

Albizia Forest Management System In The Madiun Distric

Indah Rekyani Puspitawati^{1*}, Anang Susanto²

^{1,2}Departemen of Agricultural Science, of Merdeka Madiun University, Madiun East Java, Indonesia

Corresponden author:

Email: Asmadiun@yahoo.com

Abstract

Albizia forest management using agroforestry and monoculture systems needs to pay attention to the involvement of local communities in using natural resource areas. This study aims to determine the advantages of the agroforestry system, which is a mixture of albizia and mountain rice. The agroforestry system gave the best growth of albizia after three years. The mean Annual Increment diameter and height of 3-year-old albizia plants in agroforestry systems were 14.02 cm and 7.19 m, respectively. The agroforestry system is also believed to reduce the number of forest damage because local people who originally stole forest wood have begun to be diverted to more productive planting activities with an intensification pattern. The involvement of local communities in business activities based on natural resource management in various forms is part of the concept of corporate social responsibility. The agroforestry system is superior to the intensive monoculture pattern because it can absorb more labor and increase the income of local communities, creating cooperation and togetherness between companies. Furthermore, an agroforestry system can reduce the number of forest and land fires because local communities, as arsonists, will help protect their land and crops.

Keywords: Albizia, intensive, community, wood and planting.

I. INTRODUCTION

Community forest development based on evaluation results [1], the success rate of community forest management is almost 75%. Since 2017 the Ministry of Forestry has relaunched the community plantation forest program with encouraging results. The success of the plantation forest development program on the island of Java is particularly related to edapist factors, technology and technical adaptation [2], and socio-cultural conditions of the local community.

Participation of local community involvement in plantation forest management activities is often a severe calculation, especially security factors, area integrity, and threats to fire [3]. The management of the **albizia** forest in Madiun, which uses a monoculture system, is not only prone to pest and disease attacks and the degradation of local species diversity, is also prone to fires and pays little attention to the involvement of local communities in the utilization and development of natural resources in the vicinity. Research on the advantages of agroforestry in the management of plantation forests is fundamental. This study aims to determine the superiority of the agroforestry system, which is a mixture of **Albizia** and gogo rice (*Oryza sativa*), compared to intensive monoculture and conventional planting patterns in *albizia* plantation management activities.

II. RESEARCH METHODS

2.1 Study area

This research was conducted from September 2019 to April 2020 in the community Forest Madiun, East Java, Indonesia (figure 1). In this research area, there were 3-years-old *albizia* stands, Kendal *albizia* stands planted with a spacing distance of 3 m x 3 m. The research area is located at an altitude of \pm 162 meters above sea level, has 0% slope, and the type of soil is latosol. During the research, the study site temperature was 26-29°C, humidity 67.7-84%, and the average rainfall was 232 mm/monthly [4].

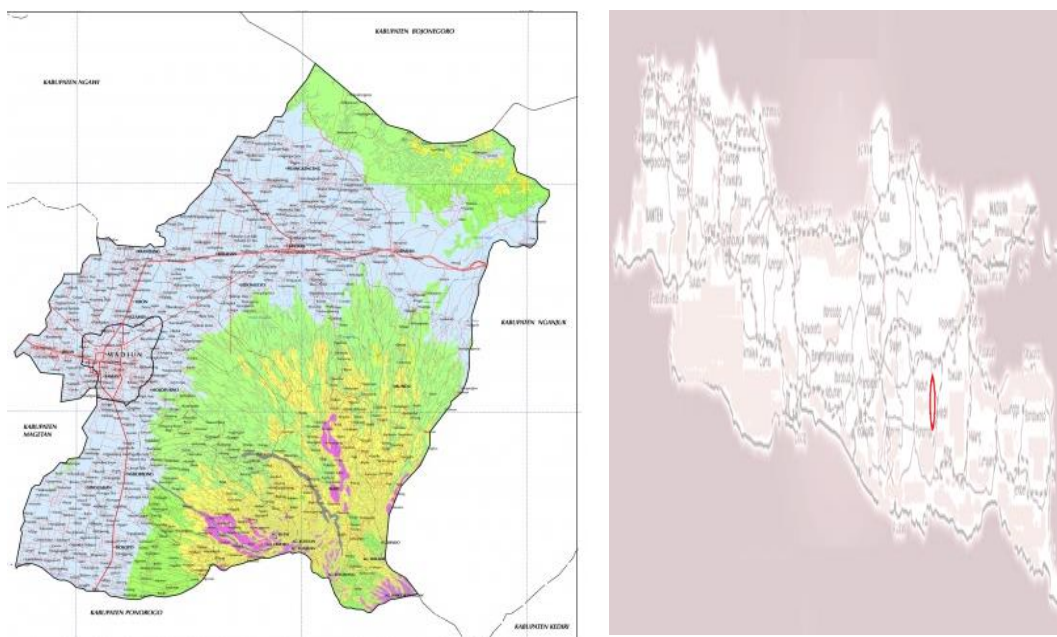


Fig. 1. Location map of the study areas

2.2 Research Procedure

Mapping session plants aged three years, continuing the observations of previous studies that have been carried out, including the agroforestry system (a mixture of albizia plants with continued fertilization) as the first treatment (t1), intensive monoculture patterns (albizia plants with continued fertilization) as the second treatment (t2) and conventional monoculture pattern (without further fertilization) as control (t3). Each plot measuring 20 m x 20 m (= 400 m²) with ten replications was randomly placed in the field.

The periodical measurement of the diameter and height of the second plant on all research plots was carried out on the 720 days to 721 days after planting, followed by continued fertilization using the composition of fertilizer SP-36, Urea, and KCl, each with a dose of 120 kg ha⁻¹ sowing in the expanse of planting land. Weed cleaning is done every three months; measurement of the diameter and height of albizia plants in the three treatments were carried out at the age of a 3-year-old .

2.3 Data Analysis

Analysis of variance (ANOVA) and inter-treatment test (LSD) on research data was carried out using SPSS 16.0

III. RESULTS AND DISCUSSIONS

3.1 Growth in Diameter and Height of Albizia

The focus of the research is on the pattern of planting of sengon plants in state forest areas. The data are taken from various places with the same age of sengon. Growth of albizia plant diameter and height in an agroforestry system, Intensive pattern monoculture, and conventional monoculture pattern are shown in Table 1

Table 1. The comparison of the growth pattern system

Variable	F test	cropping system		
		Agroforestry	Monocultur intensif	monocultur
Increase of total plant height (m)	ns	7,19	7,12	5,38
Increase of the stem diameter (cm)	ns	14,02	13,1	10,3
Total plant height (m)	*	212,4	197,4	107,8

Note: *= treatment has a significant effect at the 5% level respectively with a significant value (PrF) 0.05 (α), ns= treatment does not have a significant effect at the 5% level respectively with a significant value (Pr> F) 0.05 (α).

The inter-treatment test (The least significant difference test) on the average diameter and height data of albizia plants showed that the agroforestry system and the intensive monoculture pattern gave the same results (not significantly different), and both were other (better) than the conventional system. There is a positive correlation between the addition of diameter and plant height of albizia, and both are essential parameters in tree growth as well as an indicator that plants usually grow [5]

The results of research on the growth of the average diameter of a 3-year-old albizia plant are as shown in the following figure 2.

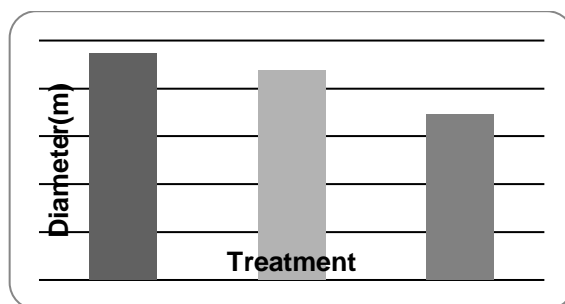


Fig 2. The average annual growth of diameter width of 3-year-old albizia stems

The results of research on the growth of the average high of a 3-year-old albizia plant are as shown in the following figure 3.

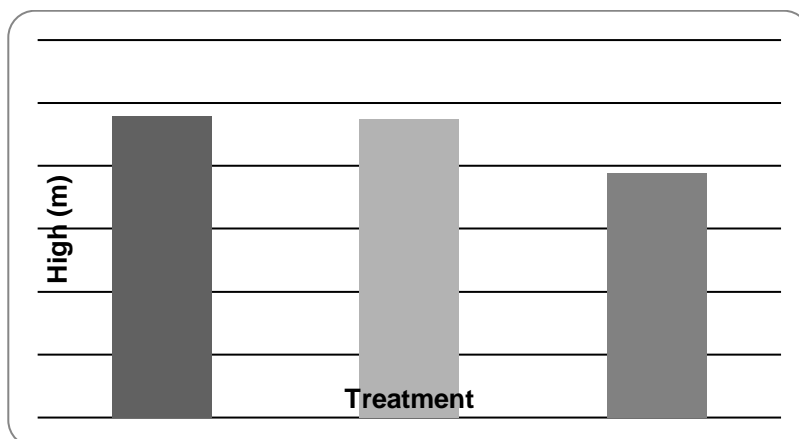


Fig.3. The average annual growth of heigh width of 3-year-old albizia stems

IV. DISSCUSION

The agroforestry system and intensive monoculture pattern resulted in diameter growth, and albizia plant height was as good as the control. Albizia plants are fast-growing species that require sufficient nutrients to keep up with the speed of their growth [6]. Although the former planting area of shrubs and alang-alang is included in the criteria for critical or degraded land (PP No.34/2002), the suitability of the place to grow is still a limiting factor for albizia plants [7], namely marginal soil with red-yellow podzolic species which acidic with high Fe and Al [8] content but with fertilizer application in the form of dolomite ($MgSO_4$) of 120 kg ha^{-1} and follow-up fertilizer with urea composition: 200 kg ha^{-1} , Super Phosphate-36: 150 kg ha^{-1} and KCl: 100 kg ha^{-1} can produce good albizia falcataria plant growth. [9] stated that plant growth is strongly influenced by land cultivation, site conditions, and plant suitability, the anorganic fertilizer used contains nutrients, especially N, P, and K needed plants, especially vegetative plants.

Mean Annual Increment diameter and height of albizia plants in the agroforestry system are $4,71 \text{ cm/year}$ and $2,39 \text{ m/year}$, respectively, which are equally good (not significantly different) with an intensive

monoculture system of 4,38 cm/year. And 2,37 m/year. Significant differences are shown in the conventional monoculture planting pattern, which is not accompanied by further fertilization. This pattern only has MAI diameter and height of albizia plants of 1,94 cm/year and 3,46 m/year, respectively, significantly different from the other two systems. The growth of albizia plants in agroforestry systems and intensive monoculture patterns in this study differed from the increments of albizia plants growing in other places with better edaphic conditions. Difference high and diameter of the resulting stem between treatments agroforestry and monoculture with the provision of anorganic fertilizer with control presumably due to the activity of cleavage and enlargement of cells in the lateral meristem resulting in a larger diameter of the rod and high. Based on the literature study, the Mean Annual Increment (MAI) diameter and height of albizia plants were 4.4 cm/year and 4.83 m/yr, respectively, 1.14-2.3 cm/year and 1.52 – 2.36 m/year in Semaras and 2.53 - 3.5 cm/year and 2.15 - 3.73 m/year [10]. Thus, the agroforestry system can be the main alternative in the development of plantation forests, especially in marginal lands scattered in Madiun Regency

Based on the study results, the agroforestry system gave the best yields of albizia plant growth as achieved in the intensive monoculture pattern. Thus, in terms of social, economic, and cultural aspects, the agroforestry system is superior to the intensive monoculture pattern because it can absorb more labor and increase the income of local communities, creating cooperation and togetherness between companies and local communities so that a sense of mutual care and belonging grows. A similar opinion was also expressed [11]. Furthermore, according to [12], the agroforestry system also has advantages in increasing the positive perception of the community towards the development of plantation forests and agroforestry systems in general.

Another benefit of agroforestry systems is the protection against hazards in forest and land fires. Many studies state that most of the causes of forest and land fires are human-intentioned factors. The tradition of local communities around the forest is to clear land for planting by burning. This method can cause more expansive fires in the woods and surrounding land, especially if the land used is close to fuel stockpiles, such as grasslands or shrubs [13]. The agroforestry system can reduce the number of forest and land fires because local communities, as arsonists, will help protect their land and crops.

V. CONCLUSION

Agroforestry systems and intensive monoculture systems applied to the management of plantation forests provide better growth staple crops albizia than conventional monoculture systems.. MAI diameter of albizia plants in agroforestry systems, intensive monoculture and conventional monoculture respectively 4,71 cm/year; 4,38 cm/year and 1.94 cm/year. The agroforestry system is the best choice in the development of plantation forests because, in addition to providing good albizia plant growth yields (not significantly different from the intensive monoculture pattern), agroforestry can create jobs, increase people's incomes. Local communities, fostering a mutual sense of belonging to access to natural resources, create positive perceptions of plant and agroforestry development, maintain forest security, and reduce the rate of forest degradation.

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