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PLANTING OF RAMIN (*GONYSTYLUS BANCANUS* KURZ) WILDING IN PEAT SWAMP THICKET OF CENTRAL KALIMANTAN

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ABSTRACT

The purpose of this study was to determine the effect of planting row with different widths on the growth of Ramin seedlings planted in the area of peat swamp thicket. The research design used was Randomized Block Design (RBD) with 3 treatments, namely L0 = planting in a row without a clearance; L1 = planting in a row with a clearance of 1 m width; L3 = planting in a row with a clearance of 3 m width each of 3 plots (plot size 30 x 30 m) with a plant spacing of 5 x 5 m, so that the total number of seeds equal to 324 seeds. The variables measured and observed were the success / percentage of life of Ramin plants, percentage of bud growth and relative growth rate. Observations and measurements are carried out every 2 (two) weeks. The success of the plant life was 72,5%. The success of bud growth 34,9% and a relatively high growth rate of 11,1%. The bud growth and the relatively high growth rate of the Ramin plant in the peat swamp thicket for six months resulted in the highest growth in the treatment of Ramin planting in the row without clearance compared with planting in the row with the clearance of 1 and 3 meters width.

KEY WORDS

Peat swamp thicket, row, clearance.

Ramin trees thrive in peat swamp natural forests on Sumatra Island, Karimata Strait Islands, and Kalimantan. Ramin wood has high economic value and is categorized as beautiful wood. High selling prices and large market needs for this type make exploitation activities out of control in natural forests (Samojlik et al., 2019; Sen & Pattanaik, 2019; Nuță, 2019; Mcelwee, 2008; Lambin & Meyfroidt, 2011). The government's effort in conservation is to include Ramin in Appendix III of CITE (*Convention International Trade Endangered Species of Wild Fauna and Flora*) (CITES) Appendix II, in 1994 as an endangered tree. Ramin cultivation has problems, including the recalcitrant seeds, erratic fruiting season, the success rate of growing saplings is still very low and the regeneration process is slow (Bismark et al., 2006; Morrogh-Bernard et al., 2003; Supriana et al., 1978; Van der Meer et al., 2008; Yule, 2010; Smulders et al., 2008; Chua, 2008; Lescuyer et al., 2019; Ogoti, 2019).

Wahyudiningsih & Rahmawati (2005), Rotinsulu et al. (2007), that various efforts have been made to increase the potential of ramin in peat swamp forests namely by maintaining existing ramin saplings and ramin cultivation which can grow as well as natural ramin growth in peat swamp forests. nformation on the technique of ramin cultivation has been limited, especially for enrichment activities in regenerated empty spaces, how the proper plant techniques and maintenance so that they can spur the growth of seeds in nature. The general growth stimulation carried out in silviculture is maintenance with clearance.

Based on this, it is necessary to strive for planting ramin seedlings in secondary forests/ peat swamp thicket area with the hope of increasing the productivity of peat swamp forests in order to meet the needs of ramin wood by making ramin plant forest.

METHODS OF RESEARCH

The study was conducted in the peat swamp thicket area of Taruna Village, Pulang Pisau Regency, Central Kalimantan Province, for 10 (ten) months, starting from June 2014 to March 2015.

The material used in the research is the seed of Ramin (*Gonystylus bancanus* Kurtz) derived from wilding which had been adapted in the nursery for 3 months as many as 400 seeds. The tools used among other saron, polybag, measuring ruler, plastic rope, compass, machete, label paper, hoes, carpentry tools, stationery, etc.

The experimental design used was a Randomized Block Design (RBD) with 3 treatments, each with 3 groups/plots (plot size 30 x 30 m) with a plant spacing of 5 x 5 m, so that the total number of seeds equal to 324 seeds.

The treatment of this study are:

- L0 = planting in a row without clearance;
- L1 = planting in a row with a clearance of 1 m width;
- L3 = planting in a row with a clearance of 3 m width.

The variables measured and observed were the success/percentage of life of Ramin plants, percentage of bud growth and relative growth rate.

The procedure/stage of this research are:

- Preparation of Ramin Seeds. Ramin seeds come from wilding that has been adapted in nurseries for 3 months with criteria for the seedling height about 20 - 60 cm and have good growth
- Making the Research Plot. The research plot was made in peat swamp thicket with the size 30m x30m as many as 9 plots with a distance between plots of 2,5 m.
- Making the Planting Row. Make the planting row as wide as 1 m and 3 m with the direction of East- West. Planting row must be completely open so that light can enter optimally with a distance between the axes of the planting row equal to 5 m.
- Installation of Ajir and Planting Holes. Ajir is made of wood with a length of approximately 1 m and the tip is given a red mark. Ajir is installed in planting row with a distance of 5m x 5m. On the side of ajir, a planting hole is made and left for 1 week before planting activities are carried out.
- Planting. The planting trial was carried out on August 15th, 2014 - February 15th, 2015 (for 6 months). Observations and measurements are carried out every 2 weeks.
- Ramin Seedling Maintenance. Conduct weeding/clearance activities towards weed plants whose its shade canopy which carried out every 2 weeks.

RESULTS AND DISCUSSION

Success of Life and Buds Growing of Ramin Plants. Based on the results of measurements and observations of Ramin plants in peat swamp thicket for 6 (six) months, the success/percentage of life and growth of Ramin bud presented in Table 1 below.

Table 1 – Percentage of Life and Bud Growth of Ramin Plants in peat swamp thicket for 6 (six) months

Clearance Width	Plot	Percentage		Percentage		Average %	
		Life	%	Bud	%	Life	Bud
0 meter	1	30	83,3	22	61,1	80,8	38,9
	2	28	77,8	12	33,3		
	3	29	80,6	8	22,2		
1 meter	1	25	69,4	20	55,6	72,2	36,1
	2	27	75,0	8	22,2		
	3	26	72,2	11	30,6		
3 meter	1	21	58,3	12	33,3	64,8	29,6
	2	25	69,4	12	33,3		
	3	24	66,7	8	22,2		

Based on Table 1 the percentage of Ramin plant life for 6 months is only 72,5%. The causes of death are thought to be related to environmental factors, planting techniques and seeds used. Some field conditions are inundated so that it can cause oxygen deficiency which can damage root development, namely the occurrence of decay in the roots causing death.

The percentage of the bud growth of Ramin plants in the thicket of peat swamps is decreasing with increasing width of the planting row in the thicket which is 1 meter high with an average seedling height of only 30 cm. With the increase in width of the row, the higher the intensity of the light received by the seed. High light intensity is good for root growth rather than bud growth. According to Soekotjo (1976), Totland (1999), Shah et al. (2011), Vasseur et al. (2011), McDowell et al. (2008), Hatfield & Prueger (2015), Zandalinas et al. (2018), Jabran & Doğan (2018), high intensity causes an increase in leaf temperature which has a negative effect on plants, among others, the decline of photosynthesis, excessive transpiration so that the stem becomes shorter, leaves are thicker and smaller, and the occurrence of growth decreases.

Relative Growth Rate of Ramin Plants. Relative Growth Rate based on measurement results of height increment and the number of buds are presented in the following Tables 2 and 3.

Table 2 – The results of variance of relative high growth and the number of buds of Ramin plants in peat swamp thicket for 6 months

Source of Variability	High Growth	Number of Bud
Planting without clearance	Very significant effect	No effect
Planting with 1 m clearance	No effect	No effect
Planting with 3 m clearance	No effect	No effect

Table 3 – Effect of Ramin planting on relative high increment in peat swamp thicket for 6 months

Source of Variability	Relative High Increment
Planting in a row without clearance	11,1 ^a
planting in a row with a clearance of 1 m	4,8 ^b
planting in a row with a clearance of 3 m width	4,7 ^b

Notes: Numbers followed by the same letter in the same column are not significantly different at 5% level of Duncan test.

Statistically there is a very significant effect from the treatment of planting in the row without clearance which given to the increment of Ramin plant height compared to planting in a clean row 1 and 3 meters width.

By planting in an open thicket (1 m thick height) where the light is directly on the Ramin plant, while the Ramin plant with an average height of only 30 cm still requires shade. This condition can increase the transpiration rate which exceeds the adsorption capacity and affect the activity of stomata cells and fixation of CO₂ from the air, for photosynthesis process become reduced, resulting in inhibition of growth.

According to Rajan et al. (1971), Walker et al. (1996), Poorter (1999), Ludwig et al. (2004), Monsi & Saeki (2005), Mårell et al. (2018) that light is the most important factor that determines the growth and development of vegetation, plant physiological processes such as photosynthesis, respiration and transpiration (Mirecki & Teramura, 1984; Darrall, 1989, Collatz et al., 1991; Bragina et al., 2004; Lambers et al., 2008; . With the difference in light intensity will also cause differences in temperature, humidity and photosynthesis and transpiration in plants Excessive light intensity can damage photosynthetic devices, causing an increase in temperature and which has a negative effect on plants, among others, can cause a decrease in photosynthesis.

CONCLUSION AND RECOMMENDATIONS

Based on the results of the study it can be concluded that the success of Ramin plants in the peat swamp thicket is included in the good criteria with a plant life percentage of 72,5%, The growth of buds and the relatively high growth rate of the Ramin plant in the peat swamp thicket for six months resulted in the highest growth in the treatment of Ramin planting in the row without clearance compared to planting in the row with a clearance of 1 and 3 meters width.

This research recommends the need for light shade on seeds and Ramin planting land to maintain moisture, because Ramin is very susceptible to high temperatures and land drought, need to be considered when planting should be conducted at the beginning of the rainy season as well as at the time of clearance should not be done in excess, because it can cause wilt/death of plants, in addition, further research needs to be done for a longer time, as information on silvicultural techniques in the field.

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