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FACTORS AFFECTING THE INCOME OF PATCHOULI FARMERS IN WEST WOYLA AND WOYLA DISTRICTS, WEST ACEH REGENCY

FAKTOR-FAKTOR YANG MEMPENGARUHI PENDAPATAN PETANI NILAM DI KECAMATAN WOYLA BARAT DAN WOYLA KABUPATEN ACEH BARAT

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Abstract

Patchouli farming is an important source of rural income in West Aceh. However, farmers still face unstable earnings due to differences in cultivated land area, selling price, production costs, and production volume. This study aimed to analyze the factors affecting the income of patchouli farmers in the West Woyla and Woyla Districts of West Aceh Regency. A quantitative field-study approach was used. Primary data were collected through observation, interviews, and structured questionnaires involving 27 patchouli farmers selected using saturated sampling. The data were analyzed using multiple linear regression, with farmer income as the dependent variable and land area, selling price, farming cost, production volume, farming experience, and education as independent variables. The results showed that the regression model explained 87.9% of the variation in farmer income. Simultaneously, the six independent variables significantly affected income (F = 32.595; p = 0.000). Partially, land area, selling price, and production volume had positive and significant effects on income, whereas farming cost had a negative and significant effect. Farming experience and education did not significantly affect income. These findings indicate that increasing patchouli farmers' income should prioritize productive land use, production improvements, cost efficiency, and stronger price management, rather than relying solely on farming experience or formal education.

***Keywords**: patchouli, farmer income, multiple linear regression, farming cost, West Aceh*

Abstrak

Usahatani nilam merupakan salah satu sumber pendapatan penting bagi petani di Aceh Barat, namun pendapatan petani masih tidak stabil karena perbedaan luas lahan, jumlah produksi, harga jual, dan biaya produksi. Penelitian ini bertujuan untuk menganalisis faktor-faktor yang memengaruhi pendapatan petani nilam di Kecamatan Woyla Barat dan Woyla, Kabupaten Aceh Barat. Penelitian ini menggunakan pendekatan kuantitatif dengan metode studi lapangan. Data primer dikumpulkan melalui observasi, wawancara, dan kuesioner terhadap 27 petani nilam yang dipilih menggunakan teknik sampling jenuh. Data dianalisis menggunakan regresi linier berganda dengan pendapatan sebagai variabel dependen, sedangkan luas lahan, harga jual, biaya usahatani, jumlah produksi, pengalaman, dan pendidikan sebagai variabel independen. Hasil penelitian menunjukkan bahwa model regresi mampu menjelaskan 87,9% variasi pendapatan petani. Secara simultan, seluruh variabel independen berpengaruh signifikan terhadap pendapatan (F = 32,595; Sig. = 0,000). Secara parsial, luas lahan, harga jual, dan jumlah produksi berpengaruh positif dan signifikan terhadap pendapatan, sedangkan biaya usahatani berpengaruh negatif dan signifikan terhadap pendapatan. Pengalaman dan pendidikan tidak berpengaruh signifikan terhadap pendapatan. Temuan ini menunjukkan bahwa peningkatan pendapatan petani nilam perlu diarahkan pada

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penguatan skala usaha, peningkatan produksi, strategi harga, dan efisiensi biaya, bukan hanya mengandalkan pengalaman atau pendidikan formal petani.

Kata Kunci: nilam, pendapatan petani, regresi linear berganda, biaya usahatani, Aceh Barat

INTRODUCTION

Patchouli (*Pogostemon cablin* Benth.) is a tropical herb that produces essential oil widely used as a raw material in the perfume, cosmetics, and pharmaceutical industries. As a smallholder plantation crop, patchouli has considerable economic value and can serve as an important source of household income for rural farmers. In Aceh, patchouli is also strategically important because the province is one of Indonesia's major patchouli-producing regions.

The development of patchouli farming in West Aceh, however, still faces a fundamental problem: farmer income is unstable. Several factors, including land area, selling price, production costs, production volume, farming experience, and education, influence income variation. The problem becomes more serious because patchouli cultivation requires approximately seven to eight months before harvest. As a result, mistakes in input allocation, cost control, harvesting, processing, or marketing can directly reduce farmer income.

Data from the Forestry and Plantation Office of West Aceh Regency in 2020 showed that West Woyla had the largest number of patchouli farmers in the regency, with 136 farmer households, while Woyla had 69 farmer households. These two districts remain active patchouli-producing areas and therefore provide a relevant empirical setting for examining the determinants of patchouli farmer income.

Previous studies have shown that farm income is generally affected by production factors, selling price, land area, cost structure, experience, and education. Nevertheless, the strength and direction of these effects may differ across regions because farmers operate under different land conditions, input-use patterns, production technologies, market access, and price information systems. Therefore, a location-specific analysis is needed to identify which factors most strongly determine patchouli farmers' income in the West Woyla and Woyla Districts.

This study aimed to analyze the effects of land area, patchouli selling price, farming costs, production volume, farming experience, and education on patchouli farmers' income in the West Woyla and Woyla Districts of West Aceh Regency.

RESEARCH METHODS

This research was conducted in the West Woyla and Woyla Districts of West Aceh Regency from September to February 2024. The research location was selected purposively because both districts remain active patchouli cultivation areas in West Aceh.

The study used a quantitative field-study approach. The population consisted of farmers who cultivated, or had previously cultivated, patchouli on land they managed in the West Woyla and Woyla Districts. The sample was determined using saturated sampling, in which all eligible

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members of the population were included as respondents. The total sample comprised 27 farmers, including 20 from West Woyla District and 7 from Woyla District.

The study used both primary and secondary data. Primary data were collected through field observation, direct interviews, and structured questionnaires. The observed variables included respondent characteristics, land area, selling price, farming cost, production volume, farming experience, education, revenue, and income. Secondary data were obtained from relevant institutions, previous studies, and supporting literature.

Farm revenue was calculated by multiplying the quantity of production by the selling price. Farmer income was calculated as the difference between total revenue and total cost. In mathematical form, total revenue was expressed as TR = P x Q. In contrast, income was expressed as Pi = TR - TC, where TR is total revenue, P is the selling price, Q is the production volume, TC is the total cost, and Pi is the farmer's income.

Multiple linear regression was used to analyze the factors affecting patchouli farmer income. The model was specified as $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e$, where Y is farmer income, X_1 is land area, X_2 is selling price, X_3 is farming cost, X_4 is production volume, X_5 is farming experience, X_6 is education, a is the constant, b1-b6 are regression coefficients, and e is the error term. The analysis included classical assumption tests, the coefficient of determination, the F-test, and the t-test at a 5% significance level.

RESULTS AND DISCUSSION

Characteristics of Respondents and Patchouli Farming Conditions

The study involved 27 patchouli farmers. Most respondents were within the productive age range, were male, and had elementary-level formal education. These characteristics indicate that patchouli farming in the study area still relies heavily on household labor and practical field experience. However, field experience alone does not necessarily lead to higher income unless it is supported by efficient use of inputs, appropriate cultivation practices, and sound marketing decisions.

Table 1. Main Characteristics of Patchouli Farmers in West Woyla and Woyla Districts

No	Characteristic	Dominant category	Number	Percentage
1	Age	41-50 years	11 farmers	42%
2	Sex	Male	25 farmers	93%
3	Education	Elementary school	14 farmers	52%
4	Family dependents	1-5 persons	26 farmers	96%
5	Land area	1 ha	15 farmers	56%
6	Farming experience	5-10 years	17 farmers	63%

Source: Primary data processed, 2024

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Most farmers managed one hectare of patchouli land, while the remaining farmers cultivated less than one hectare. Land area is important because it directly determines the potential production scale. In patchouli farming, a larger land area allows farmers to plant more patchouli and achieve higher biomass and essential oil yields, provided that cultivation and input management are properly implemented.

Cost, Revenue, and Income of Patchouli Farming

Patchouli farming costs consisted of fixed and variable costs. Fixed costs included the depreciation of equipment such as sprayers, hoes, and machetes. Variable costs included seedlings, fertilizer, pesticides, sacks, labor, and distillation. Variable costs accounted for the largest share of total production costs, especially for seedlings and labor.

Table 2. Average revenue and income of patchouli farmers

No	Item	Average value
1	Essential oil production	96 kg
2	Essential oil price	IDR 712,963/kg
3	Revenue	IDR 131,821,429
4	Total cost	IDR 25,203,120
5	Income	IDR 83,215,411

Source: Primary data processed, 2024

The average income of patchouli farmers in West Woyla and Woyla Districts was IDR 83,215,411 per production season. This figure indicates that patchouli has strong economic potential. However, income was not evenly distributed among farmers because it depended on land area, production volume, selling price, and cost efficiency. Farmers with higher yields and better cost control earned higher incomes than those who relied solely on traditional practices or experience.

Classical Assumption Tests

The regression model was evaluated using classical assumption tests. The multicollinearity test showed that all independent variables had tolerance values above 0.10 and VIF values below 10, indicating that the model was free from multicollinearity. The heteroscedasticity test using a scatterplot showed that the residual points were randomly distributed above and below zero without a clear pattern, indicating that heteroscedasticity was not detected. Therefore, the regression model was considered appropriate for estimating the effects of the independent variables on patchouli farmer income.

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Multiple Linear Regression Analysis

Table 3. Summary of Coefficient of Determination and F-test Results

Indicator	Value	Interpretation
R	0.952	Very strong relationship
R Square	0.907	Variation in income explained by the model
Adjusted R-Square	0.879	Independent variables explained 87.9% of income variation
F-statistic	32.595	Simultaneous effect detected
Sig. F	0.000	Significant at the 5% level

Source: SPSS output processed, 2024

The adjusted R-squared value of 0.879 indicates that 87.9% of the variation in patchouli farmer income was explained by land area, selling price, farming cost, production volume, farming experience, and education. The remaining 12.1% was explained by other factors outside the model, such as market access, oil quality, distillation technology, farmer institutions, and price fluctuation. The F-test yielded a significance value of 0.000, indicating that all independent variables collectively had a significant effect on patchouli farmers' income.

Table 4. Partial Test Results of Factors Affecting Patchouli Farmer Income

Variable	Coefficient B	t-statistic	Sig.	Interpretation
Constant	-88,452,927.433	-2.123	0.046	-
Land area (X1)	17,355,275.399	2.128	0.046	Positive and significant
Selling price (X2)	141.497	2.473	0.022	Positive and significant
Farming cost (X3)	-1.582	-3.958	0.001	Negative and significant
Production volume (X4)	631,810.361	8.445	0.000	Positive and significant
Farming experience (X5)	177,726.634	0.434	0.669	Not significant
Education (X6)	-240,557.209	-0.330	0.745	Not significant

Source: SPSS output processed, 2024

The estimated regression equation was $Y = -88,452,927.433 + 17,355,275.399X_1 + 141.497X_2 - 1.582X_3 + 631,810.361X_4 + 177,726.634X_5 - 240,557.209X_6 + e$. The equation shows that land area, selling price, production volume, and farming experience had positive coefficients, while farming cost and education had negative coefficients. However, only land area, selling price, farming cost, and production volume were statistically significant at the 5% level.

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Effect of Land Area on Income

Land area had a positive and significant effect on patchouli farmer income, with a significance value of 0.046. The coefficient of 17,355,275.399 indicates that an increase in land area tends to increase income when other variables are held constant. This result is logically consistent with agribusiness, as land area determines the number of plants, biomass production, and potential essential oil output. Farmers with larger landholdings have greater opportunities to increase revenue and income, especially when appropriate inputs and crop management support land use.

Effect of Selling Price on Income

The selling price had a positive and significant effect on income, with a significance value of 0.022. This means that higher selling prices directly increased farmer income. The finding is important because patchouli oil prices are often volatile. Farmers who can access market information, choose the right time to sell, dry and store patchouli before distillation, or improve product quality are more likely to obtain better prices and increase income.

Effect of Farming Cost on Income

Farming costs had a negative and significant effect on income, with a significance value of 0.001. The coefficient of -1.582 indicates that higher costs reduce income unless proportional increases in output or product value match them. This result does not mean that farmers should unthinkingly cut all production costs. Instead, they must distinguish between productive costs and inefficient costs. Seedlings, fertilizer, pesticides, labor, and distillation costs should be managed so that every additional cost contributes to higher production, better oil quality, or improved market value.

Effect of Production Volume on Income

Production volume was the strongest determinant of income, as shown by the t-statistic of 8.445 and a significance value of 0.000. The coefficient of 631,810.361 indicates that higher production directly increased farmer income. In patchouli farming, production volume is affected by land area, planting distance, seedling quality, fertilization, pest and disease control, crop maintenance, and distillation performance. Therefore, strategies to increase farmer income should place productivity and product quality at the center of farm management.

Effect of Farming Experience and Education on Income

Farming experience did not significantly affect income, as indicated by a significance value of 0.669. This finding shows that longer experience in patchouli farming does not automatically result in higher income. Some experienced farmers may continue to use traditional practices and may avoid fertilizers, pesticides, or other productive inputs. In contrast, less experienced farmers may earn comparable or higher incomes by adopting more appropriate cultivation and input management practices.

Education also did not significantly affect income, with a significance value of 0.745. This suggests that formal education was not the primary factor differentiating farmers' incomes in the study area. Income was determined more directly by technical and economic decisions at the

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farm level, particularly land area, production volume, selling price, and farming costs. Nevertheless, this result should not be interpreted as meaning that education is unimportant. Non-formal education, such as extension services, cultivation training, financial management training, and market information support, remains essential because it is directly connected to farmers' production and marketing decisions.

CONCLUSION

Land area, selling price, farming cost, production volume, farming experience, and education simultaneously had a significant effect on the income of patchouli farmers in the West Woyla and Woyla Districts of West Aceh Regency. Partially, land area, selling price, and production volume had positive and significant effects on income, while farming cost had a negative and significant effect. Farming experience and education did not have a significant effect on patchouli farmers' income.

The findings imply that increasing patchouli farmer income should focus on productive land use, production improvement, efficient cost management, and better selling-price strategies. Farmers should not rely solely on experience; they need to adopt more efficient cultivation practices, use inputs appropriately, improve post-harvest handling, and base marketing decisions on price information. Local agricultural institutions should support farmers through extension services, market information systems, and technical training on patchouli cultivation and distillation efficiency.

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