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Farmers Perception of Climate Change on Pepper (Pipper nigrum L.) Productivity of In East Lampung District

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Abstract. This study aims to determine farmers' perceptions of climate change on pepper productivity in East Lampung Regency and Sukadana Baru Village, Marga Tiga District, East Lampung Regency, from March to April 2020. The research method used is survey method. The research population is 433 pepper farmers. in Sukadana Baru Village. The number of samples in this study were 108 people. The data analysis method used is descriptive statistical analysis. The results show that climate change causes changes in temperature, changes in rainfall, changes in production so that it has an impact on changes in pepper productivity. Changes in temperature that occur in the study area are indicated by the percentage of respondents of 51.85%. Meanwhile, 30.56% of respondents stated that there was no change in temperature in the study area. Rainfall experienced a change with the percentage of respondents amounting to 75.00%, while the rest considered it unchanged with a percentage of 7.41% and 17.59% stating they did not know. Most of the farmers stated that their production had decreased by 75.93%. farmers answered they don't know with a percentage of 63.89%, this situation occurs because most farmers rarely calculate the amount of productivity. Only 20.37% of respondents answered that there was a change in productivity due to climate change.

1. Introduction

Pepper is one of the most abundant spices among other spices (King of Spices), both in terms of its very distinctive uses and cannot be replaced with other spices [1]. Pepper has an important place in the world spice trade, where pepper was the first commodity to be traded internationally and opened trade routes for the western and eastern world [2]. The climate in the study area also greatly affects pepper productivity. During the rainy season, pepper is more easily damaged than during the summer. In the rainy season, pepper will be more susceptible to diseases, such as root rot, yellowing leaves and also decreased pepper productivity. Lampung Province is the second largest pepper centre in Indonesia after the Bangka Belitung Islands, with an area of 45,863 ha. Pepper production in Lampung Province also ranks second after the Bangka Belitung Islands with a total production of 14,860 tons/year.

Pepper centres in Lampung Province are North Lampung, West Lampung, Way Kanan, Tanggamus and East Lampung Regencies. East Lampung is one of the pepper centres in Lampung Province which has a relatively low productivity level (320 kg/ha), far below the average productivity in Lampung Province which reaches 493 kg/ha [3]. The largest black pepper producers in East Lampung Regency

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are Marga Tiga District, Melinting District, and Gunung Pelindung District. Marga Tiga District in 2016 was able to produce 434 tons of pepper with a planting area of 814 ha, an increase from the previous year which only produced 401 tons. To maintain productivity, pepper farmers in Marga Tiga village are required to know various kinds of obstacles that hinder the pepper production process, especially climate problems and weather conditions in the local environment. This is so that pepper plants can grow optimally, and pests or diseases due to climate change can be overcome. Based on the description above, the purpose of this study was to determine farmers' perceptions of the impact of climate change on pepper productivity in Sukadana Baru Village, Marga Tiga District, East Lampung Regency [4].

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2. Materials and Methods

The research method used is a method survey. The research was conducted in Sukadanan Baru Village, Marga Tiga Subdistrict, East Lampung Regency, which was chosen purposively with the consideration that the area is a centre for pepper and has also received certification from MIGHL, for nursery production. The number of samples in this study was determined using the Slovin formula (Noor, 2012). [5].

$$n = \frac{N}{1 + N(e)^2}$$

n = Number of samples
N = Total population of lowland rice farmers
e = Error level (set at 10% with a confidence level of 90%)

The population in this study were 433 pepper farmers who were members of the pepper farmer groups in Sukadana Baru Village. The number of samples in this study were 108 people, with each farmer group consisting of three managers and three members of the farmer group [6].

The data collection techniques used were questionnaires and documentation. The technique of collecting data with a questionnaire was carried out by directly interviewing pepper farmers who were the research samples. Data collection techniques with documentation are carried out on data stored in materials in the form of documentation, such as daily notes, letters, reports and photos. The data analysis method used in this research is descriptive.

3. Result and Discussion

3.1. Age

The majority of farmer group in Sukadana Baru Village range from 25-40 years old, with a percentage of 50 percent, which means they fall into the productive age category. The farmer group members with age 41-55 years are 48.15 percent, which is categorized as still included as the productive age for working in farming.

3.2. Level of education

The education level of pepper farmers in Sukadana Baru Village is quite high with high school education (SMA) are 62%. And another member is junior high school.

3.3 Time period of Farming

The average duration of pepper farming is 16-29 years in pepper farming and as a percentage of 59.26 percent. Meanwhile, members of farmer groups are only 42.59 percent with a susceptibility to farming 16-29 years [7].

3.4 Land area

The majority of farmers have a land area of 0.25-1.5 hectares, which means that many pepper farmers still have small land for the size of their gardens or annual crops. This is because most of the farmers are continuing family farming that has been passed down from generation to generation.

3.5 The Impact of Climate Change on Pepper productivity

Indonesia is a tropical area that is crossed by the equator so that in a year the sun crosses the equator twice. So, Indonesia has two seasons, namely summer and rainy season. When the sun is directly north of the equator, some parts of Indonesia will experience a dry season. On the other hand, if the sun is directly south of the equator, some parts of Indonesia will experience the rainy season. Climate change is something that cannot be avoided due to global warming. Climate change has an impact on various sectors and is very complex because it covers various aspects of human life [8]. Several studies have shown that climate change has had a negative impact on many aspects of life, especially farmers' lives, such as changes in rainfall patterns, an increase in the frequency of extreme climate events, and an increase in air and sea level temperatures. is a serious impact of climate change that affects the agricultural sector [9]. The climate recapitulation at the level of application of pepper cultivation techniques can be seen in Table 1.

Table 1. The climate recapitulation at the level of application of pepper cultivation techniques

Indicator of Climate Change	Classification	Farmers Group Member (%)
Temperature Change	Do not know	17,59
	Do not change	30,56
	Change	51,85
Average		**2,34**
Change in rainfall	Do not know	17,59
	Do not change	7,41
	Change	75,00
Average		**2,57**
Production change	Do not know	0,00
	Do not change	24,07
	Change	75,93
Average		**2,75**
Productivity chane	Do not know	63,89
	Do not change	15,74
	Change	20,37
Average		**2,16**

Table 1 shows that the climate that occurs at the level of application of pepper cultivation techniques has changed, both from changes in temperature, changes in rainfall to impact on changes in pepper production and productivity in the study area.

3.6 High Temperature

Temperature is the heat and coldness of air caused by the combination of work between the speed of the cooling and heating process of an area in the amount of water content and the earth's surface. Based on the results of the research in Table 1, it shows that there is a change in temperature that occurs in the research area with a percentage of respondents of 51.85. Meanwhile, 30.56 percent of respondents said there was no change in temperature that occurred in the study area. This shows that most residents can feel the temperature that occurs around the research area, which of course has an impact on the pepper farming they are doing.

Changes in temperature, which are the impact of climate change that occurs in the territory of Indonesia. This is in line with Bande's research [10]. This difference in temperature and humidity causes the transpiration rate of pepper in Konawe Regency to be higher, so the occurrence of plant wilting is faster. Likewise, in the research area the temperature changed, causing the leaves of the pepper plant to turn yellow.

3.7 High Rainfall

Rainfall is the amount of water that falls on a flat surface during a certain period measured in millimetres (mm) above the horizontal surface. Based on the results of the study, the rainfall that occurred experienced a change with the number of respondents as much as 75.00%. While the rest are considered unchanged, with a percentage of 7.41% and 17.59% stating they do not know. The higher the rainfall, the lower the pepper production will be. Plants rot more easily due to waterlogging, so pepper plant roots are more susceptible to rot. Precipitation with a greater amount usually causes erosion [11]. This situation will worsen if land cover vegetation and soil conservation efforts are not improved [12]. High rainfall during the flowering and fruiting phases of pepper plants can cause the loss of flowers and fruit seeds. In the process of fruit ripening, high rainfall accelerates fruit decay, thereby damaging fruit quality. Likewise, with pepper, if there is high rainfall it will rot more easily and in the flowering phase it can cause flower miscarriage [13,14].

3.8 Changes in Production

Climate change causes the productivity of pepper plants to be disturbed in the research area. Based on Table 1, most of the farmers said that their production decreased by a percentage of 75.93 percent, this indicates that climate change has a very large influence on the growing nature of pepper in the study area

3.9 Change in Productivity

The impact of climate change on the productivity of pepper plants is not known. Based on Table 1, most of the farmers answered they did not know with a percentage of 63.89%, because most of the farmers rarely calculated the amount of productivity. and 20.37% of respondents answered that there was a change in productivity due to climate change.

4. Conclusion

The impact of climate change on pepper plants that occurs is changes in temperature, changes in rainfall, changes in production and changes in pepper productivity. The temperature changes that occur in the research area are indicated by the percentage of respondents at 51.85% said there was changes.

Meanwhile, 30.56% of respondents said there was no change in temperature that occurred in the study area. Rainfall that occurred experienced a change with the percentage of respondents of 75.00% said there was changes, while the rest considered it unchanged with a percentage of 7.41% and 17.59% said they did not know.

The majority of farmers said that production had decreased by a percentage of 75.93%. the farmer answered that he did not know with a percentage of 63.89%, because most of the farmers rarely calculated the amount of productivity and 20.37% of respondents answered that there is a change in productivity that occurs as a result of climate change.

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