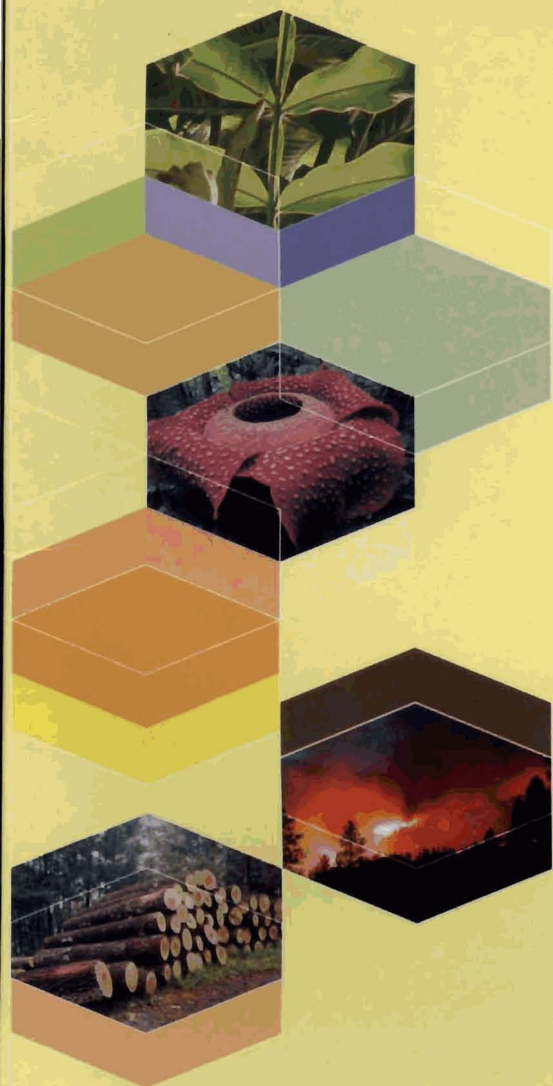


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FORESTRY SCIENCE JOURNAL



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**THE CORRELATION BETWEEN THE HEIGHTENING OF ACACIA MANGIUM  
AND GROWTH SITE FACTORS ON EX-AREAL OF TIN MINING <sup>1</sup>**  
(HUBUNGAN ANTARA PENINGGI ACACIA MANGIUM DAN FAKTOR TEMPAT TUMBUH  
PADA AREAL BEKAS PERTAMBANGAN TIMAH)

Siti Latifah <sup>2</sup>, Yadi Setiadi, <sup>3</sup> Cecep Kusmana, <sup>3</sup> Endang Suhendang<sup>3</sup>

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### Abstract

Disturbance in forest ecosystem will have negative impact on forest itself and environment. In considering the negative impact resulting from mining activities, PT Timah is implementing "re-vegetation" with acacia mangium intensively on open lands as its ex-area of tin mining. The valuation showed the success of re-vegetation were the goodness of plants growth and plant site factors. This information was very important as standard to evaluate silviculture technique to re-vegetation strategy on the future.

**Keywords:** Acacia mangium, re-vegetative, site factors, ex-area of tin mining.

### Abstrak

Kerusakan pada ekosistem hutan menyebabkan dampak negatif pada hutan dan lingkungan sekitarnya. Menyadari akan dampak negatif akibat aktivitas penambangan, maka secara intensif PT Timah Tbk telah melakukan kegiatan revegetasi dengan penanaman *acacia mangium* pada areal bekas tambang timah. Penilaian yang menunjukkan keberhasilan revegetasi adalah baiknya kondisi pertumbuhan tanaman dan faktor tempat tumbuh tanaman. Informasi ini sangat penting sebagai standar evaluasi untuk tindakan silvikultur dan strategi revegetasi pada masa mendatang.

**Kata kunci:** *Acacia mangium*, revegetasi, faktor tempat tumbuh, areal bekas tambang timah.

### INTRODUCTION

The tropical forest is a stable ecosystem in a balance condition between the components of ecosystem. The disturbance on the forest ecosystem has a negative impact to the forest and its environment (Alberta Environmental Protection, 1995).

The mining activity of PT Timah, Ltd. will change the physical, chemical and biological environment such as the condition of soil, water quality, growth of vegetation and fauna habitat. The alteration of the environment must be managed to avoid the negative environment impact. One of the improvement activities to the disturbed ecosystem is the re-vegetation of the open area of ex-tin mining (Australian Mining Industry Council, 1990)

Seventy five percent of re-vegetation activity is conducted by the cultivation of *acacia mangium* in the ex-area of tin mining (PT Timah Indonesia, 1990). The growth of this plant

influenced by three main factors, i.e.: genetic factor, growth site, and silviculture.

This study aim to get more information about the growth of *A. mangium* indicated by the correlation of between the factors influence the growth of plant (Majid *et al.*, 1994)

### MATERIALS AND METHODS

The materials used in this research were *A. mangium* stand of 2-6 years of age on ex-mining area PT Timah, Bangka Island-South Sumatra. The sample plots of 0,1 hectare in size (40 m length and 25 m width) was set on re-vegetation map. Sample plot total of observation is 1% re-vegetation area width for age 2 years = 460 hectare, 3 years = 320 hectare, 4 years = 200 hectare, 5 years = 210 hectare, and 6 years = 100 hectare.

Each plot 0,1 hectare was measured the high of plantations, altitude (m), the sands depth (m), slope of site and the sample of soil. Technique to get 1 kilograms soil sample by

made profile on 0-50 cm and 50-100 cm mixing to be one, and then be analyzed the soil chemist characteristics, N (%), P (ppm), K (ppm), Ca (%), ratio C/N and pH. (Hakim, 1986)

The correlation of any factors of growth site to the heightening of *A. mangium* for all the age degree was state by equivalent Log  $Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_kX_k + E$  (Husch, 1963). The methods which be used to choice the best regression with stepwise regression procedure.

## RESULT AND DISCUSSION

The best regressions which state the correlation of age and some factors of site to the heightening of *A. mangium* was : Log  $Y = 1,3857 - 1,4576 X_1 + 0,0618 X_2 - 0,0537 X_3 + 0,0049 X_6 + 0,0061 X_{11}$ .

### Age

Age factor ( $X_1$ ) gives participate the biggest in mentioning the diversity of stands, the value 0,958. The negatives correlation showed 1/ age of plantation gradually lower (the age gradually older) so the stands gradually higher at the sure age.

### N Contents

N contents ( $X_2$ ) have positive *A. mangium* stands, the value was 0,311. This means the increasing of N contents will be increasing the growth plantation. The mean of N contents in the research place was 16%.

### P Contents

P contents ( $X_3$ ) have positive correlation 0,409 to stands. The means of P contents in the research place 0,27 ppm include very low category.

### K Contents

K contents ( $X_4$ ) not be followed in this regressions because the value is too small 0,042. The means of K was 0,2 ppm.

### Ca Contents

Ca contents ( $X_5$ ) not be followed in this regression because the value is too small 0,0242. The means of Ca was 1,55 ppm.

### C Contents

C contents ( $X_6$ ) have positive correlation 0,559 to stand, it was mean the increasing the value of stands followed by increased of Carbon value. The C means 1,47%.

Table 1. The correlation of dependent variables and independent variables

	Age 1/ $x_1$	N $X_2$	P $X_3$	K $X_4$	Ca $X_5$	C $X_6$	C/N $X_7$	PH $X_8$	Sand $X_9$	Altitude $X_{10}$	Slope $X_{11}$
X2	- 0.285										
X3	- 0.446	0.11 6									
X4	0.064	0.07 7	0.393								
X5	- 0.030	- 0.03 1	0.188	0.471							
X6	- 0.579	0.22 5	0.466	0.233	0.29 4						
X7	0.080	- 0.07 3	0.125	0.037	- 0.02 7	0.21 1					

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	Age 1x1	N X2	P X3	K X4	Ca X5	C X6	C/N X7	PH X8	Sand X9	Altitude X10	Slope X11
X8	- 0.198	0.13 5	0.179	-0.267	0.33 3	0.33 1	- 0.03 7				
X9	- 0.101	0.14 7	0.121	-0.058	- 0.24 8	- 0.05 5	- 0.14 7	- 0.09 1			
X10	0.244	- 0.04 5	- 0.131	-0.276	- 0.33 7	- 0.33 3	0.19 7	- 0.26 9	- 0.09 1		
X11	- 0.043	0.05 0	0.089	-0.101	- 0.17 1	- 0.00 2	- 0.07 1	- 0.01 8	- 0.00 1	0.33 8	
Log Y	- 0.958	0.33 1	0.409	-0.042	0.02 4	0.55 9	- 0.11 1	0.19 5	- 0.11 1	- 0.02 7	0.093

#### C/N Ratio

C/N ratio (X7) has negative correlation to stands -0,111. C/N ratio not be followed in this

equality because they e represented by C and N contains. The means C/N 10,36.

Table 2. The Means Factors of Site and Soil Chemist Characteristics in the re-vegetation area

Age of plant (year)	Stand height (m)	the depth of Sand (m)	altitu de (m)	slop e (%)	N (%)	P	K	Ca	C (%)	C/N	p H
6	13.32	5.89	9.75	1.1 5	0.23	0.67	0.28	1.75	2.2 0	9.77	4. 8
5	13.27	5.23	12.47	1.3 8	0.19	0.26	0.17	1.69	2.0 9	10.77	4. 8
4	10.84	7.77	10.41	1.1 7	0.31	0.13	0.14	1.45	1.5 2	7.99	4. 7
3	8.59	5.51	14.39	1.5 0	0.09	0.14	0.17	1.59	1.0 5	9.49	4. 6
2	4.67	5.56	16.55	1.1 6	0.15	0.15	0.25	1.61	1.1 4	10.32	4. 6
Means	10.14	5.99	12.71	1.2 7	0.19	0.27	0.202	1.62	1.6 0	9.668	4. 7
Means *		5,99	10.6	3.8	0.16	0.27	0.042	0.024	1.4 7	10.36	4. 5

\* Based on area data's

### Degree of Soil Acid (pH)

Degrees of soil acid (pH) (X8) have positive correlation with stand 0,195. The correlation showed that the increasing of acidity of soil make decreasing the stands. The means of pH 4,5.

### Sand Depth

Sand depth (X9) has negative correlation to stands -0,111. That correlation showed that the increasing of sand depth, the value of stands decreasing. The means of sand 5,99 meters.

### Altitude

Altitudes (X10) have negative correlation to stands -0,027. The negative correlation showed that the increasing of place from the surface of sea make decreased the tree measurement. The means of altitude was 10,6 m.

### The Slope of Area

The slopes of area (X11) have positive correlation with stands 0,093. This correlation showed that *A. mangium* grows better in the slope area. The means of slope area degree was 3,8%. The increasing of percentage of slope will make optimal drainage and aeration to plantation growth. (Thorne, 1990)

### CONCLUSION

Management measure on the re-vegetation activity requires more information about the relationship between the factors influence the growth of plant. The factor of site exclude the age which has participate to *A. mangium* plantation growth on re-vegetation area were nitrogen, phosphor, carbon contents, and percentage of slope area with the best regression which state the correlation with site condition and the heightening of *A. mangium* was  $\text{Log } Y = 1,3857 - 1,4576 X_1 + 0,0618X_2 - 0,0537X_3 + 0,0049X_6 + 0,0061 X_{11}$ .

### REFERENCES

- Alberta Environmental Protection. 1995. *Reclamation Criteria for Well Sites and Associated Facilities*. Edmonton. Alberta Environmental Protection. Land Reclamation Division. British Columbia. *Unpublished*.
- Australian Mining Industry Council. 1990. *Mine Rehabilitation Hand Book*. Australian Mining Industry Council. Australia
- Hakim. 1986. *Dasar-Dasar Ilmu Tanah*. Penerbit Universitas Lampung. Lampung.
- Husch, B.1963. *Forest Mensuration and Statistic*. The Ronald Press Company. New York
- Majid, N.M., A. Hashim, and Abdul. 1994. *Rehabilitation on ex-tin mining land by agroforestry practice*. Journal of Tropical Forest Science 7(1): 113-127
- PT Timah Indonesia. 1990. *Studi Evaluasi Dampak Lingkungan*. Buku I-IV. PT Timah, Tbk. Pangkal Pinang.
- Thorne, C.R. 1990. Effects of Vegetation on Riverbank Erosion and Stability. In *Vegetation and Erosion*. J.B. Thornes (ed). John Wiley and Son Ltd. New York.