

THESIS CONTENT

ACKNOWLEDGEMENT	iii
THESIS CONTENT	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	viii
CHAPTER I: INTRODUCTION	1
1.1. Forest Rehabilitation in Tropical Regions	1
1.2. Nutrient Input from Litter-fall	2
1.3. Problem Formation	3
1.4. Wanagama Forest	4
1.5. Objective	5
CHAPTER II: RESEARCH REVIEW	6
2.1. Period for Forest Rehabilitation	6
2.2. Selection of 4 Tree Species	6
2.3. Calculation of Nutrient Input	8
2.4. Calculation of Tree Biomass	9
CHAPTER III: MATERIALS AND METHODS	10
3.1. Research Site	10
3.2. Original stands conditions at 4 sites	10
3.3. Production of Litter-fall	11
3.4. Decomposition of Litter-fall	11
3.5. Statistical Analysis	12
CHAPTER IV: RESULTS	13
4.1. Characteristics of 4 tree stands	13
4.2. Production rate of litter-fall in 4 species	14

4.3. Decomposition rate of litter-fall in 4 species	14
4.4. Nutrient input by 4 species	15
CHAPTER V: DISCUSSION	16
5.1. Difference in tree stand condition.....	16
5.2. Dynamics of litter-fall by each species.....	17
5.2.1. Mahogany	17
5.2.2. Teak.....	18
5.2.3. Acacia.....	19
5.2.4. Eucalypt.....	20
5.3. Nutrient input from litter-fall	21
CHAPTER VI: CONCLUSION.....	22
REFERENCES	23
APPENDICES	40

LIST OF TABLES

Table 1. Characteristics of litters in 8 different tree species in Wanagama forest.....	26
Table 2. Summary of litter properties among 8 tree species.....	27
Table 3. Characteristics of 4 tree stands.	36
Table 4. Nutrient input from litter-fall of 4 tree stands during May to June.....	39
Table A1. Initial litter condition for litter bag experiment.....	40

LIST OF FIGURES

Figure 1. Location of Wanagama forest in Java Island.....	28
Figure 2. Map of Wanagama forest and 4 research sites in this study.	29
Figure 3. Picture of mahogany site.	30
Figure 4. Picture of teak site.	31
Figure 5. Picture of acacia site.	32
Figure 6. Picture of eucalypt site.	33
Figure 7. Experimental design of plots with litter trap and litter bag.....	34
Figure 8. Litter trap and litter bag at field (above; a) and litter bag in detailed (below; b).	35
Figure 9. Production rate of litter-fall during May to June in 4 tree stands: leaves (above; a) and non-leaves (below; b).	37
Figure 10. Decomposition rate of litter-fall after 1 month and 2 month in 4 tree stands.	38
Figure A1. Different size and shape of leaves of 4 tree species.	41
Figure A2. Eucalypt oil naturally extracted from litter samples.	42

ABSTRACT

Recovery of soil nutrient is important for forest rehabilitation in degraded forest, which could be achieved by nutrient input from litter-fall. This study set the hypothesis that there were some tree species providing good nutrient input for faster forest rehabilitation. The objective of this study was to measure nutrient input from litter-fall by 4 different pioneer species (mahogany, teak, acacia, and eucalypt) in Wanagama forest, a rehabilitating forest in central Java Island. During 2 months in dry season, the production rate and decomposition rate of litters were measured at 4 tree stands by litter trap and litter bag, respectively. As a result, highest production rates were observed at acacia site (1.7 t ha^{-1}), followed by teak (1.6 t ha^{-1}), eucalypt (1.4 t ha^{-1}), and mahogany sites (0.8 t ha^{-1}) for 2 months. These values would be higher than data in other months because this research was conducted in dry season when production would be highest: in particular, deciduous teak trees. The highest decomposition rates were shown at mahogany site (33%), followed by eucalypt (31%), acacia (23%), and teak site (14%). Some data disagreed with other reference probably because of experimental limitation; for example, natural extraction (mass loss) of eucalypt oil was considered as decomposition and physical protect of teak leaves with litter bag prevented big leaves from being broken down, which overestimated and underestimated the value, respectively. Nevertheless, these results could clearly show different characteristics among each 4 species. However, nutrient input, calculated with reference of nutrient content in litters, showed all 4 species could provide good nutrient input in some elements: much K and Ca from mahogany, much N, P, and Mg from teak, C, N, and Na from acacia, and C, K, and Na from eucalypt. This finding implied that initial hypothesis may be wrong; instead, all species have some specific advantages and disadvantages in nutrient input.

Keywords: Forest rehabilitation, Pioneer species, Litter production, Litter decomposition