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by Puspitahati Puspitahati

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Original Article

Analysis of Factors Influencing Rubber Farmers' Knowledge of Climate Change in Rambang District, Muara Enim Regency, Indonesia

Eva Juniar Andika[1], Amin Rejo[2]* and Puspitahati[2]

[1]*Master Program of Environmental Management, Sriwijaya University, Padang Selasa Street No. 524, Bukit Besar, Palembang 30139, South Sumatra, Indonesia.*
[2]*Agricultural Technology and Agriculture Faculty, Sriwijaya University, Padang Selasa Street No. 524, Bukit Besar, Palembang 30139, South Sumatra, Indonesia.*

**Correspondence E-mail: aminrejo@unsri.ac.id*

Abstract

Objective: The quality of rubber sap and variables related to climate change substantially impact rubber producers' revenue. This study aimed to collect fundamental information on climate change understanding and analyze the factors influencing rubber farmers' knowledge in one of the rubber plantation centers, Rambang Sub-district. Methods: The study employed a mixed-method approach, combining quantitative and qualitative methodologies. This research was conducted in Rambang District, Muara Enim Regency. Purposive sampling would be used to choose the respondents. The study utilized SPSS version 27.0 for MacBook to conduct data analysis, employing descriptive correlation analysis and multiple linear regression analysis methods.. Results: Respondents in the research were categorized based on education, age, rubber farming experience, number of family dependents, average rubber income, and total rubber plantation. All farmers agree that climate change has occurred and can feel it. Conclusion: 70.42% of rubber farmers know of climate change, whereas 29.58% are uninformed. Partially (t-test), the variables of age and total rubber plantation significantly affect knowledge of climate change. The variable level of education, rubber gardening experience, number of dependents, and income do not considerably affect the understanding of climate change rubber tapping farmers in Rambang District, Muara Enim Regency. Drawing from research findings, it's evident that both the age of rubber farmers and the extent of rubber plantation tapping influence their level of knowledge. Therefore, initiating climate change education for rubber farmers at a young age is advisable. Additionally, rubber farmers must comprehend alterations in the conditions of tapped rubber plantations.

Keywords: *Climate change, Rambang District, rubber farmer*

Introduction

Climate change is already hurting everything and will keep doing so, including rubber productivity. In its most recent report, the Intergovernmental Panel on Climate Change (IPCC) has issued a stronger push than ever to regulate greenhouse gases (Intergovernmental Panel on Climate Change, 2021). Rubber manufacturing is already impacted by climate change (Hadi *et al.*, 2022; Jacob *et al.*, 2022; Pinizzotto *et al.*, 2021) regarding the nation's capacity for exporting, Indonesia's natural rubber exports, both in terms of volume and value, exhibited a declining trend between 2017 and 2021 (Syarifa *et al.*, 2023). One of the plantation commodities that contributes foreign exchange to the Indonesian state is rubber plantation, listed as a superior product (BPS, 2020). The quality of rubber sap and variables related to climate change substantially impact rubber producers' revenue (Hadi & Hardiansah, 2023), rainfall affects water availability (Ulya *et al.* 2019), and decreased productivity (Rosana *et al.*, 2020). Facing the challenges of climate change on rubber (Junaidi, 2019), extensive knowledge of climate change is needed. Climate change knowledge constitutes the accuracy of an

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individual's understanding of climate change (Fischer & Broek, 2021).

Climate change knowledge is essential for society (Sulistyawati *et al.*, 2018). Farmers' level of expertise has a significant impact since the more knowledge they hold, the more insight and knowledge they might be receptive to regarding advances in their farms. The level of education is an influential factor in understanding climate change (Kabir *et al.*, 2016). The lack of farmers' knowledge of climate change in terms of rubber cultivation (Junaidi, 2019) causes low rubber productivity, poor rubber quality, and destroyed rubber prices, which will reduce the purchasing power of rubber farmers (Brown & Rosendo,2000). Adequate knowledge and skills in rubber cultivation are essential to achieve better quality (Wiyanto & Kusnadi, 2013).

Farmers aware of climate change will behave reactively and anticipate the effects of climate change (Suriati *et al.*, 2023). However, research on rubber farmers' knowledge of climate change is rarely carried out and never done in Rambang District, which is the center of the rubber commodity. For this reason, it is necessary to record the knowledge of rubber farmers about climate change. This study aimed to collect fundamental information on climate change understanding and analyze the factors influencing rubber farmers' knowledge in one of the rubber plantation centers, Rambang Sub-district.

Research Methods

Location and Time of Research

This study was carried out in Rambang Sub-district, Muara Enim Regency, which has 13 villages, namely Negeri Agung Village, Baru Rambang Village, Sugihan Village, Sukarami Village, Tanjung Dalam Village, Tanjung Raya Village, Pagar Agung Village, Sugih Waras Village, Sumber Rahayu Village, Marga Mulia Village, Kencana Mulia Village, Air Keruh Village, and West Sugih Waras Village. The research was conducted from October to November 2023.

Research Procedure

The study employed a mixed-method approach, combining quantitative and qualitative methodologies to obtain more comprehensive, valid, reliable, and objective data (Sugiyono, 2016). In-depth interviews and a review of the literature were the main approaches used to acquire data, with the use of questionnaire techniques. Purposive sampling would be used to choose the respondents. One strategy for selecting samples (respondents) intentionally based on certain factors or standards from reliable sources is the purposive sampling approach (Sugiyono, 2016). The purposive sampling approach was used to choose the samples; samples were selected based on predetermined criteria to get sampling units that met the intended requirements. To pick 142 respondents, each community had to have a minimum of 10 representatives who could speak for that village.

Data Analysis

The study utilized SPSS version 27.0 for MacBook to conduct data analysis, employing descriptive correlation analysis and multiple linear regression analysis methods. Descriptive correlation analysis was used to understand the relationships between variables, while multiple linear regression analysis was employed to investigate how independent variables affect the dependent variable. In this study, the dependent variable, denoted as Y, represents rubber farmers' knowledge of per, while the independent variable, denoted as X, influences or modifies this knowledge. The dependent variable will include the discussion of climate change with rubber growers. Questions such as whether rubber farmers know about climate change, in addition to questions on climate change, are then answered to determine if rubber farmers are knowledgeable (Yes) or not (No).

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 \varepsilon$$

Y	=	Knowledge about climate change (Yes/No)
α	=	Constant (Y score when X = 0)
β1 - β5	=	Variable coefficients
X1	=	Education level (No formal education/Primary/Secondary/ Higher Secondary/ Graduate and above)
X2	=	Age (Year)
X3	=	Rubber gardening experience (Year)
X4	=	Number of family dependents (Person)
X5	=	Income (Picul)
X6	=	Tapped rubber area (Ha)
ε	=	Unobservable factors (error)

Hypothesis Test
Simultaneous test (F-test)

The F-test is conducted to determine whether the independent variables influence the dependent variable. Hypothesis testing in this study will be carried out using a significant value of 0.05 (α = 5%) or a confidence level of 95%. The hypotheses used are:

H_0 : Jointly, there is no significant influence between variables X1, X2, X3, X4, X5, and X6 on variable Y.
H_1 : Jointly, there is a significant influence between variables X1, X2, X3, X4, X5, X6 and X7 on variable Y.

The F test can be done by comparing the F_{count} value with F_{table} using the following criteria:

Ho is rejected if the $F_{count} > F_{table}$ and the H1 value is accepted.

If the value of $F_{count} < F_{table}$, H0 is accepted, and H1 is rejected.

Partial Test (T-test)

The t-test is conducted to see whether each independent variable partially has a significant effect on the dependent variable. The t-test can also explain the extent to which one independent variable explains its impact on the dependent variable. Hypothesis testing in this study will be carried out using a significant value of 0.05 (α = 5%) or a confidence level of 95%. The hypotheses used are:

Ho : Partially, there is no significant influence between variables X1, X2, X3, X4, X5, and X6 on variable Y.
Ha : Partially, there is a significant influence between variables X1, X2, X3, X4, X5, and X6 on variable Y.

The t-test can be done by comparing the T_{count} value with the T_{table} using the following criteria:

If the value of $T_{count} > T_{table}$ value, then Ho is rejected, and Ha is accepted.

If the value of $T_{count} < T_{table}$, then Ho is accepted, and Ha is rejected.

Results and Discussion

Characteristics of Respondents

Respondents in the research were categorized based on education, age, rubber farming experience, number of family dependents, average rubber income, and total rubber plantation. This study included 142 rubber tappers from Rambang District, Muara Enim Regency. The characteristics of respondents based on the research findings are as follows:

Table 1. Characteristics of respondents

No	Descriptions	Category	Percentage (%)
1	Education level	No formal education	1.41
		Primary	41.55
		Secondary	19.72
		Higher secondary	32.39
		Graduate and above	4.93
2	Age (Year)	21-35	21.83
		36-50	43.66
		51-64	29.58
		>65	4.93
3	Farmer gardening experience (Year)	0-10	18.31
		11-25	44.37

		26-40	27.46
		41-49	7.04
		>50	2.82
4	Number of family dependents (Person)	1 person	10.56
		2 persons	40.99
		3 persons	15.49
		4 persons	26.06
		>5 persons	22.54
5	Income (Rubber production)	0-1.5 picul	42.25
		2-3.5 Picul	42.25
		4-5.5 picul	5.63
		6- 9 picul	7.04
		> 1 ton	2.82
6	Tapped rubber area (Ha)	0 - 1.5 Ha	34.51
		2 Ha	37.32
		3 Ha	16.2
		4 Ha	4.93
		> 5 Ha	7.04

Characteristics Based on Last Education

The results showed that respondents have the highest level of education up to a university degree, with the highest percentage of education level in primary school (Table 1). Education is essential in identifying respondents' knowledge of climate change. Individuals with less education than those in high school reported less environmental understanding than those with a high school education. This research shows that respondents whose last education was up to primary school were, on average, over 50 years old, while the percentage of respondents whose previous education was up to senior high school was before 50 years old. This shows that rubber farmers' education levels have improved over the years and should provide more opportunities for rubber farmers to understand climate change.

Characteristics Based on Age

Rubber farmers in Rambang Sub-district in this study have a productive age level. Age can be a benchmark in assessing respondents' knowledge of climate change. Younger people tend to have more pertinent expertise and are more likely to be aware of environmental challenges (Yang *et al.*, 2020). Although respondents are above 50, they are still very active in tapping rubber. Even those above 70 years old can still work in rubber plantations. This is expected to better understand climate change by looking at patterns of change from year to year or environmental conditions.

Characteristics Based on Rubber Farmer Experience

Rubber farming experience is essential because the longer time spent being a rubber farmer will provide many opportunities for rubber farmers to understand climate change on rubber. The results showed that rubber farmers, on average, have had rubber farming experience of more than 15 years (Table 1). This indicates that rubber farmers have good knowledge of rubber conditions. Respondents begin working as rubber farmers at 18 or after graduating senior high school. In addition to familial pressures for labor, rubber growers typically begin marrying once they have completed their education. Farmers can respond to climate change by understanding it. Even with years of farming expertise, farmers are familiar with such traditional climate change adaptation strategies (Tshikororo *et al.*, 2024).

Characteristics Based on Number of Family Dependents

Every respondent still has dependents. Respondents with more than four dependents included their wives, children, and parents. In contrast, respondents with only one or two dependents were beyond the age of 50. They only have one dependent because their children are all married. The more dependents, the more dependent costs required in one household will be significant, so income will affect the standard of living of rubber farmers. Consistent with the findings of Rani's study, the typical

respondent's household consisted of one to four agarwood and rubber farmers (Muttaqin *et al.*, 2019).

Characteristics Based on Rubber Farmer Income

Income from rubber production is an essential aspect. All responders work primarily as rubber farmers. Rubber prices fluctuate dramatically, having a significant impact. According to the results of in-depth interviews with respondents, climate change has reduced rubber production by more than 50%. Rubber production was still regular five years ago, with rubber farmers earning over two million rupiah on average. This contrasts sharply with the existing situation for rubber growers, who can only earn up to $1 million per month from selling rubber sap. This highlights the importance of rubber growers' understanding of per capita income.

Characteristics Based on Tapped Rubber Area

The total number of rubber plantations owned by rubber farmers is significant to estimate the income that farmers have. Rubber growers' income is influenced by land acreage and ownership status (Syahbani *et al.*, 2023). The more rubber plantations farmers own, the more likely the farmers' income will increase. Farmers with large rubber plantations will have more opportunities to understand climate change through its adverse impacts on rubber and can compare each change to the rubber on each plantation. Rubber farmers in the Rambang sub-district have at least half a ha of rubber plantations, and only a few farmers have rubber plantations that are more than 5 ha (Table 1).

Rubber Farmers' Understanding of Climate Change

One of the main elements influencing adaptive ability in climate change adaptation techniques is farmers' knowledge of the phenomenon. Rubber producers who are aware of climate change's effects will try to adjust to reduce these effects on rubber output. Rubber plants usually begin to be tapped at age six and continue to be tapped until almost 30 years old. Rubber trees aged 15 years produce more latex (Ginting & Astuti 2018). Rubber plants and plantation commodities are highly dependent on climatic conditions. This makes rubber very vulnerable to climate change. In line with the study's findings, Climate change, particularly dryness brought on by erratic dry and wet seasons, seriously affects rubber productivity and rubber farmers' income (Rosana *et al.*, 2020). Therefore, the level of knowledge of rubber farmers is fundamental. All farmers agreed that climate change has occurred and can feel it (Table 2). However, respondents needed help answering in detail about the climate change. 70.42% of respondents know climate change, and 29.58% don't (Figure 1).

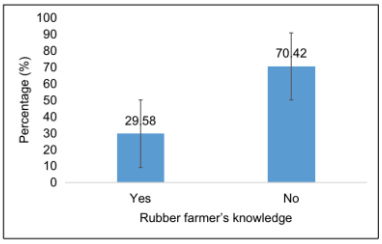

Figure 1. Percentage of rubber farmers' knowledge of climate change (Do you know what climate change means, and are you aware?)

Most farmers explained climate change as a change in seasonal patterns from dry to rainy and vice versa, where the difference is very pronounced at this time in the form of difficulty predicting what month the rainy or dry season will occur (Table 2). Rubber farmers have felt climate change for the last five years (Table 2), which can be seen from the condition of rubber that is vulnerable to disease. Farmer Rubber also explains that climate change can be felt by Temperature change. The finding is similar to the studies of Min *et al.* (2020), show the result of the estimation suggests that the main influence factor for farmers' perceptions of temperature change is farmers are more likely to notice rising temperatures if they have recently undergone shocks from drought and intense heat.

Table 2. Rubber farmers' knowledge of climate change

No	Descriptions	Category	Percentage (%)
1	Do farmers feel climate change?	Yes	100
		No	0
2	Do you know what the meaning of climate change is and are you aware?	Yes	70.42
		No	29.58
3	Since when has climate change been felt?	Don't know	10.05
		1-3 years	20.95
		3-5 years	30.50
		>5 years	39.00
4	What is climate change?	Change in weather	30.35
		Drought to rainy	55.65
		Temperature change	14.00

Knowledge about climate change's impact on rubber

An effect of climate change that rubber farmers are particularly affected by is the rise in widespread disease outbreaks. An in-depth knowledge of climate change will make rubber farmers more adaptable. When choosing representative climatic datasets, evaluating the local effects of climate change, and creating adaptation plans, local knowledge may be helpful (Kieslinger *et al.*, 2019). According to the results of in-depth interviews, some common diseases detected in trees include leaf fall, termites, stem death, white root fungus, and dry-tapping grooves. This is consistent with the findings of studies by Hidayah & Samuri (2023); however, the condition that drew the attention of rubber growers in this study was rubber leaf fall disease. Rubber typically sheds its leaves once a year, but in the previous five years, it has shed its leaves every three months or more than four times yearly (Table 3). As a result of leaf fall disease, rubber production has dropped by up to 50%. According to research findings, leaf fall disease attacks can dramatically lower yield (Junaidi *et al.*, 2018).

The pattern of leaf fall, which happens all year long, is that the oldest leaves drop their leaves first. Then, the younger leaves gradually re-grow when the income of rubber growers declines due to this onslaught on leaf fall. Throughout the previous five years, rubber prices have fluctuated. Regretfully, farmers who grow rubber lack expertise in disease management. In certain countries, like São Paulo, rubber is advised not to be tapped for two months while it is exposed to leaf fall, meaning that in a year, rubber should only be tapped for ten months to maintain rubber (Deus, 2019). Other research suggests that rubber tapping should be stopped when rubber sap is not produced or when rubber leaves fall (Chantuma *et al.*, 2017). However, rubber growers will find it challenging to adopt this strategy because not tapping for one-month results in no money. This demonstrates that understanding climate change is becoming increasingly crucial. However, Personal encounters with climate change's consequences might not always prompt concern or action.

Table 3. The intensity of rubber leaf fall

No	(Descriptions)	Category	Percentage (%)
1.	Does rubber shed its leaves more than once a year?	Yes	100
		No	0
2.	How many times does rubber shed its leaves in a year?	Three times	12.20
		Four times	75.80
		>4 times	12.00

Factors Influencing Rubber Farmers' Knowledge of Climate Change

Table 4. Results of Multiple Regression Analysis

Coefficients						
Model	Unstandardized Coefficients			Standardized Coefficients		
		B	Std. Error	Beta	t	Sig
1	Constant	1.135	.230		4.938	.000
	Education Level (X1)	0.37	0.41	.079	.892	.374
	Age (X2)	.116	.058	.207	1.986	.049
	Rubber Farming Experience (X3)	-.039	.053	-.081	-.744	.458
	Number of Family Dependents (X4)	-.016	.030	-.043	-.515	.608
	Income (X5)	-.160	.060	-.384	-.2.643	.009
	Tapped Rubber Area (X6)	.116	.0.51	.291	2.285	.024

In Rambang Subdistrict, Muara Enim Regency, factors affecting rubber farmers' knowledge were examined using multiple linear regression analysis and the SPSS version 27.0 software. Using the SPSS program and multiple regression analysis based on Table 2 above, the regression equation that follows was produced:

$$Y = 1.135 + 0.37X1 + 0.116X2 – 0.039X3 - 0.016X4 - 0,160X5 + 0.116\ X6 + e$$

Based on the multiple linear regression equation, the constant value is 1.135 (Table 4). This explains that if the variable value of education level (X1), age (X2), rubber farming experience (X3), number of family dependents (X4), income (X5), and tapped rubber area (X6) is equal to zero then farmers knowledge on climate change (Y) is 1.135. This means that every 1-year increase in age will increase the understanding of rubber tappers increased by 0.116 with the assumption that other variables, namely education level (X1), rubber farming experience (X3), number of family dependents (X4), income (X5), and tapped rubber area (X6) remain or do not change.

Simultaneous Test (F-test)

Table 5. Result of Simultaneous Test (F Test)

ANOVA[a]						
Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	2.906	6	.484	2.415	.030[b]
	Residual	27.073	135	.201		
	Total	29.979	141			

From Table 3 above, it can be seen that the value of $T_{count} > T_{table}$ (2.415 > 2.17) and the significance value < α (0.030 < 0.05) then H0 is rejected and H1 is accepted, so it can be concluded that education, age, rubber gardening experience, number of family dependents, total monthly income, and total rubber plantations have a significant effect on the knowledge of rubber farmers in Rambang District Muara Enim Regency (Table 5).

Partial Test (T-test)

Table 6. Result of Partial Test (T-Test)

Coefficients						
Model	Unstandardized Coefficients			Standardized Coefficients		
		B	Std. Error	Beta	t	Sig
1	Constant	1.135	.230		4.938	.000
	Education Level (X1)	0.37	0.41	.079	.892	.374
	Age (X2)	.116	.058	.207	1.986	.049
	Rubber Farming Experience (X3)	-.039	.053	-.081	-.744	.458
	Number of Family Dependents (X4)	-.016	.030	-.043	-.515	.608
	Income (X5)	-.160	.060	-.384	-.2.643	.009
	Tapped Rubber Area (X6)	.116	.0.51	.291	2.285	.024

According to the equation table of multiple regression results above, the partial test (t-test) can be described as follows:

Education level (X1)

The T_{count} value in the education level variable (X1) is less than the T_{table} (0.892 < 1.977), and the significance value is more significant than α (0.347 > 0.05) (Table 6). After that, Ha is rejected, and Ho is accepted; it may be inferred that the level of education has no significant impact on rubber producers' understanding of climate change in Rambang District, Muara Enim Regency. This runs counter to studies showing that, in the univariate analysis, education was highly correlated with comprehension of climate change (Kabir *et al*., 2016).

Age (X2)

In the age variable (X2), the value of $T_{count} > T_{table}$ (1.986> 1.977) and the significance value > α (0.049 < 0.05) (Table 6). After that, Ho is rejected, and Ha is accepted; it may be said that rubber tappers' knowledge about climate change is significantly influenced by their age in the Rambang sub-district of Muara Enim Regency. This situation explains that increasing age will significantly influence understanding of changing weather patterns and rising temperatures because the higher age will provide knowledge and changes to the condition of the rubber. This differs from the Ayalon & Roy (2023) research, which shows that In the context of climate change, the current study has not determined the consequences of age(ism). However, according to research, Middle-aged and elderly persons are more prone to have optimistic illusions in their knowledge assessment because the young did better regarding climate change awareness (Yang *et al.*, 2020).

Rubber farming experience (X3)

In the farming experience variable (X3), the value of $T_{count} < T_{table}$ (-0.744 < 1.977) with a significance value > α (0.458 > 0.05) (Table 6). Thus, it can be inferred that farming experience substantially impacts the work productivity of rubber tappers in the Rambang sub-district of Muara Enim Regency, with Ha being rejected and Ho accepted. The more work experience owned by rubber farmers does not necessarily make rubber farmers know and understand climate change. This finding contradicts other findings, which suggest that people's firsthand experiences with extreme weather events and local weather anomalies, including temperature variations (i.e., departures from the typical seasonal temperature), are essential factors that can influence views of climate change (Zaval *et al*., 2014 ; Demski *et al*., 2017).

Number of family dependents (X4)

In the variable number of family dependents (X4), the value of $T_{count} > T_{table}$ (-0.515 < 1.977) with a significance value < α (0.608 > 0.05) (Table 6). Therefore, Ha is rejected, and Ho is accepted, concluding that rubber tappers in Rambang District, Muara Enim Regency, do not significantly differ in their understanding of climate change based on the number of family dependents. The large number of family dependents makes the expenditure on living costs higher. They must fulfill their daily needs for food, shelter, clothing, school fees, and other unforeseen costs. This situation is the basis for tappers to work more diligently when the number of families is more significant, a factor that rubber farmers do not have much time to learn about climate change.

Income (X5)

In the variable number of family dependents (X5), the value of $T_{count} < T_{table}$ (-2.643 < 1.977) with a significance value < α (0.009 < 0.05) (Table 6). Therefore, regardless of their total monthly income, rubber tappers in Rambang District, Muara Enim Regency, have little awareness of climate change, with Ha being rejected and Ho accepted. This is consistent with studies showing that individuals from high-income households typically underestimate their knowledge of climate change, while those from low-income families tend to overestimate it (Yang *et al.*, 2020). Rubber producers' limited financial capacity to meet their demands results from the intricacy of their issues (Sasmi *et al*., 2023). This is so because rubber farmers' income is impacted by production (Sari *et al*., 2023).

Tapped rubber area (X6)

In the age variable (X2), the value of $T_{count} > T_{table}$ (2.285 > 1.977) and the significance value > α (0.024 < 0.05) (Table 6). Therefore, since Ha is accepted and Ho is refused, it can be said that the entire rubber plantation significantly affects the rubber tappers' understanding of climate change in the Rambang sub-district of Muara Enim Regency. This is because the more extensive the rubber plantation owned, the more the household economy of rubber farmers will be. According to study

findings, respondents with higher socioeconomic backgrounds—those whose parents completed college and worked in the formal economy—had greater awareness and perceptions of climate change than respondents with lower socioeconomic backgrounds—those whose parents did not complete formal education and were unemployed (Dhal, 2021). This finding is not similar to the study result that the characteristic of farm size has no significant contribution to their knowledge of climate change effects (Islam *et al.*, 2019). According to Siregar *et al.* (2023), in addition to being a factor influencing rubber farmers' knowledge of climate change, land area has a significant effect on rubber production, which means that when the land area is expanded, rubber production is expected to increase; on the other hand, when the land area is reduced, production is expected to decrease.

Climate Change Education

Education on climate change is undeniably critical in confronting the issues it presents. Heightening awareness and comprehension of climate change among individuals, communities, and societies is vital for fostering informed decision-making and action at all levels. Increasing the intensity of climate change education encompasses a range of approaches. These include incorporating climate change topics into school curricula, conducting public awareness campaigns, providing training programs for professionals in relevant fields, and leveraging diverse media platforms for information dissemination. Furthermore, cultivating a culture of sustainability and environmental stewardship demands continuous engagement in conversations about climate change, its consequences, and the available solutions. Empowering individuals with knowledge and skills enables collective efforts to mitigate the effects of climate change and enhance resilience against its impacts. Ofori *et al.* (2023) research highlights the pressing need to ramp up efforts in educating and raising awareness about this issue.

Climate change education plays a vital role in the global fight against climate change. Providing climate change education to rubber farmers is essential for their adaptation and resilience. This education should focus on how climate shifts impact rubber cultivation, such as changing weather patterns, heightened pest and disease pressures, and market dynamics. Emphasizing strategies for climate-smart rubber farming, like drought-resistant varieties, water management techniques, and agroforestry practices, is critical. Additionally, offering training on sustainable land management, soil conservation, and carbon sequestration can help farmers reduce their carbon footprint. Awareness about climate-resilient financial instruments and insurance schemes can also assist farmers in managing climate-related risks. Overall, tailoring climate change education specifically for rubber farmers can empower them to make informed decisions and thrive amidst a changing climate. Drawing from research findings, it's evident that both the age of rubber farmers and the extent of rubber plantation tapping influence their level of knowledge. Therefore, initiating climate change education for rubber farmers at a young age is advisable. Additionally, rubber farmers must comprehend alterations in the conditions of tapped rubber plantations.

Conclusion

Based on studies conducted on rubber farmers' knowledge, it is determined that 70.42% of rubber farmers know of climate change, whereas 29.58% need to be made aware. This indicates that a higher number of rubber growers are informed of climate change. According to the results of multiple linear regression analysis for the F-test, overall, the variables of education, age, rubber farming experience, number of family dependents, total monthly income, and total tapped rubber area have a significant effect on the knowledge of climate change owned by rubber farmers in Rambang District, Muara Enim Regency. While partially (T-test) variable age and tapped rubber area significantly affect the knowledge of climate change. The variable level of education, rubber gardening experience, number of dependents, and total monthly income have no significant effect on climate change knowledge of rubber tappers in Rambang District Muara Enim Regency, Indonesia.

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Conflict of Interest

The authors disclose no conflicts of interest.

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