

Study of Palm Plant Productivity (*Arenga pinnata merr.*) Based on Differences in Companion Plants

Kajian Produktivitas Tanaman Aren (*Arenga pinnata merr.*) Berdasarkan Perbedaan Tanaman Pendamping

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ABSTRACT

This research was conducted in Aek Nabara Village, Marancar District, South Tapanuli Regency. This study aims to determine the production of sap and palm sugar production based on differences in companion plants. Plant samples were taken from rubber companion plants, snakefruit companion plants, cinnamon companion plants, durian companion plants, and cacao companion plants. The highest sap production was found in sugar palm plants with durian companion plants, while the lowest sap production was found in sugar palm plants with rubber companion plants. The highest sugar production was found in palm plants with rubber companion plants, while the lowest sugar production was found in sugar palm plants with cinnamon companion plants.

Keywords: *Palm Plants, Companion Plants, Productivity*

ABSTRAK

Penelitian ini dilakukan di Desa Aek Nabara Kecamatan Marancar Kabupaten Tapanuli Selatan. Penelitian ini bertujuan untuk mengetahui Produksi Nira dan Produksi Gula Tanaman Aren Berdasarkan Perbedaan Tanaman Pendamping. Sampel tanaman yang diambil mulai dari tanaman pendamping karet, tanaman pendamping salak, tanaman pendamping kayu manis, tanaman pendamping durian, dan tanaman pendamping kakao. Produksi nira tertinggi dijumpai pada tanaman aren dengan tanaman pendamping durian, sedangkan produksi nira terendah dijumpai pada tanaman aren dengan tanaman pendamping karet. Untuk produksi gula tertinggi dijumpai pada tanaman aren dengan tanaman pendamping karet, sedangkan produksi gula terendah dijumpai pada tanaman aren dengan tanaman pendamping kayu manis.

Kata Kunci: Tanaman Aren, Tanaman Pendamping, Produktivitas.

INTRODUCTION

In Indonesia, sugar palm plants are abundant and spread almost throughout the archipelago, especially in humid hilly areas (Sunanto, 1993), and grow individually or in groups (Alam and Suhartati, 2000). Heyne (1950) reported that the plant Sugar palm often grows from sea level to an altitude of 1,300 meters above sea level. But this plant prefers places with an altitude of 500-1,200 meters above sea level (Lutony, 1993) and when cultivated in places with an altitude of 500-700 meters above sea level will give

satisfactory results (Soeseno, 1993). 1992).

In Aek Nabara Village, Marancar District, South Tapanuli Regency, the majority of the population works as farmers. Sugar palm which grows wild in the Marancar forest makes many farmers who manage sugar palm as a source of livelihood that has economic value that can meet the needs of daily life. Most of the palm farmers prefer to use sugar palm from sap water which is processed into high quality brown sugar and has a fairly high selling price.

Sugar palm is a multi-purpose plant, because almost all parts of this plant can be

used, such as sap (the main ingredient of palm sugar, beverages, vinegar and alcohol), a source of bioethanol energy, a source of carbohydrates (flour), a mixture of drinks (kolang-kaling) and as a conservation plant for critical land (Darmadi Erwin 2017).

Palm sugar is generally not a cultivated plant, but a plant that grows naturally from seeds brought by animals that eat ripe palm fruit (Plantation Office of Lampung Province, 2001). Many sugar palm plants grow wild in the forest, whose name is also a forest ecosystem, there must be many plants that live in the forest, so that around the place where sugar is grown, there must be many wild plants that also grow around the place where the sugar is grown, which are called companion plants. There are also farmers who deliberately plant various kinds of cultivated plants around the empty sugar palm land in order to increase the farmer's income. Companion plants that grow, so that

it will affect the amount of sap production or the quality of the sap that comes out of the sugar palm.

MATERIALS AND METHODS

The location where this research study is conducted is a forest in the Marancar area, South Tapanuli Regency which has sugar palm stands with predetermined criteria, namely based on the criteria for companion plants. Marancar village has an altitude of 400 to 800 meters above sea level.

The materials used in this study were from each sugar palm plant that had been designated as a sample plant. The tools used in this study include a cauldron, knife, spatula, firewood, stationery and ladder. These tools really support the author in researching various types of sugar palm companion plants.

Table 1. Companion plant data taken in the field

No	Plant Sampel	Companion Plant Type
1	Plant 1	Rubber, Cacao, snakefruit , Durian
2	Plant 2	Cinnamon
3	Plant 3	Durian, snakefruit , Cinnamon
4	Plant 5	snakefruit
5	Plant 8	Durian, Cinnamon
6	Plant 9	Rubber, Durian
7	Plant 10	Rubber, cinnamon, snakefruit , Durian
8	Plant 11	snakefruit , Rubber
9	Plant 12	Rubber , snakefruit , Durian
10	Plant 13	Cacao, snakefruit , Cinnamon, coconut
11	Plant 14	snakefruit , Durian, Mango, Rubber
12	Plant 15	Rubber , Cinnamon , snakefruit , Durian, Petai
13	Plant 16	snakefruit , Rubber , Cinnamon , Durian, Petai
14	Plant 17	snakefruit , cacao , Cinnamon
15	Plant 18	snakefruit , cacao , Cinnamon
16	Plant 19	Cinnamon , snakefruit , Durian
17	Plant 20	cacao, Durian, Rubber
18	Plant 21	snakefruit , Rubber
19	Plant 22	Cinnamon , Durian
20	Plant 23	snakefruit , Rubber

Observations on the development of palm plants in the field were carried out by surveys. While the sampling method is carried out by *purposive sampling*, which is

done by taking samples from the population based on certain criteria (Jogiyanto, 2008). The data taken in the field are companion plant data with the number of samples in this

study were 20 samples / companion plants.

The data obtained in the field is then tabulated based on indicators and parameters that have been determined in order to obtain an average value of each indicator or par these meters. From the tabulation results, the data is processed using linear regression analysis and correlation, according to the linear model as follows:

$Y = a + bX$ Where: Y: Sugar Palm Production A: Intercepts B: Correlation Coefficient X = Companion Plants

Next, a correction test is carried out to find the relationship between independent variables with a significant difference test of the correlation coefficient (R^2). Sampling of sap was carried out on each sample plant, according to the specified companion plant. Then each of the sap results taken from each stem will be analyzed for the sap content. To find out the average sap production, calculations were made on the yield of sap produced/tree for 1 week.

Growth Parameters

The parameters used in this study are companion plants, the way is by looking directly at the sugar palm plants that are used as sample plants to determine the effect of various types of companion plants on the production of sap produced by sugar palm plants.

Analysis of Sap Levels

The process of processing sap into palm sugar is done by cooking the sap using a cauldron. The fuel used is firewood. 3 liters of palm sap is heated for 1.5 hours (the sap is ready to be poured into the mold) where the sap will become thick and red-brown in color which then the thick sap is put into the prepared mold. After the palm sugar is dry and cold, the palm sugar is weighed.

RESULTS AND DISCUSSION

From Figure 1, it can be seen that the influence of companion plants on the average production of the highest sap found in durian companion plants while the lowest was in rubber companion plants.

From Figure 2 it can be seen that the

influence of companion plants on the average sugar production is highest found in rubber companion plants while the lowest was found in cinnamon companion plants.

Based on Figure 1, it can be seen that the companion plant that has the highest sap production is durian. The sugar palm plant which only has a height of approximately 30 meters which makes it shaded by a durian tree which causes the palm to be protected from direct sunlight, so that the productivity of sap water increases because the protective tree can make the area around the sugar palm moist.

Based on Setiadi's statement (1992:4), "the durian tree does not want to succumb to other trees around it. Villagers say, the durian tree has the ability to "catch up with the sun". Because, while there are other trees that are still tall, the durian tree will not stop growing, and the branches will not stop stretching. Therefore, in virgin forests, the height of durian can reach 50 m, the circumference of the trunk is also gigantic." Meanwhile, the lowest sap production was found in rubber companion plants. Rubber is a plant that is intentionally planted by sugar palm farmers to fill vacant land and can increase farmers' income. planting rubber with an intercropping system is the distance between the plants should not be too tight so that there is no competition for nutrients. If there is competition, both the main plant and the intercropped plant, its growth will be stunted (M. Syakir, 2010: 36-37). Rubber plants have a taproot type, the taproots of rubber plants can grow up to a depth of 2 meters in the soil. In addition, for lateral roots or roots whose growth direction extends to the side can even reach 10 meters. These lateral roots are used by rubber plants to absorb nutrients or nutrients and water from the soil. Because rubber is very greedy for nutrients, it causes sugar palm lack of nutrients so that the production of sap is low.

In contrast to the productivity of sap water, the companion plant that has the highest sugar productivity is the rubber companion plant. Although in the production of sap, rubber companion plants have low sap water productivity, but in terms of sugar productivity, rubber companion plants have high sugar

productivity. This is in accordance with the opinion of Darmadi Erwin (2017) which states that the decrease in the amount of sugar produced is related to the production of sap where the higher the production of

sap, the sugar content contained in it will decrease, which means the water content is higher than the sugar content so that it will we find that high sugar production is at lower sap production.

Table 2. Average sap production based on companion plants

No	Sample	Companion Plants	Production (l)
1	1, 9, 10, 12, 15	Rubber	2.45
2	21, 5, 23, 11, 14, 16, 17, 18	Snakefruit	2.64
3	2, 22, 19	Cinnamon	2.80
4	3, 8	Durian	3.13
5	13, 20	Cacao	2.77

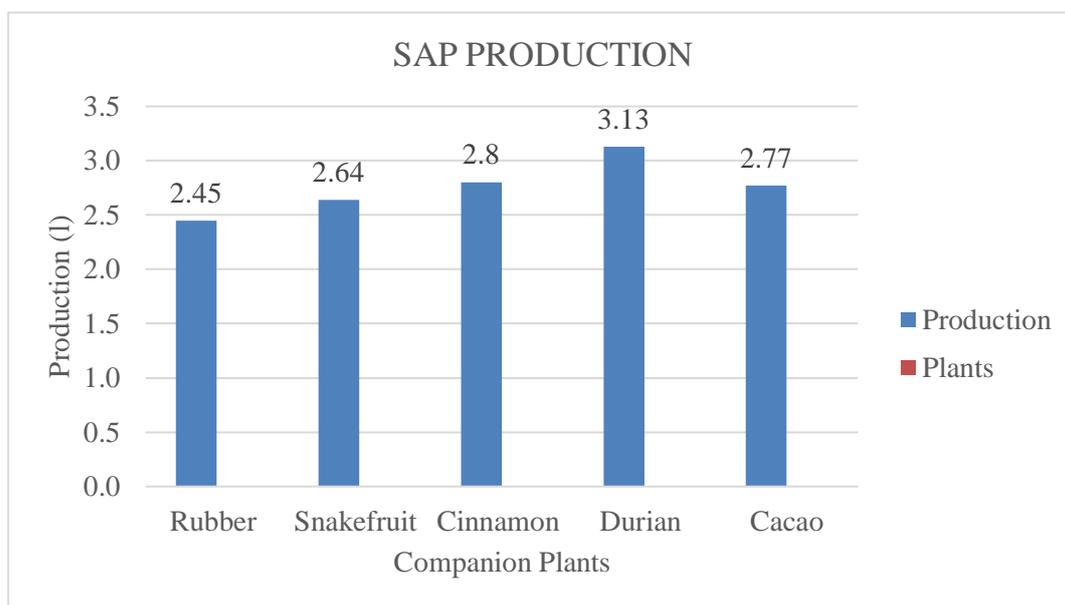


Figure 1. Diagram of the influence of companion plants on the production of sap

Table 3. Average palm sugar production based on companion plants

No	Sample Plants	Companion Plants	Sugar Production (l)
1	1, 9, 10, 12, 15	Rubber	0.46
2	21, 5, 23, 11, 14, 16, 17, 18	Snakefruit	0.31
3	2, 22, 19	Cinnamon	0.27
4	3, 8	Durian	0.38
5	13, 20	Cacao	0.32

Companion plant that has the lowest sugar productivity is cinnamon. In accordance with the opinion (Harmoko 2012), cinnamon plants are classified as cormus plants (*organum nutritivum*) with roots having taproot, vascular and brown in color. Taproot is the main root which is fleshy and very distant into the soil with only a few lateral roots growing from the main root (Fried and Hademenos, 1999).

Because deep in the soil, cinnamon roots can absorb nutrients, water and absorb nutrients deep in the soil. Sugar palm which only has fibrous roots can only take nutrients and food substances that are only around where it grows. Therefore, between sugar palm and cinnamon creates competition in absorbing nutrients from the soil which causes palm sugar levels to be low.

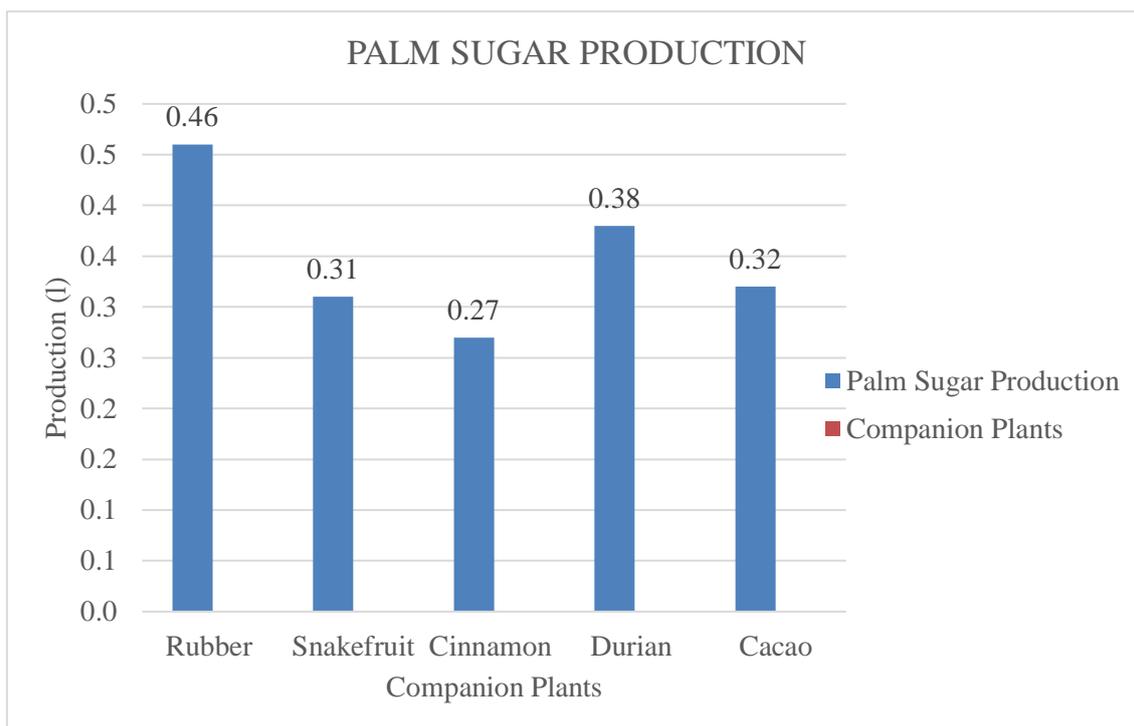


Figure 2. Diagram of the influence of companion plants on sugar production

CONCLUSION

Companion plants affect the productivity of sap water and sugar productivity in palm plants. The highest sap production was found in sugar palm plants with durian companion plants, while the lowest sap production was found in sugar palm plants with rubber companion plants. The highest sugar production was found in palm plants with rubber companion plants, while the lowest sugar production was found in sugar palm plants with cinnamon companion plants. The higher sugar production, the lower sap production and vice versa. Cinnamon has a taproot, cinnamon roots can absorb nutrients, water and absorb nutrients deep in the soil. Sugar palm which only has fibrous roots can only take nutrients and food substances that are only around where it grows. Therefore, between sugar palm and cinnamon creates competition in absorbing nutrients from the soil which causes palm sugar levels to be low.

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