeds undergo 3 changes in physical form, namely 1% healthy seeds, 46% fixed seeds and 43% rotten seeds. The time of BSC and SSC soak for 4 days, every day the physical form was observed. This is in line with Mahendra (2018) generative plant propagation for seed types (*Enterolobium cyclocarpum* Griseb) with a weight of> 90 grams gives a significant influence. Seed mass has implications for the percentage of seed PD, this could be shown in **Table 3** which depicts PD 24 hours early seed mass of 35.25 grams, final seed mass of 46.74 grams with an average early seed mass of 1.18 grams, average mass of seed end of 1.56 grams, PD 48 hours of early seed mass of 35.24 grams, final seed mass of 63.84 grams with an average early seed mass

of 1.17 grams, average final seed mass of 2.13 grams, PD 72 hours of early seed mass of 34.19 grams, final seed mass of 69.24 grams with an average initial seed mass of 1.14 grams, average final seed mass of 2.39 grams and PD 96 hours of early seed mass of 34.69 grams, final seed mass of 61.09 grams with an average mass of early seed of 1.16 grams, the average final seed mass was 2.55 grams.

Generative propagation of plants, by soaking the seeds using AC water, gave the effect of increasing the seed mass to the rate of percentage of breaking dormancy, this was shown in **Tables 1** and **3**.

CONCLUSION

The perfection of the physical shape of the seeds, the accuracy of the time to soak the seeds and the weight of the seeds had a positive effect for the rate of percentage of dormancy breaking.

ACKNOWLEDGEMENTS

Research Center of Medicene and Cosmetic from tropical Rainforest Resources, Mulawarman University.

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