JPPIPA 9(11) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Identification Of Types Companion Plants for Aren Plants *(Arenga Pinnata Merr)* and Agroforestry Patterns of Community Forests Area

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Received: August 9, 2013
Revised: October 21, 2023
Accepted: November 25, 2023
Published: November 30, 2023

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DOI: 10.29303/jppipa.v9i11.4936

Abstract: The aren palm plant is a multi-purpose plant, where almost all parts of this plant can be utilized. One of them is nira water which can be used as sugar. his study aims to identify types of companion plants for sugar palm and agroforestry patterns used in community forests in South Tapanuli Regency. The research method used in this study was a field survey in three villages that have community forests. The results showed that there were 17 types of companion plants growing around the sugar palm plants. The pattern of the agroforestry system that occurs in the forests of South Tapanuli Regency is natural. The results showed that coffee plants were dominated in Simaninggir and Bulu Mario villages, while in Aek Nabara village it was dominated by zalacca plants.

Keywords: Agroforestry Patterns; Aren Plants; Community Forests Area; Companion Plants

Introduction

Forests have an important role both for the preservation of nature and for the continuity of life (Kuuluvainen et al., 2019). Where the forest is a part of the ecosystem that produces Non-Timber Forest Products (NTFP) (Nedeljković, 2020; Rahman et al., 2021; Talukdar et al., 2021). Communities who's living around the forest can certainly take advantage of NTFPs either directly or indirectly. From various NTFP products that have high economic value, humans can obtain them for free and do not require difficult technology (Husen et al., 2021; Simangunsong et al., 2020). So that it can be ascertained that the existence of NTFPs will greatly affect the lives of the people who live around the forest, where the presence of NTFPs will be able to meet the needs of food, clothing and other needs (Suhesti & Hadinoto, 2015). Aren is a non-timber forest product that is widely used by residents around the forest. Sugar palm plants have two goals: conservation and trade (Tahnur et al., 2020; Winarno et al., 2019).

Sugar palm is one of the important forest plants in Indonesia. This plant grows naturally in forests and is considered a multi-use plant that has the potential to improve people's welfare. Apart from being used for the production of palm sugar and sap, palm plants also provide benefits in terms of reforestation, soil and water conservation, and erosion control (Mulyanie & Romdani, 2018; Putuhuhu et al., 2011). A formula in the form of guidelines for agroforestry systems in improving the environment is needed in an effort to identify alternative solutions in efficient land use to reduce erosion rates (Naharuddin, 2018; Utami et al., 2003). Agroforestry is how to manage land in a sustainable manner with a balance of economic, ecological and social factors, agroforestry combines

How to Cite:
Harahap, D.E., Kuswardani, R.A., Siregar, T.H., & Darwis, M. (2023). Identification of Types Companion Plants for Aren Plants (Arenga Pinnata Merr) and Agroforestry Patterns of Community Forests Area. *Jurnal Penelitian Pendidikan IPA*, *9*(11), 10302–10307. https://doi.org/10.29303/jppipa.v9i11.4936

forest trees and plants with seasonal crops, especially agriculture and animal husbandry (Rosati et al., 2021; Sahoo et al., 2020; Samosir et al., 2021).

In South Tapanuli Regency, there are forests which are habitat for sugar palm plants (P. Harahap et al., 2018) in which there are also several types of plants that live side by side with sugar palm plants. Unintentionally, the community has been able to take advantage of wood and non-timber forest products to increase the welfare of the community where the composition of plant species that make up the sugar palm plants and plants that grow around the sugar palm plants (Pusat Statistik Tapanuli Selatan, 2020). However, information about the types of companion plants that live around the sugar palm plantations in the forests of South Tapanuli Regency is still limited. Therefore, research on companion plants in sugar palm forests, especially in forests in South Tapanuli Regency, needs to be carried out to provide more complete information about the types of companion plants that exist and their benefits in agroforestry systems. The purpose of this study was to identify and evaluate the types of companion plants that live around sugar palm plants and agroforestry patterns in community forests in South Tapanuli Regency.

Method

This research was conducted in three villages with two sub-districts in South Tapanuli Regency North-Sumatera Province, respectively: Simaninggir Village, Bulu Mario Village (Sipirok District) and Aek Nabara Village (Marancar District) South Tapanuli Regency.

This study used a descriptive research design with a field survey method (Mishra & Alok, 2022). This study determined the sample at points in the village community forest that had been determined in South Tapanuli Regency. Data collection techniques were carried out in this paper using field survey methods (Guest et al., 2020). Then carried out observations and identification of companion plants that grow around the sugar palm plants on each plant that is used as a sample.

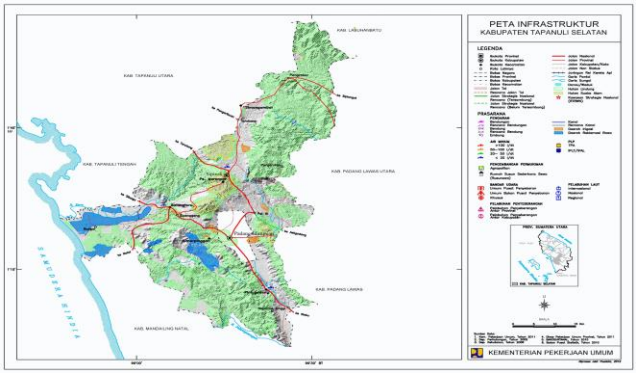

Figure 1. Research Location Map

Data collection is done by: Direct observation; direct observation was carried out at each predetermined research location (Pandey & Pandey, 2021). Identification was carried out on each of the sugar palm plants found and then recorded regarding the presence of companion plant species that grew around the sugar palm plants; Interview; interviews were conducted with the local community as landowners to obtain an explanation about the sugar palm and companion plants that grow around the sugar palm. Interviews were conducted directly with the landowners, where the answer was obtained that the sugar palms and companion plants that grow in community forests were not actually planted by the community but grew naturally. So, it can be concluded that there is no cultivation system carried out by the community as the land owner. Data analysis in this paper using descriptive analysis by calculating the percentage of each type of companion plant found in each sample plant. The results of data analysis will be presented in the form of tables and graphs.

Result and Discussion

Land Conditions in Research Locations

Based on the topography, the land conditions in the two sub-districts which are the research locations are different, where for Sipirok sub-district (Simaninggir Village and Bulu Mario Village) are at altitudes above 900 m asl, while for Marancar Sub-district (Aek Nabara Village) are at altitudes of 400 – 800 m asl (Pusat Statistik Tapanuli Selatan, 2020).

Under these conditions, it will cause differences in the types of plants that grow around the sugar palm plants in the research location, where the types of plants that reproduce at each location will adjust to the growing conditions of the plants that become companion plants for the sugar palm plants. Where plants can grow well depends on the characteristics of the plants themselves and the altitude of the location (D. E. Harahap, 2017; Nathalie et al., 2020).

Companion Plant Type Composition

The composition of plant species that make up the sugar palm plants and the plants that grow around the sugar palm plants (Amzu et al., 2020; Asyraf et al., 2022), which is often referred to as the agroforestry system, is between the sugar palm plants and companion plants in the forest of South Tapanuli Regency which consists of existing plant species (Table 1).

Table 1. Composition of Agroforestry Plant Types in the Forest of South Tapanuli Regency

Local Name	Latin Name	Utilization Section
Karet	*Hevea brasiliensis*	Latex
Salak	*Salacca zalacca*	Fruit
Kulit Manis	*Cinnamomum verum*	the skin
Durian	*Durio zibetinus*	Fruit
Kopi	*Coffea*	Fruit
Pisang	*Ceiba petandra*	Fruit
Coklat	*Theobroma cacao*	Fruit
Markisa	*Passion fruit*	Fruit
Rambutan	*Nephelium lapacium*	Fruit
Jambu	*Pseudium guajava*	Fruit
Alpukat	*Persia americana*	Fruit
Manga	*Mangifera indica*	Fruit
Jengkol	*Archidendron fauciflorum*	Fruit
Kepundung	*Baccaurea racemosa*	Fruit
Sikkam	*Bischotia javanica*	Skin
Pakis	*Diplazium esculentum*	Leaf
Tambiski	*Eurya acuminata*	Leaf

Table 1 shows that most of the plant species that make up agroforestry are habituated plants to be used as fruit producers. In addition, there are also types of plants that produce leaves and bark as a food source and food flavoring. This shows that the characteristic of agroforestry on community land is still in the form of providing food sources. According to Nugroho et al., (2022) and Tamrin et al. (2015), agroforestry plays a role in improving people's welfare, as well as ensuring adequate food supply, and also as a source of raw materials for biofuels and environmental services for the community.

Composition of Types of Companion Plants in Simaninggir Village

The composition of companion plant species found in the community forest of Simaninggir Village generally consists of plants (Table 2). From table 2 it can be seen that in Simaninggir Village the types of plants that are often found as companion plants for sugar palm plants are dominated by coffee and followed by other plants. To see how big the percentage of the number of companion plants can be seen in Figure 2.

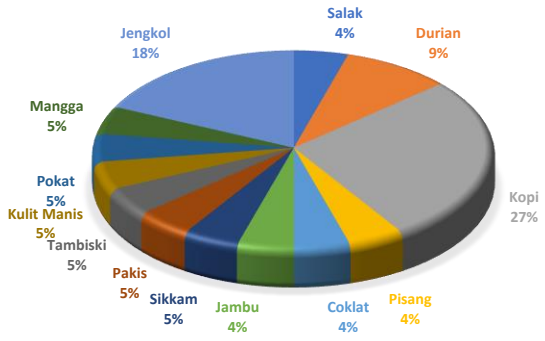

Figure 2. Percentage Composition of Palm Agroforestry Plant Types in Simaninggir Village

Table 2. Composition of Palm Agroforestry Plant Types in BSimaninggir Village

Nama Lokal	Amount
Salak	1
Durian	2
Kopi	6
Pisang	1
Coklat	1
Jambu	1
Sikkam	1
Pakis	1
Tambiski	1
Kulit Manis	1
Pokat	1
Mangga	1
Jengkol	1

Composition of Companion Plant Types in Bulu Mario Village

The composition of companion plant species found in the community forest of Bulu Mario Village generally consists of plants (Table 3).

Table 3. Composition of Palm Agroforestry Plant Types in Bulu Mario Village

Local Name	Amount
Karet	2
Salak	4
Kulit Manis	4
Durian	1
Kopi	19
Pisang	1
Coklat	7
Markisa	1
Rambutan	1
Jambu Bol	1
Kapundung	1

From table 3 it can be seen that in Bulu Mario Village the types of plants that are often found as companion plants for sugar palms are also dominated by coffee plants, followed by cacao and other plants. To see how big the percentage of the number of companion plants.

Composition of Types of Companion Plants in Aek Nabara Village

The composition of companion plant species found in the community forest of Bulu Mario Village generally consists of plants (Table 4).

Table 4. Composition of Palm Agroforestry Plant Types in Aek Nabara Village

Local Name	Amount
Karet	5
Salak	8
Durian	2
Coklat	2
Kulit Manis	3

From table 4 it can be seen that in Aek Nabara Village, the types of plants that are often found as companion plants for aren palms are dominated by snakefruit plants, followed by rubber, cinnamon, durian and cocoa. To see how big the percentage of the number of companion plants.

Agroforestry Pattern

From the results of research in the field it can be seen that the pattern of agroforestry systems that occur in the forests of South Tapanuli Regency is a natural process where both the sugar palm plants and plants that grow around the sugar palm plants grow naturally without any intervention from humans, so that both the distance planting or types of plants that grow as companion plants around palm plants vary greatly. From the results of identification in the field of the companion plants that grow around the sugar palm plants, it was found that the plants that dominate growing around the sugar palm plants depend on the area where the sugar palm plants grow, meaning that the companion plants that grow are in accordance with the morphological characters of the companion plants themselves (Ilyas et al., 2018).

Table 5. Composition of Agroforestry Plant Types Based on Altitude Place

Research Places	Altitude Place	Companion Plants	%
Simaninggir	836 - 965	Coffee	27
Bulu Mario	907 - 1.116	Coffee	45
Aek Nabara	410 - 785	Snakefruit	40

From Table 5 it can be seen that in the three research locations that were used as research sites it can be seen that for areas with elevations above 800 m asl Sipirok District (Simaninggir Village and Bulu Mario Village) companion plants that grow around sugar palm plants are dominated by coffee types arabica. At an altitude of more than 1000 m above sea level, Arabica coffee thrives and develops a good taste (Nurdiansyah et al., 2018).

Meanwhile, for the Marancar District (Aek Nabara Village) with an altitude of 400–800 m asl, it was found that the snakefruit dominates growing around the sugar palm as a companion plant. This condition occurs because many people's lands in Aek Nabara Village are planted with snakefruit (Ritonga et al., 2022), states that when viewed from its productivity, Marancar is one of the snakefruit producing villages in South Tapanuli Regency.

Conclusion

There are 17 types of companion plants that grow around the sugar palm plants. The types of accompanying plants in Simaninggir Village and Bulu Mario Village are dominated by coffee, while in Aek Nabara Village they are dominated by snakefruit. The pattern of agroforestry that occurs naturally.

Acknowledgments

The authors would like to thank all parties who have contributed towards the implementation of this research.

Author Contributions

This article was prepared by four authors who worked together solidly in completing each stage. The four authors of this article are D.E.H, R.A.K, T.H.S.S, and M.D.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

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