

Analysis of Oil Palm Production Potential Based on Plantation Area in Major Oil Palm-Producing Provinces of Indonesia

Heri Setyawan^{1*}, *Agus Manto*¹, *Wandha Atmaka Aji*¹, *Adhitya Kurniadhi*², *Theofilus Tejo Murti*²

¹ Program studi Pembibitan Kelapa Sawit, Akademi Komunitas Perkebunan Yogyakarta, Yogyakarta, Indonesia

² Program studi Budi Daya Kelapa Sawit, Akademi Komunitas Perkebunan Yogyakarta, Yogyakarta, Indonesia

*Corresponding author: herisetiawan@akpy-stiper.ac.id

Article History: Received: 16 June 2026, Final Revision: 02 July 2026, Accepted: 15 July 2026, Online Publication: 31 July 2026

ABSTRACT

Oil palm is one of the leading plantation commodities that contributes significantly to the Indonesian economy. Plantation area is one of the main factors influencing oil palm production. This study aimed to analyze the potential of oil palm production based on plantation area in several major oil palm-producing provinces in Indonesia. A descriptive quantitative approach was employed using secondary data from ten major oil palm-producing provinces in Indonesia in 2024. The variables analyzed included plantation area, production, and oil palm productivity. Data were analyzed using descriptive statistics, Pearson correlation analysis, and simple linear regression. The results showed that Riau Province had the largest plantation area and production, reaching 3,490,000 ha and 9,130,000 tons, respectively, while Central Kalimantan recorded the highest productivity at 3.67 tons/ha. Pearson correlation analysis revealed a very strong positive relationship between plantation area and oil palm production, with a correlation coefficient of $r = 0.973$. Furthermore, simple linear regression analysis produced the equation $Y = 2.7218X + 94,434$ with a coefficient of determination (R^2) of 0.9476, indicating that 94.76% of the variation in oil palm production could be explained by plantation area. These findings demonstrate that plantation area is the dominant factor affecting oil palm production in the major oil palm-producing provinces of Indonesia. Therefore, increasing oil palm production can be achieved through the optimization of plantation land utilization and improvements in plantation productivity.

Keywords: oil palm, plantation area, production, Pearson correlation, simple linear regression.

INTRODUCTION

Oil palm is one of the strategic plantation commodities that has an important role in the Indonesian economy. This commodity not only contributes to the supply of raw materials for the vegetable oil industry, but also becomes a source of foreign exchange for the country through the export of palm oil products and their derivatives,

[1] Indonesia is still the largest palm oil producer in the world with a significant contribution to the global market. Indonesia has an oil palm plantation area which is divided into three groups, the first is the large state plantation of 577,937 hectares, the large private plantations of 8,614,259 hectares, and the smallholder plantations of 6,736,516, with a

total area of 15,928,712, [2]. The large role of the oil palm sector makes the management and development of oil palm plantations one of the priorities in the development of the plantation sub-sector.

The development of oil palm plantations in Indonesia is shown by the increase in area and production spread across various regions, especially on the islands of Sumatra, Kalimantan, and Sulawesi. Provinces such as Riau, North Sumatra, South Sumatra, Central Kalimantan, and West Kalimantan are known as the main centers of national palm oil production. A large plantation area provides opportunities to increase production, but the size of the area does not always reflect high productivity and efficiency of plantation management, [3]. Therefore, a study is needed to examine the relationship between plantation area and oil palm production in major oil palm-producing provinces in Indonesia.

Oil palm production is influenced by various factors, including planting area, plant age, quality of planting material, agroclimatic conditions, application of cultivation technology, and plantation management [4]. Among these factors, area is one of the easiest indicators to

observe and is often used to describe the production potential of an area. Analysis of the relationship between area and production is important to know the extent to which an increase in plantation area can contribute to an increase in oil palm production.

Several previous studies have shown a positive relationship between plantation land area and plantation commodity production levels, [5]. However, an increase in area is not always followed by a proportionate increase in production due to other factors that also affect plantation production performance. Therefore, an analysis of major oil palm-producing provinces is needed to obtain a more comprehensive picture of oil palm production potential.

This study aims to analyze the area and oil palm production in several major oil palm-producing provinces in Indonesia and examine the relationship between the area and oil palm production. The results of this study are expected to provide information on oil palm production potential in major oil palm-producing provinces in Indonesia and support future plantation development planning.

MATERIALS AND METHODS

This study uses a descriptive quantitative method by utilizing secondary data obtained from the publication of oil palm plantation statistics in 2024. The research data covers ten major oil palm-producing provinces in Indonesia, namely Riau, North Sumatra, South Sumatra, Jambi, Central Kalimantan, West Kalimantan, East Kalimantan, Central Sulawesi, West Sulawesi, and South Sulawesi. Data collection, processing, and analysis were conducted in March 2026 using data obtained from the Central Statistics Agency (BPS). The variables used in this study consisted of oil palm plantation area (ha) as an independent variable (X) and oil palm production (tons) as a dependent variable (Y). In addition, palm oil productivity (tons/ha) is calculated as a supporting variable to describe production efficiency in each province. Productivity is calculated using the following equation:

$$\text{Productivity} = \frac{\text{Production}}{\text{Plantation Area}}$$

The data obtained was then analyzed using descriptive statistics to describe the characteristics of oil palm area, production, and productivity in Indonesia's major oil palm-producing provinces. The descriptive statistics used include the minimum, maximum, average, total, and percentage of each province's contribution to the total area and production.

The relationship between area and oil palm production was analyzed using Pearson correlations. This analysis aims to determine the direction and degree of closeness of the relationship between the two research variables. The value of the correlation coefficient (r) is interpreted based on the level of relationship, namely very weak (0.00–0.19), weak (0.20–0.39),

medium (0.40–0.59), strong (0.60–0.79), and very strong (0.80–1.00).

Furthermore, the influence of area on oil palm production was analyzed using simple linear regression with the model: $Y=a+bX$

With Y being oil palm production (tons), X is the area of oil palm plantations (ha), a is the constant, and b is the regression coefficient. Regression

analysis was used to measure the magnitude of the influence of area on oil palm production in Indonesia's major oil palm-producing provinces. All data was processed using Microsoft Excel and analyzed quantitatively to produce information on oil palm production potential based on the area of plantations.

RESULTS AND DISCUSSION

This study aims to analyze the potential of palm oil production based on the area of several major oil palm-producing provinces in Indonesia in 2024. The analysis was carried out using data on oil palm area and production obtained from the publication of plantation statistics. The results of the study are presented in the form of tables and graphs to provide an overview of the distribution

of area, production levels, productivity, and the relationship between area and oil palm production in Indonesia's major oil palm-producing provinces. The discussion focused on identifying the provinces with the highest production potential and the influence of area on oil palm production as the basis for the development of the national oil palm plantation sector.

Table 1. Plantation Area, Production, and Productivity of Oil Palm in Major Oil Palm-Producing Provinces of Indonesia in 2024

No	Province	Plantation Area (Ha)	Production 2024 (Tons)	Productivity (Tons/Ha)
1	Riau	3.490.000	9.130.000	2,62
2	Sumatera Utara	2.010.000	5.120.000	2,55
3	Sumatera Selatan	1.400.000	3.960.000	2,83
4	Jambi	1.190.000	2.750.000	2,31
5	Kalimantan Tengah	2.030.000	7.450.000	3,67
6	Kalimantan Barat	1.945.000	4.950.000	2,54
7	Kalimantan Timur	1.320.000	3.900.000	2,95
8	Sulawesi Tengah	152.000	470.000	3,09
9	Sulawesi Barat	73.578	250.165	3,40
10	Sulawesi Selatan	44.014	129.841	2,95

Based on Table 1, the area and production of palm oil in Indonesia's major oil palm-producing provinces in 2024 show significant differences between regions. Riau is the province with the largest oil palm plantation area, reaching 3,490,000 ha with a production of 9,130,000 tons. This condition shows that Riau is still the main center of national oil palm plantations. The large area owned contributes greatly to the total oil palm production

produced, [6].

Central Kalimantan occupies the second position with an area of 2,030,000 ha and production reaches 7,450,000 tons, followed by North Sumatra with an area of 2,010,000 ha and production of 5,120,000 tons. The high production observed in these provinces indicates that Sumatra and Kalimantan remain the main centers of oil palm production in Indonesia. In addition to

extensive plantation areas, efficient plantation management, harvesting systems, and transportation facilities also contribute to supporting higher production levels, [7].

On the other hand, Central Sulawesi, West Sulawesi, and South Sulawesi have a relatively smaller area than other provinces. Despite this, the productivity achieved by these provinces is quite competitive. West Sulawesi has a productivity of 3.40 tons/ha, while Central Sulawesi reaches 3.09 tons/ha. This value is higher than some provinces that have a larger area, such as Jambi and West Kalimantan. These findings show that area size is not the only factor that determines the success of oil palm production, but is also influenced by the

efficiency of plantation management, crop quality, and the application of cultivation technology, [8].

The highest productivity in this study was found in Central Kalimantan at 3.67 tons/ha, while the lowest productivity was found in Jambi at 2.31 tons/ha. These differences in productivity indicate that there is a variation in the level of land use efficiency in each province. Therefore, increasing oil palm production can not only be done through expanding plantation areas, but also through efforts to increase crop productivity and more effective plantation management. Comparison of Oil Palm Area and Production in the Indonesian Palm Oil Center Province is presented in Figure 1 below:

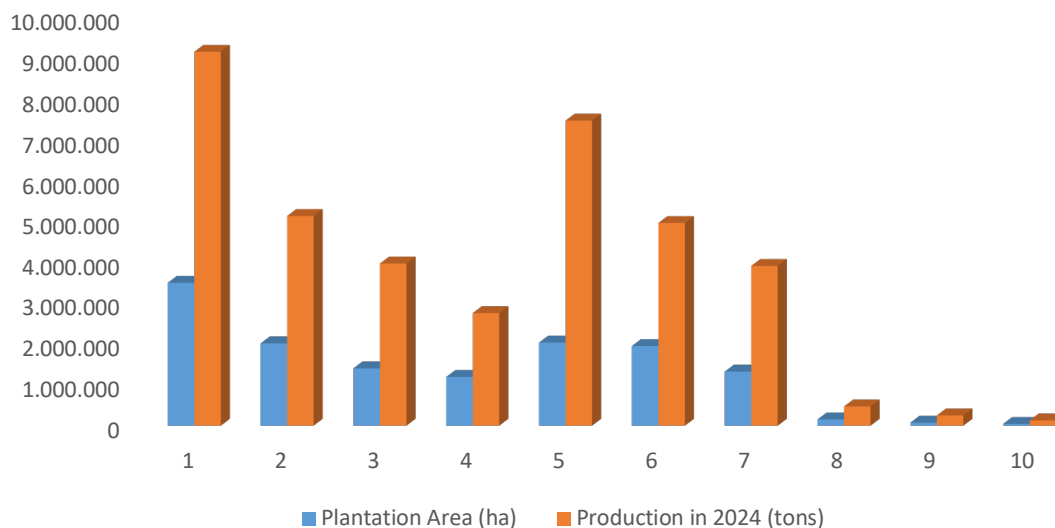


Figure 1. Comparison of Plantation Area and Oil Palm Production in Major Oil Palm-Producing Provinces of Indonesia in 2024

Figure 1 shows that provinces with larger oil palm plantation areas tend to have higher production rates. Riau is the province with the largest area and production, which is 3.49 million ha and 9.13 million tons, respectively. The same pattern is also seen in Central Kalimantan and North Sumatra. In contrast, West Sulawesi and South Sulawesi have relatively low area and production. In general, the graph shows a tendency to have a positive relationship between area and oil palm production in Indonesia's major oil palm-

producing provinces, [9]. Based on Figure 1, it also shows that productivity and area in the Sumatra and Kalimantan regions tend to be greater than in Sulawesi Province. To strengthen the findings regarding the relationship between area and oil palm production, a Pearson correlation analysis was conducted. This analysis aims to measure the degree of closeness of the relationship between the two variables so that it can be known to what extent the area contributes to the increase in oil palm production in Indonesia's major oil palm-

producing provinces. The results of Pearson's correlation analysis are presented in Table 2.

Table 2. Results of Pearson's Correlation Analysis between Area and Oil Palm Production in the Palm Oil Center Province Indonesia

Variabel	Plantation Area	Production
Plantation Area (Ha)	1	0,973
Production 2024 (Tons)	0,973	1

The results of Pearson's correlation analysis in Table 2 show a correlation coefficient value of $r = 0.973$, which indicates a very strong positive relationship between area and oil palm production in Indonesia's major oil palm-producing provinces. Correlation values close to one indicate that an increase in area is likely to be followed by an increase in oil palm production. Thus, the area is one of the main factors that contribute to the production capacity of palm oil at the provincial level. This relationship is reflected in the data presented in Table 1. Riau as the province with the largest area, which is 3,490,000 ha, produces the highest production of 9,130,000 tons. The same

pattern is also seen in Central Kalimantan and North Sumatra which have relatively high area and production.

On the other hand, West Sulawesi and South Sulawesi, which have a smaller area, only produce relatively low production. These findings show that area is an important factor in supporting oil palm production. However, production is not only influenced by the area of the area, but also by other factors related to crop productivity [10]. Therefore, a simple linear regression analysis was carried out to measure the magnitude of the influence of area on oil palm production. The results of regression analysis are presented in Figure 2.

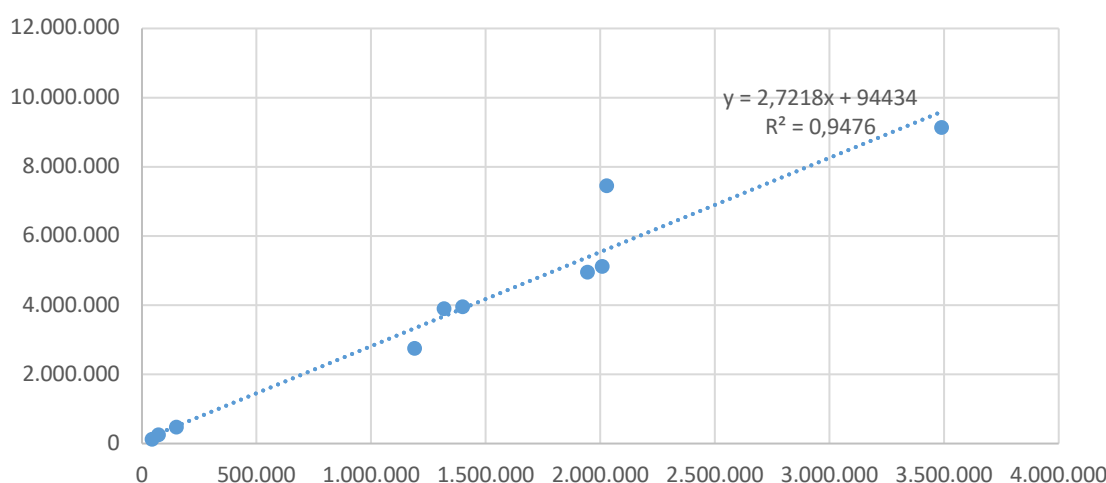


Figure 2. Relationship Between Plantation Area and Oil Palm Production in Major Oil Palm-Producing Provinces of Indonesia in 2024

The results of the simple linear regression analysis in Figure 2 show a positive relationship between area and oil palm

production in Indonesia's major oil palm-producing provinces. The regression equation obtained is $Y = 2.7218X + 94.434$, which

indicates that the increase in the area of plantations tend to be followed by an increase in oil palm production

The regression coefficient with a positive value shows that the area plays an important role in determining the production capacity of oil palm in an area. The value of the determination coefficient ($R^2 = 0.9476$) showed that 94.76% of the variation in oil palm production could be explained by the area of the plantation while the remaining 5.24% was influenced by other factors outside the study model. This value shows that area is the dominant factor that affects palm oil production at the provincial level. The area of the plant area can also be interpreted as the large number of plants that affect the productivity, [11]. This result is also in line with Pearson's correlation analysis which yields a correlation coefficient value of $r = 0.973$, thus strengthening the

existence of a very close relationship between the two variables.

The dot distribution in Figure 2 shows that most of the data follows a pattern of regression lines that are formed. Provinces with large areas, such as Riau, Central Kalimantan, and North Sumatra, tend to produce high production, while provinces with smaller areas produce relatively low production. However, the variation in productivity between provinces shows that oil palm production is not only influenced by the area, but also by other factors such as seed quality, age of the crop produced, plantation management and climate, [12]. One of them is in the province of Sulawesi where the soil fertility level tends to be less fertile than the soil in Sumatra, [13]. Therefore, increasing oil palm production can be done through a combination of area expansion and increasing existing land productivity.

CONCLUSION

Based on the results of the study, the area of oil palm plantations in Indonesia's major oil palm-producing provinces has a very strong relationship with oil palm production. Riau is the province with the largest area and production, which is 3,490,000 ha and 9,130,000 tons, respectively, while Central Kalimantan has the highest productivity of 3.67 tons/ha. The results of Pearson's correlation analysis showed a correlation coefficient value of $r = 0.973$, which indicates a very strong positive relationship between area and oil palm production. Simple linear regression analysis yielded the equation $Y = 2.7218X + 94.434$ with a coefficient of determination value (R^2) of

0.9476, which shows that 94.76% of the variation in oil palm production can be explained by plantation area. These findings confirm that area size is the dominant factor influencing palm oil production at the provincial level. Therefore, increasing oil palm production can be done through optimizing the use of plantation areas and increasing productivity through the application of cultivation technology and more effective plantation management. Further research is recommended to include other variables that have the potential to affect palm oil production in order to obtain a more comprehensive model.

ACKNOWLEDGEMENTS

The authors would like to thank the Director of the Yogyakarta Plantation Community Academy (AKPY) for the support and facilities provided during this research. Appreciation is also extended to fellow researchers and colleagues for their cooperation, discussions,

and assistance throughout the research process. The authors are grateful to the Central Statistics Agency (BPS) for providing the data used in this study. Finally, thanks are given to all parties who contributed to the completion of this research.

REFERENCES

- [1] H. Setyawan, S. M. Rohmiyati, and J. H. Purba, "Application of Cow Manure, Urea and NPK Fertilizer Combination on the Growth of Palm Oil (*Elaeis Guineensis* Jacq) in Pre-Nursery," *Agro Bali Agric. J.*, vol. 3, no. 1, pp. 74–83, Jun. 2020, doi: 10.37637/ab.v3i1.419.
- [2] B. P. Statistik, "Statistik Kelapa Sawit Indonesia 2023," *Badan Pus. Stat.*, vol. 17, no. 1–160, 2024.
- [3] N. P. Daulay, O. N. Ramadani, E. V. Agata, and M. Hamid, "Analisis Perkembangan Produksi Kelapa Sawit Berdasarkan Luas Lahan dan Jumlah Pabrik Kelapa Sawit (Studi Pada Kabupaten Rokan Hulu)," vol. 4, no. 2, pp. 11335–11342, 2025.
- [4] T. Ningsih, I. O. Y. Sitompul, and S. D. Siahaan, "Analisa Faktor-Faktor Yang Mempengaruhi Produksi Kelapa Sawit Di Kebun Tanah Raja PT . Bakrie Sumatera Plantations Analysis Of Factors Affecting Oil Palm Production In Tanah Raja Plantation Of PT . Bakrie Sumatera Plantation Penelitian dilaksanakan di Kebun Tanah Raja PT . Bakrie Sumatera," no. 2, pp. 166–174, 2023.
- [5] Williadi, As'ad, and T. D. Arsyah, "Pengaruh Luas Lahan dan Jumlah Produksi Kelapa Sawit terhadap Produk Domestik Regional Bruto (PDRB) Sub. Sektor Perkebunan di Propinsi Bengkulu Tahun 2011-2021," *Econ. Rev. J.*, vol. 3, no. 3, pp. 2385–2397, 2024, doi: 10.56709/mrj.v3i3.379.
- [6] Ismiasih and H. Afroda, "Faktor Penentu Produksi Kelapa Sawit Rakyat di Provinsi Riau The Determinant Factor of Smallholder Palm Oil Production in Riau Province," *J. Penelit. Pertan. Terap.*, vol. 23, no. 2, pp. 211–218, 2023, doi: <http://dx.doi.org/10.25181/jppt.v23i2.2726>.
- [7] A. R. Shuib *et al.*, "Journal of the Saudi Society of Agricultural Sciences Development of a harvesting and transportation machine for oil palm plantations," *J. Saudi Soc. Agric. Sci.*, vol. 19, no. 5, pp. 365–373, 2020, doi: 10.1016/j.jssas.2020.05.001.
- [8] A. Sigit, S. Mardiyati, and Hasriani, "Jurnal Agristan," *J. Agristan*, vol. 7, no. 2, pp. 99–106, 2025, doi: <https://doi.org/10.37058/agristan.v7i2.16847> ISSN.
- [9] S. Yonanda, E. Rahayu, and N. Andayani, "Produktivitas Tanaman Kelapa Sawit (*Elaeis Guineensis* Jacq) pada Topografi Berbeda di Estate BKCE PT . BUMITAMA GUNAJAYA AGRO (BGA)," vol. 2, pp. 1–8, 2024.
- [10] M. J. Suhartono, H. Setyawan, and W. A. Aji, "Identifying Plant Age to Determine Production Trend of Oil Palm Fresh Fruit Bunches," vol. 6, no. 2, pp. 378–384, 2023.
- [11] A. Bobby, W. Fitrianti, and S. Oktoriana, "Analisis Faktor-faktor yang Memengaruhi Produktivitas Kelapa Sawit Rakyat Pola Swadaya di Desa Sungai Daka Kecamatan Sungai Laur Kabupaten Ketapang Analysis of Factors Affecting the Productivity of Smallholder Oil Palm in the Self-Help Pattern in Sungai Daka Village , Sungai Laur District , Ketapang Regency," vol. 11, pp. 2153–2165, 2025.
- [12] N. Nadia, S. Xiao, S. Nabilah, S. Salleh, H. Xu, and C. Chen, "Heliyon Nonlinear impacts of climate anomalies on oil palm productivity," *Heliyon*, vol. 10, no. 15, p. e35798, 2024, doi: 10.1016/j.heliyon.2024.e35798.
- [13] R. A. P, A. D. Utami, P. Romadhon, and H. Setyawan, "Evaluation of Land Suitability for Coconut Plants in Airmadidi District , North Minahasa Regency , North Sulawesi," *SEAS (Sustainable Environ. Agric. Sci.)*, vol. 08, no. 02, pp. 89–96, 2024, doi: <http://dx.doi.org/10.22225/seas.8.2.10595>. 89-95.