

THE EFFECT OF PLANT SPACING ON SAGO PALM (*Metroxylon* spp.) GROWTH

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ABSTRACT

This experiments was carried out from February – August 2009 at PT. National Timber And Forest Product in Selatpanjang, Riau. The objective of this experiment was want to know the effect of plant spacing on sago palm growth. The treatments were plant spacing i. e. 8 m x 8 m, 10 m x 10 m, and 10 m x 15 m. The result is indicated that 8 m x 8 m was the best treatment for sago palm growth.

Keyword : *Metroxylon* spp., plant spacing, Selatpanjang, PT. National Timber And Forest Product

INTRODUCTION

Sago palm (*Metroxylon* spp.) has known for long ago especially for alternative staple food. Up to know people in Maluku and Irian Jaya eat sago starch because of the high content of carbohydrate. If we compare with other carbohydrate producer plants, sago palm is the best, because the palm can produce 25 – 40 ton dry starch ha⁻¹ year⁻¹. Cassava and potato can produce only 10 - 15 ton dry starch ha⁻¹ year⁻¹ (Bintoro, 2008, Rahman, 2009).

Cultivation technique, internal, and external factors influence sago palm growth. Sago palm and other plants need sunlight, relative humidity, oxigen, water, and nutrient. Plant spacing often influenced sago palm growth and development. Sago palm growth optimal if its spacing proper

condition. The objective of this experiment is want to know the effect of palnt spacir g on sago palm.

MATERIALS AND METHODS

This experiment was carried out from February to August 2009 at PT. National Timber And Forest Product in Selatpanjang, Riau.

The spacing treatment consisted of 8 m x 8 m, 10 m x 10m , 10 m x 15 m. Block design with three replications was use in this experiment. Sago plant in Division 2 at Block M-24, N-24, O-24 were planted with 8 m x 8 m spacing, in Division 5 at block A-32, A-33, B-33 were planted with 10 m x 10 m, spacing, and in Division 9 at block Q-10, Q-11, R-10 were planted with 10 m x 15 m spacing. Ten plants in each block were observed their number of sucker, heigh, plant diameter, and number of leaf.

RESULTS AND DISCUSSIONS

Number of sucker

Spacing treatment was sifnificantly affected number of sucker. The treatment of 8 m x 8 m caused the best sucker and 10 m x 15 m caused the worth one (Figure 1). At 8 m x 8 m area, the weeds were dominated by *Nephrolephis* sp. and at 10 m x 10 m the weeds were shrubs and at 10 m x 15 m the wecds were secondary forest. According to Sitompul and Guritno (1995) different environment conditions caused plant growth variation.

At 8 m x 8 m arca, sun light can reach to soil surface and sago palm can absorb sun light optimally for photosynthesis. So, its photosynthate can be used for producing new sucker.

Although the sago palm growth rate was not significantly different, but the growth rate at 8 m x 8 m area were always the best and at 10 m x 10 m and 10 m x 15 m were almost the same (Table 1). Because of the weeds conditions at 10 m x 10 m and 10 m x 15 m areas, sago palm can

not absorb sunlight maximal. It was possible that weeds at two areas compete minerals absorption very strong and then the weeds depressed sago palm growth.

Plant Height

Spacing treatment was significantly affected sago palm height, from the beginning until the end of this experiment. Same as the number of sucker variable, the 8 m x 8 m spacing treatment caused the highest sago plant and 10 m x 15 m spacing treatment was the worst one. Sago palm treated by 10 m x 15 m was not able to make its trunk (Figure 2).

Sago palm growth rate treated by 8 m x 8 m and 10 m x 10 m were almost the same, the difference was not significantly different (Table 2). Actually, sago palm can grow as high as 7-8 m, but until August 2009, sago palm treated by 8 m x 8 m and 10 m x 10 m only as high as 5.72 m and 4.02 m respectively. It was possible that without maintenance as long as 5 years inhibited sago palm growth. Haryanto and Pangloli (1992) stated that sago palm growth depends on its environment. According to Sjachrul (1993) unfavorable conditions will more time to be harvested.

Plant Diameter

Spacing treatment was significantly affected sago palm diameter. The treatment of 8 m x 8 m and 10 m x 10 m were always better than 10 m x 15 m (Figure 3). Same as plant height, sago palm treated by 10 m x 15 m was not able to make its trunk, so the palm has not plant diameter.

Although 8 m x 8 m and 10 m x 10 m spacing treatments were not significantly different in plant diameter (Table 3), but the diameter of sago palm that treated by 8 m x 8 m was better than 10 m x 10 m. The diameter rate of sago palm treated by 8 m x 8 m were always more than 1 m, the diameter rate of the other treatment less than 1 m. It is possible that photosynthetic rate in sago palm that treated by 8 m x 8 m was higher than 10 m x 10 m. The condition is almost the same as Amarilis (2009) and Andani (2009) result, *Nephrolepis* sp. dominated at sago palm area which

treated by 8 m x 8m, at 10 m x 10 m area the weeds are shrub, and at 10 m x 15 m area the weeds are secondary forest (Table 4).

Number of Leaf

Spacing treatment was significantly different on number of leaf from the beginning of this experiment (Table 5). The 10 m x 15 m treatment always has the lowest leaf. Its leave are around 6-7. At the beginning of this experiment (March - June) the 10 m x 10 m treatment has more leaves than the 8 m x 8 m one, but in the end of this experiments (July – August) was rise (Figure 4).

Under secondary forest sago palm was not able to produce more leaf, because sago palm was under the forest. This condition caused the photosynthetic process in the sago palm was inhibited. Rostiwati et. al. (1998) stated that sago palm can created more leaves if sago palm can absorp more sunlight.

CONCLUSIONS

The effect of spacing treatment was significantly different on sago palm growth and the 8 m x 8 m was the best treatment for sago palm growth.

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FIGURE AND FIGURE TITLE

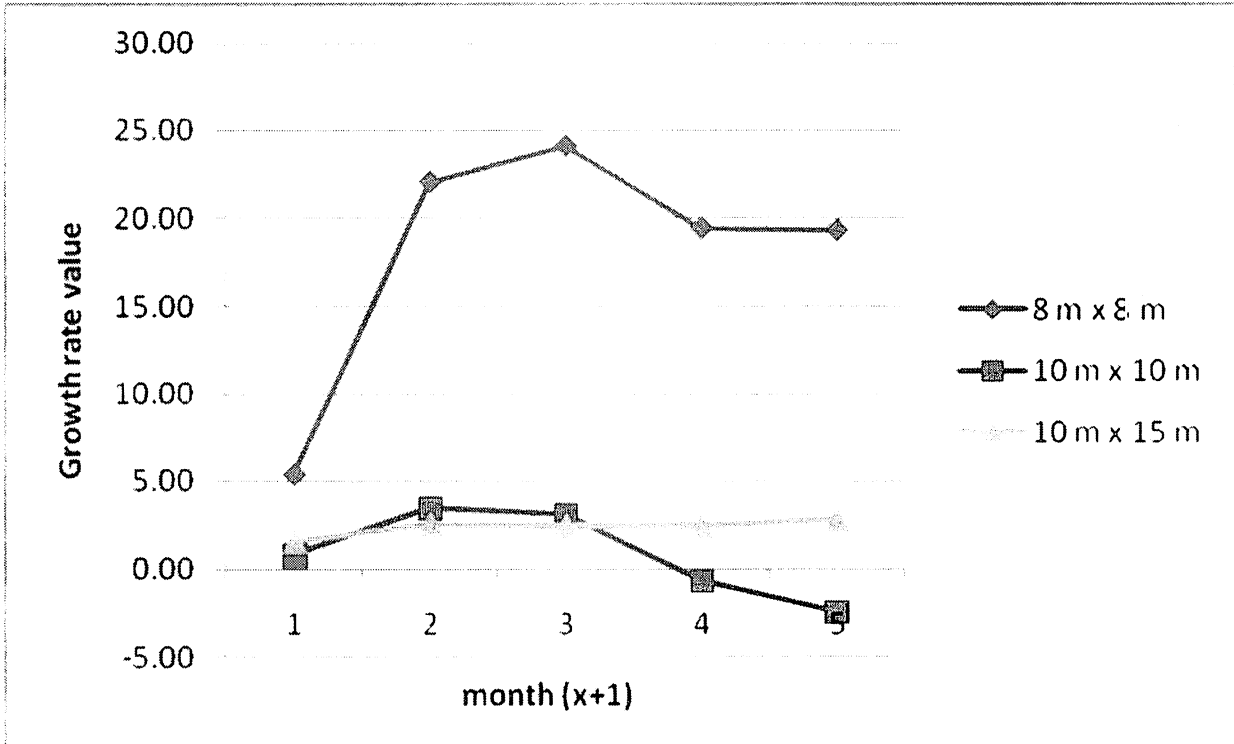


Figure 1. Sucker growth rate on sago palm.

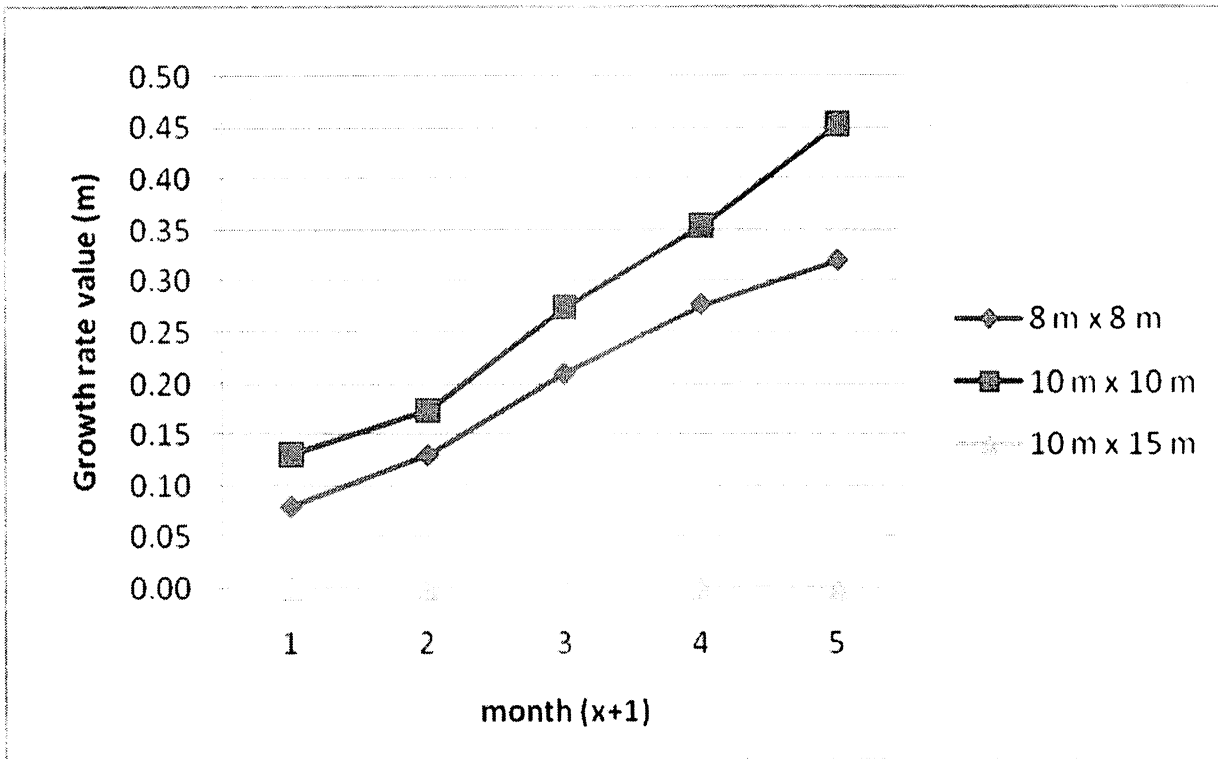


Figure 2. Plant height growth rate on sago palm

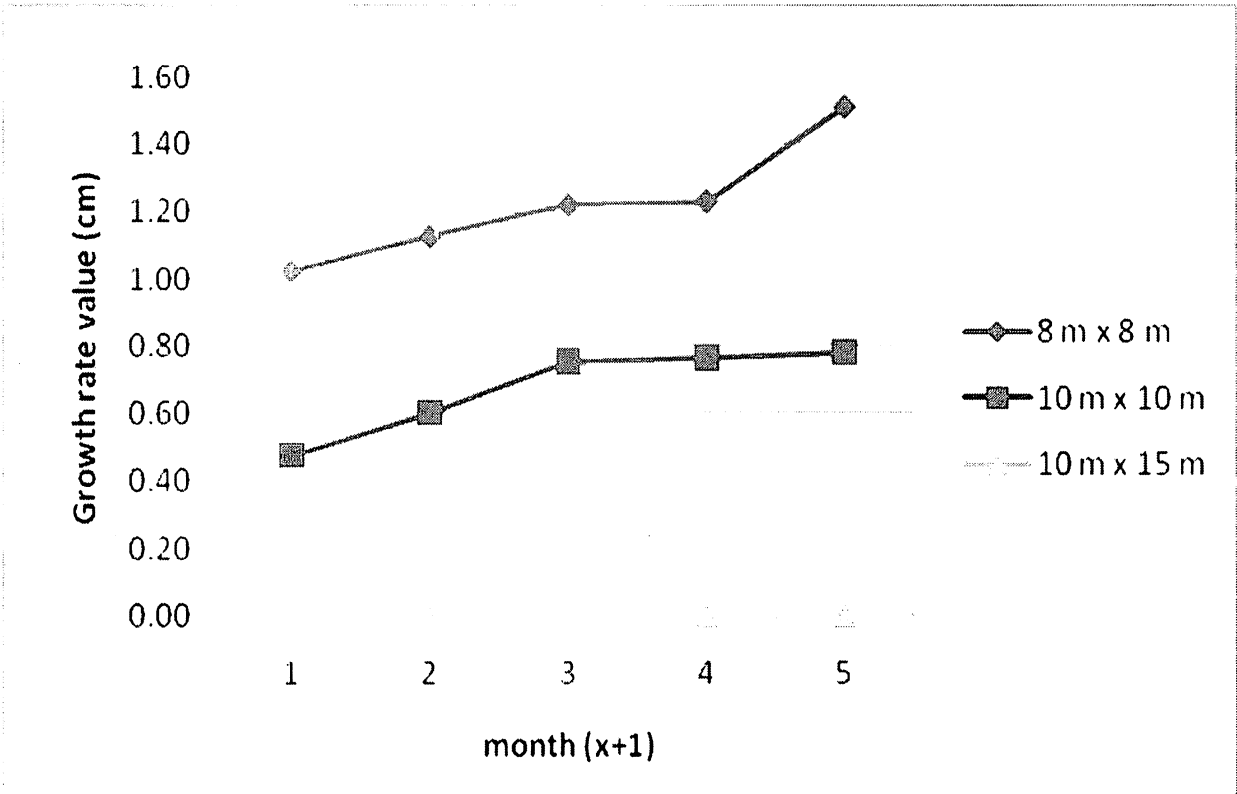


Figure 3. Plant diameter growth rate on sago palm

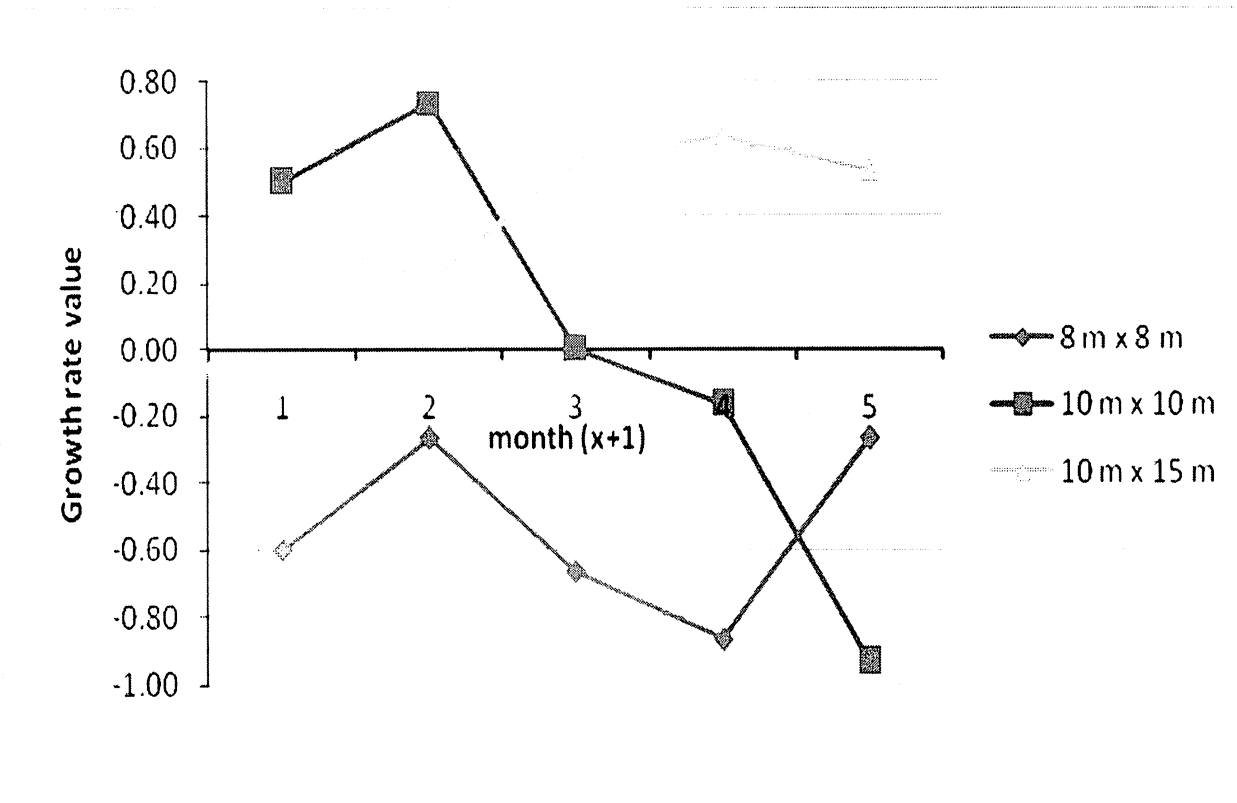


Figure 4. Number of leaf growth rate on sago palm

TABLE AND TABLE TITLE

Table 1. Effect of plant spacing on number of suckers

TreatmentNumber of sucker.....					
	1	2	3	4	5	6
Spacing					
8 m x 8 m	41.00 a	46.40 a	63.10 a	65.13 a	60.47 a	60.37 a
10 m x 10 m	30.20 a	32.67 b	35.33 b	35.00 b	31.20 b	29.40 b
10 m x 15 m	7.13 b	8.73 c	9.70 c	9.60 c	9.67 c	9.97 c

Note : The number which followed by the same alphabet was not significantly defferent in DMRT test 5 %.

Table 2. Effect of plant spacing on plant heigh

TreatmentPlant heigh.....					
	1	2	3	4	5	6
Spacing(m).....					
8 m x 8 m	5.40 a	5.48 a	5.53 a	5.61 a	5.68 a	5.72 a
10 m x 10 m	3.56 b	3.69 b	3.74 b	3.84 b	3.92 b	4.02 b
10 m x 15 m	0.00 c	0.00 c	0.00 c	0.00 c	0.00 c	0.00 c

Note : The number which followed by the same alphabet was not significantly defferent in DMRT test 5 %.

Table 3. Effect of plant spacing on plant diameter.

Treatment	Plant diameter.....					
	1	2	3	4	5	6
Spacing(cm).....					
8 m x 8 m	135.74 a	136.77 a	136.87 a	136.96 a	136.97 a	137.25 a
10 m x 10 m	138.17 a	138.65 a	138.77 a	138.92 a	138.93 a	138.95 a
10 m x 15 m	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b	0.00 b

Note : The number which followed by the same alphabet was not significantly different in DMRT test 5 %.

Table 4. Weeds in sago palm research area.

No.	Treatment	Weeds
1.	8 m x 8 m	
	Blok M24 (UI 1)	Dominated by <i>Nephrolepis</i> sp.. Also grew geronggang (<i>Cratoxylon formosum</i> Dyer), and few trees with diameter 10-30 cm.
	Blok N24 (UI 2)	Dominated by <i>Nephrolepis</i> sp.. Also grew few trees with diameter 10-30 cm.
	Blok O24 (UI 3)	Dominated by <i>Nephrolepis</i> sp.. Also grew mahang (<i>Macaranga</i> sp.), and few trees with diameter 10-30 cm.
2.	10 m x 10 m	
	Blok A32 (UI 1)	Dominated by trees such as mahang (<i>Macaranga</i> sp.), geronggang (<i>C. formosum</i> Dyer), and meranti (<i>Shorea</i> sp.). Also grew pakis, salak hutan (<i>Salacca conferta</i> Griff.), and kantung semar (<i>Nepenthes</i> sp.).

No.	Treatment	Weeds
2.	Blok B33 (U1 2)	Dominated by trees such as mahang (<i>Macaranga</i> sp.), geronggang (<i>C. formosum</i> Dyer), dan meranti (<i>Shorea</i> sp.). Also grew pakis and salak hutan (<i>S. conferta</i> Griff.)
	Blok A33 (U1 3)	Dominated by trees such as pohon mahang (<i>Macaranga</i> sp.), geronggang (<i>C. formosum</i> Dyer), meranti (<i>Shorea</i> sp.), and salak hutan (<i>S. conferta</i> Griff.)
3.	10 m x 15 m	
	Blok R10 (U1 1)	Weeds consisted of <i>Nephrolepis</i> sp., salak hutan (<i>S. conferta</i> Griff.), palem merah (<i>Cyrtostachys lakka</i> Becc.), palas (<i>Licuala paludosa</i> Griff.), sirih hutan (<i>Piper caducibracteum</i> C.DC), and few trees with small until large diameter. (≥ 30 cm).
	Blok Q11 (U1 2)	Dominated by trees with small until large diameter (≥ 30 cm). Also grew pakis (<i>Nephrolepis</i> sp.), salak hutan (<i>S. conferta</i> Griff.), palem merah (<i>C. lakka</i> Becc.), palas (<i>L. paludosa</i> Griff), sirih hutan (<i>P. caducibracteum</i> C.DC), and kantung semar (<i>Nepenthes</i> sp.).
	Blok Q10 (U1 3)	Weeds consisted of pakis (<i>Nephrolepis</i> sp.), salak hutan (<i>S. conferta</i> Griff.), palas (<i>Licuala paludosa</i> Griff.), palem merah (<i>C. lakka</i> Becc.), sirih hutan (<i>Piper caducibracteum</i> C.DC), and few trees with small until large diameter. (≥ 30 cm).

Table 5. Effect of plant spacing on number of leaf.

TreatmentNumber of Leaf.....					
	1	2	3	4	5	6
Spacing					
8 m x 8 m	11.73 b	11.13 b	11.47 b	11.07 b	13.10 a	12.33 a
10 m x 10 m	13.27 a	13.77 a	14.00 a	13.27 a	10.87 b	11.47 b
10 m x 15 m	6.47 c	6.83 c	6.67 c	7.03 c	7.10 c	7.00 c

Note : The number which followed by the same alphabet was not significantly defferent in DMRT

test 5 %.