AGRISOCIONOMICS
Journal of Agricultural Socio-Economics and Policy

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 9 (2): 397-414, June 2025

Risk Mitigation Of Rice Production In Pringsewu District

Siti Hafsyoh Aldilla, Dwi Haryono, Novi Rosanti
Agribusiness, Faculty of Agriculture, Lampung University, Lampung, Indonesia

*Correspondence Email: novi.rosanti@fp.unila.ac.id

Submitted 26 August 2024; Approved 6 January 2025

ABSTRACT

This research aims to identify sources of risk that cause production risks in rice commodities, analyze the impact and probability of production risks occurring, and analyze production risk management for handling production risks that rice farmers must carry out in Pringsewu Regency. This research was conducted on lowland rice farmers in Pringsewu Regency. The sampling technique used was purposive sampling with a total sample of 67 people. The analytical tool used to answer the aim of identifying risk sources uses qualitative descriptive analysis. The probability and impact of production risks are analyzed using the Z-score and Value at Risk methods. Meanwhile, risk management is analyzed using a risk management matrix by Kountur, 2012. *Analysis results using z-score indicate a risk probability of 3%. The results of the analysis using the Value at Risk method shows a risk impact of IDR 2,726,743 -. Risk management carried out by farmers based on the risk management matrix is insurance. Other mitigation measures that farmers can carry out include creating irrigation channels, pumping programs and using pesticides*.

Keywords: *Risk, Rice, Z-score, Value at Risk*, *Insurance*

BACKGROUND

Rice, as a primary agricultural commodity, plays a crucial role in ensuring food security in Indonesia by serving as the main staple food for its population. It is also a strategic food commodity, central to efforts aimed at achieving food security and self-sufficiency goals (Yusuf, 2024). In addition, rice serves to fulfill people's nutrition and main carbohydrate. As much as 95% of the Indonesian population consumes rice to fulfill 40-80% of the calories the body needs (Bahri et al., 2023) The high rice consumption in Indonesia causes the demand for rice to continue to increase. Per capita rice consumption in Indonesia is still higher than other countries such as Thailand, Malaysia, China, Japan, and Korea (Isnawati, 2022). Indonesia's rice consumption reached 81 kg per capita per year in 2022 (Kementerian Pertanian Republik Indonesia, 2022).

The growth of rice production in meeting the availability of rice in Indonesia in 2023 decreased by 2.05 percent, while the population growth rate increased by 1.13 percent (Badan Pusat Statistik, 2023). The declining production growth rate while the increasing growth rate will cause high demand for rice and cannot be met by domestic production (hairati & Syahni, 2016(Khairati & Syahni, 2016) These conditions can cause a shortage of food availability that can jeopardize economic stability and national stability (Novrimansyah & Daud, 2022)

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Therefore, the government must maintain the availability of rice in all regions in Indonesia to maintain food security. Based on data from Pusdatin (2021), Lampung Province is the sixth largest rice contributor in Indonesia, with a contribution of 4.9%. Lampung ranks second in rice production centers outside Java (Lampung Provincial Statistics Agency, 2023). Rice production in Lampung Province can be seen in Figure 1.

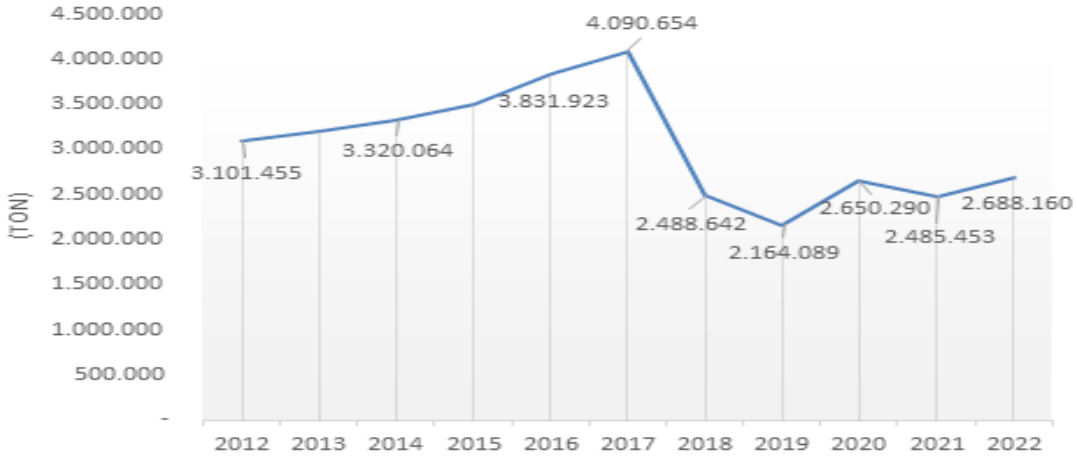

Figure 1. Rice Production in Lampung Province
Source: Central Bureau of Statistics

Figure 1 shows that rice production fluctuated with a downward trend from 2012 to 2022. From 2012 to 2017, Lampung Province's rice production increased significantly, but it experienced a drastic decline in 2018. The drastic decline was caused by changes in the calculation method carried out by BPS.

The decline in rice production is caused by several factors such as land area, seed quality, labor, modern technology, and fertilizer use. (Dahiri & Tineke, 2021; Kharoh et al., 2023). Conversion of agricultural land into settlements, which is triggered by an increase in population in Lampung Province by 1.65 percent annually (BPS Lampung, 2021), also contributed to the decrease in the area of rice paddy fields (Setyaningsih et al., 2023).. In addition, pest and disease outbreaks and weather changes are other factors affecting rice production decline (Oort, 2018).

Climate change significantly impacts the agricultural sector, especially food crops in various parts of Indonesia. (Helmy et al., 2023; Hidayati & Suryanto, 2015; Perdinan et al., 2008).. Climate change also increases climate variation, as seen from the acceleration of the El Nino period in Indonesia, from previously every 5-6 years to every 2-3 years (Mulyanti, 2023). Increased temperatures can reduce agricultural production by between 5-20 percent (Hidayati & Suryanto, 2015). Rainfall is one of the most significant climatic parameters in reducing crop yields (Angles et al., 2011). Extreme weather causes decrease harvest area and results in decreassed production (Pusparisa, 2020). Reduced rainfall and irrigation water availability will result in a decrease in production by 3.06 percent and potentially many farmers experience crop failure, so mitigation is needed to anticipate this problem (Mego, 2023).

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This condition occurred in Banten with a 3.75% decrease in production due to extreme weather. (Mulyaqin, 2020). Rice production in Lampung can actually still be increased to its maximum potential, but various problems arise along with the emergence of various interests and extreme climate change (Lien, 2022). The decline in production and harvested area is inversely proportional to the increasing population. The decline in production faced is often a threat to the welfare of farmers, causing farmers to lack capital for farming in the next planting season. (Philip & Suresh, 2024). The risk of extreme climate change will encourage farmers to shift away from rice farming. This can threaten food availability such as rice, which is a strategic food commodity(Suindah et al., 2021). Therefore, mitigation is needed to overcome losses due to large farming risks. The existence of risk mitigation is expected to prepare farmers to face risks and maintain the commodities planted (Fradinata et al., 2022).

Risk can be minimized through effective risk management (Hasan et al., 2017). Implementing risk management strategies can successfully reduce losses, enhance production, and facilitate the identification, measurement, monitoring, and control of emerging risks (Tengor et al., 2015). Moreover, farmers' understanding of risk and its management plays a critical role in mitigating the impact of losses (Puspitasari & Hasan, 2021). One of the key mitigation strategies to address the significant impact of these risks is the implementation of agricultural insurance. Agricultural insurance is an effort made by the government to minimize losses and negative impacts from the risk of uncertainty in rice farming activities as stated in Law Number 19 of 2013 concerning Rice Farming Insurance (AUTP).

Agricultural insurance is very important for farmers to protect their farming business. Agricultural insurance is a risk transfer that can compensate for farm losses so that somebody can guarantee the sustainability of the farming business. The guarantee that will be given in the AUTP program is in the form of compensation in the form of money if the damage to rice plants is caused by natural disasters and plant pest organisms (OPT). The AUTP program is not conducted by the government independently. The Ministry of Agriculture collaborates with OJK and PT Jasindo to run the AUTP program. The implementation requires the support of the local Agriculture Office, farmer groups, Field Agricultural Extension Workers (PPL), Education institutions and GAPOKTAN (Kasim et al., 2017). The implementation of AUTP in Indonesia started in 2015 and Lampung Province became one of the participants in this program (Directorate General of Agricultural Infrastructure and Facilities, Ministry of Agriculture of the Republic of Indonesia, 2018)

Pringsewu Regency has the most AUTP participants among other regions in Lampung Province. As many as 55% of AUTP participants in Lampung Province are in Pringsewu District (Jasindo, 2022). Pringsewu Regency, one of the key rice production centers in Lampung Province, has been implementing the Agricultural Insurance Program (AUTP) since 2016. However, the program has not achieved optimal outcomes due to several inherent weaknesses (Indra et al., 2023). According to the Department of Food Security, Food Crops, and Horticulture of Lampung Province (2018), less than 50% of harvested land in Pringsewu Regency was registered as part of the AUTP, indicating limited program reach and adoption. This discrepancy highlights the pressing need to investigate whether the AUTP, as a policy innovation, has not been effectively embraced by the farming community. Furthermore, understanding the predominant risks in rice farming is crucial to

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addressing production uncertainties. Given the challenges related to AUTP in Lampung Province, researching the risk management strategies of rice farmers participating in the program is both timely and essential. This study contributes novel insights into the intersection of agricultural policy implementation and farmer risk behavior, aiming to enhance the program's effectiveness and the resilience of rice farming in the region.

RESEARCH METHODS

The research location was determined purposively in Pringsewu Regency with the consideration of one of the areas with the highest number of insurance participants in Lampung Province. The sampling method in this study used Purposive Sampling or a sampling technique with certain considerations. Calculation using the formula according to Isaac and Michael in Ismail (2018), namely:

$n = 66.7 \approx 67$

Description:
s= Number of samples
N= Number of population (8533 people)
λ= 90% Confidence Level (1.64)
d= Degree of deviation (10%=0.1)
P= Chance of being right (5%=0.05)
Q= Chance of being wrong (5%=0.05)

Based on the calculation using the formula above, the number of farmers is 67 farmers. Data collection was conducted from September to November 2023. The data collected were the identity of the respondents, rice production, the percentage of crop failure, and the selling price of rice. Risk analysis was conducted using Kountor's (2008) approach, through the calculation of probability, impact and risk map. This method has been widely used in previous studies (Saragih, 2018; Andesmora et al., 2019; Isminiarti, 2017). Risk probability was calculated using the Z-score method (Altman, 1998):

$$\boldsymbol{Z} = \frac{x - \bar{x}}{S}$$

where Z = Risk probability of rice farming production, S = Standard deviation of production risk, X = risk threshold of production shortfall tolerated by farmers, $\bar{x}$ = Average risk event, which is the difference between standard productivity and actual productivity (Kg/Ha), and Z table is obtained from the normal distribution value of Z. $\bar{x}$ and S are calculated by the formula.

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$$\bar{x} = \frac{\sum_{t=1}^{n} xi}{n} dan\ S = \sqrt{\frac{\sum_{t=1}^{n}(xi - \bar{x})}{n-1}}$$

in where n is the sample count. Using the Value at Risk (VaR) method and the formula, the impact of risk is computed.

$$\boldsymbol{VaR} = \bar{\boldsymbol{x}} + z\,(\frac{S}{\sqrt{n}})$$

Where z is the value obtained from the standard distribution table with α = 5%, VaR is the effect of losses caused by risky events, x̄ is the average value of losses from risky events, S is the standard deviation of losses owing to risky events, and n< is the number of samples.

The calculation of the impact of production risk is determined by the confidence level used is 95%.

From the results of the calculation of the probability and impact of the risk, it can then be determined the appropriate mitigation to be carried out in dealing with existing risks. To find out, you can enter the results of the calculation of probability and impact in risk mapping according to (Kountur, 2008)

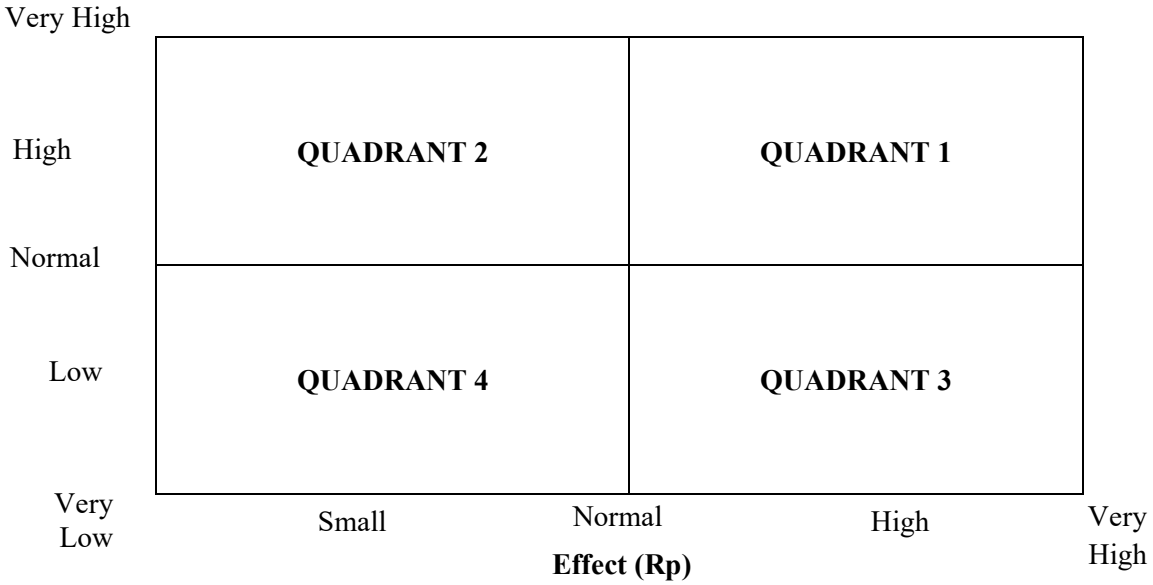

Figure 4. Risk Result Mapping
Source: (Kountur, 2008)

The normal limit of impact and probability of risk occurrence is determined based on calculating the middle limit between the existing risk coverage sources. The results of this calculation obtained a probability of 28.5% and an impact of Rp2,650,000. If the probability exceeds 28.5%, then the probability of risk occurrence is relatively high, and vice versa. If the risk impact > IDR 2,650,000, the risk impact is classified as high, while if < IDR 2,650,000 the risk impact is classified as low. The

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results of the calculation are included in the risk management mapping determined based on the matrix according to (Kountur, 2008) which can be seen in Table 1.

Table 1. Risk Management Matrix

Type of loss	*Loss Frequency*	*Loss Severity*	*Appropriate risk management techniques*
1	*High*	*High*	*Avoidance*
2	*High*	*Low*	*Loss Control and Retention*
3	*Low*	*High*	*Insurance*
4	*Low*	*Low*	*Retention*

Source: (Kountur, 2008)

RESULT AND DISCUSSION

Respondents are research objects in the context of problems and objectives that are closely related to the research findings. Respondents' characteristics are the criteria given to AUTP member rice farmers so that the source of information in the study is accurate.

Socioeconomic Characteristics of Respondents

Farmers' socioeconomic characteristics affect their production, productivity and income. These differences in socioeconomic characteristics lead to variations in income levels across farms. In addition, these characteristics also affect how farmers receive and access information, which is expected to increase their income from farming. Data on the characteristics of wet-rice farmers in Pringsewu District can be seen in Table 2.

Table 2. Characteristics of Respondents

No.	Description	Average	St. Deviation
1	Age	50 years	10,08
2	Education Level	High School/ Equivalent	-
3	Side Job	Off farm	-
4	Family Dependents	3 people	1,27
5	Land Area	0.6 ha	0,56
6	Ownership Status	Owned	-
7	Farming Experience	22 years old	12,37

Source: Primary Processed Data, 2023.

Table 2 shows the characteristics of rice farmers in Pringsewu Regency consisting of age, education level, side jobs, family dependents, land size, ownership status, and farming experience. Based on the average age of AUTP rice farmers are included in the productive age of 50 years. Productive age is the right age to carry out work activities such as farming because it is physically still good, has high enthusiasm and dependents to support the family (Herdiana, 2016). The side jobs of rice farmers in Pringsewu Regency are divided into other off farm and on farm jobs. Farm labor is a side job that many rice farmers do to increase the income of farming households. (Sholeh & Mublihatin, 2021). The average number of family dependents of rice farmers is 3 people. The number

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of family dependents is one of the factors motivating farmers to seek income (Margawati et al., 2020). The average land ownership of rice farmers is 0.6 ha and self-managed, so AUTP rice farmers are included in the smallholder group (0.50 - 1.00 ha) (Mandang et al., 2020). The pattern of land ownership has a significant effect on the technical efficiency of farming, self-managed land has higher productivity than shared land. (Koirala et al., 2016). The average experience of farmers in rice farming is 22 years. Farming experience affects crop yields, where the more experience a farmer has, the fewer mistakes that occur in farming (Robintara & Dewi, 2018).

Understanding AUTP

The Rice Farming Business Insurance Program (AUTP) is a program that has been planned by the government to help the farming community in overcoming losses due to crop failure, caused by floods, droughts, and attacks by pests and plant diseases (HPT) or plant disrupting organisms (OPT), but in reality there are still many farmers who have not participated in the AUTP program (Ministry of Agriculture, 2020). The observation on farmers' understanding of AUTP can be seen in Table 3.

Table 3. Understanding of AUTP

No.	Description	Average	St. Deviation
1	Frequency of Participating in AUTP Socialization	67%	-
2	Frequency of Following AUTP	1	1,70
3	Frequency of Claim Submission	40%	-
4	Frequency of Claims Receipt	30%	-

Source: Primary Processed Data, 2023.

Socialization on overcoming production risk issues has been conducted in Pringsewu District. Socialization conducted directly from *expert* resource persons is needed to be able to convey information clearly about the AUTP program. (Fauzi, 2018). As many as 67% of the farmers have participated in the socialization. However, socialization is still quite rare, so many farmers still do not know about agricultural insurance, which is one of the mitigations that can be done to overcome production risk problems. The failure of AUTP implementation can occur because the socialization by the agriculture and food crops agency is not optimal. (Oktavia & Azriani, 2020). The intensity of the AUTP program socialization has caused farmers in Pringsewu Regency to only participate in agricultural insurance once with a claim submission frequency of 40% and a claim success rate of 30% even though the AUTP program has been running since 2016.

The results indicate that the low participation of farmers in the Agricultural Insurance Program (AUTP) in Pringsewu Regency is influenced by several factors, including insufficient socialization efforts, a complicated registration and claims process, a societal stigma associating insurance with anticipating crop failure leading farmers to believe insurance is unnecessaryand the perception among some farmers that the insurance premiums are still too expensive. The reasons why farmers do not participate in insurance are low income, low trust in local insurance companies, and failure to understand complicated information from insurance policies (Jin et al., 2016).

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According to the Ministry of Agriculture (2019), the insurance premium set by the government is IDR 180,000/hectare/planting season. The government has prepared funds (APBN) to help farmers to pay premiums of 80% or IDR 144,000/hectare/planting season and insured farmers of 20% or IDR 36,000/hectare/planting season. With a maximum insurance participant land area of 2 hectares, the insurance company PT Asuransi Jasa Indonesia bears the cost of the AUTP program at IDR 6,000,000/hectare/MT (Syah et al., 2021).

Farmers' participation in the AUTP program is seen from the claim submission and successful claim receipt. As many as 40% of the rice farmers have filed a claim, and 71% have successfully received the AUTP program claim. The results show that there are several factors that cause farmers not to submit claims, including the complicated and time-consuming claim process, the extent of land damage <75% or not eligible, and the amount of loss is still acceptable. This is supported by (Seamon et al., 2023) that the decision on whether to file a crop insurance claim depends on many dynamic and changing factors.

Rice farmers who will claim the AUTP program must go through several stages. The claim will be processed if the farmer submits a written notification of the damage to the PPL/POPT-PHP and the Insurance Officer within 7 calendar days after the damage is noticed. During the reporting process, farmers do not remove evidence of damage before inspection, and take control measures with the local agricultural office. Damage that cannot be controlled, the PPL/POPT-PHP and loss assessor from the insurance company will inspect and calculate the damage. Furthermore, the minutes of the results of the damage inspection must be filled in, attached with evidence of damage, and signed by all relevant parties and recognized by the District/City Agriculture Office. (Liskasari et al., 2016).

Factors that cause the insurance claim process to take a lot of time are the lack of implementing personnel and the long distance between the land and the insurance officer. On the other hand, farmers' damaged land will soon be used by farmers to replant or plant other crops in order to continue earning income. As a result, farmers who wait too long for insurance officers to conduct inspections have already cleared their land and when surveyed the condition of land damage required as evidence does not meet the requirements of the claim. Evidence of crop damage on farmers' land that does not exist causes farmers to be unable to receive compensation claims. This is also in line with research (Herizal & Haflisyah, 2017) that the delay in the claim process is caused by the lack of technical and claim employees and the late submission of claim settlement documents to PT Asuransi Jasindo.

Source of Production Risk

The main sources of risk for rice farming in Pringsewu District are pest attacks and climate change. The greatest production risk is caused by pests, with a percentage of crop failure of 50%. Pest attacks consist of rats, leafhoppers and birds. Similar research conducted by Ramadhana (2013) found that the largest percentage of crop failure was caused by pest attacks. The following presents the distribution of the percentage of harvest due to the source of risk coverage of rice farming in Pringsewu Regency in Table 4.

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Table 4. Percentage of Harvests Due to Sources of Farm Risk Coverage

Category Harvest Percentage (%)	Harvest Percentage		
	Both	Pests	Weather
<25	4%	3%	5%
25-50	49%	47%	58%
50-75	37%	42%	37%
>75	11%	8%	0%
Total	100%	100%	100%

Source: Primary Processed Data, 2023

Yields below 50% of the expected potential are called crop failures, because the results are far below the expected standard. (Novia & Zulkifli, 2021). Table 4 shows that rice farmers who do not fail to harvest or have yields above 50% due to existing risks are 48%, while those who experience crop failure or have yields below 50% are 52%. The results of the description of each percentage of crop failure due to the source of risk coverage can be seen in Figure 2.

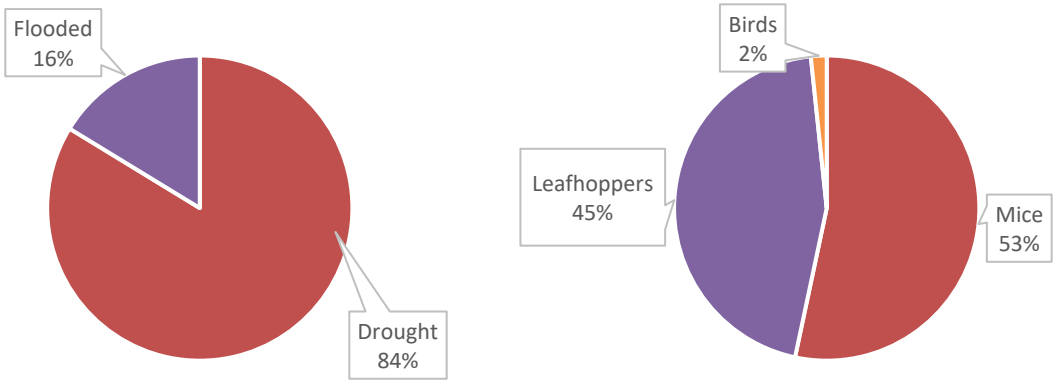

Figure 2: Distribution of Risk Coverage Sources
Source: Primary Processed Data, 2023

Figure 2 shows that the risk due to pest attacks is mostly caused by rats with a percentage of 52%. This is in line with research (Asih et al., 2023) which states that rats are the main source of Plant Disturbing Organisms (OPT) that attack rice farming in Mesuji Regency.

Risks due to climate change are mostly caused by drought with a percentage of 88%. The impact of drought is far more widespread than flooding. This is exacerbated by the fact that the current dry season is longer than before. (Rika, 2018; Surmaini & Faqih, 2016). The longer dry season is caused by global warming. Global warming can trigger the occurrence of the el nino and la nina phenomena to be faster than usual (Ali, 2017). Climate change also results in a delay in planting time, causing frequent explosions of pest and disease attacks (Megasari & Sodiq, 2023).

Risk Probability and Impact

Cross-sectional data in the form of productivity data from rice farmers who suffer crop failure are used to calculate the probability of the risk value of rice production. The risk threshold limit of

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52% is obtained from farmers by assuming the fulfillment of production costs and living needs of farmers according to the number of dependents of each farmer. A summary resuluts of the risk probability analysis on rice farmers in Pringsewu Regency can be seen in Table 5.

Table 5. Risk Probability Calculation Results

Description	Source of Production Risk		
	Both	Pest Factors	Weather Factors
Average harvest percentage is low	51%	54%	47%
St. Deviation	15%	16%	15%
X (Normal limits)	52,00%	52%	52%
Z	0,08	-0,14	0,34
Values in the Z table	0,0319	0,4443	0,1331
Probability	3%	44%	13%

Source: Primary Processed Data, 2023.

The calculation results in Table 5 show that the lowest average percentage of production risk experienced by rice farmers is 51% of normal conditions. This is supported by data from the Central Bureau of Statistics which shows that rice crop failure in Pringsewu Regency reached 40% in 2023. The probability of risk occurrence due to production risk sources caused by pests and weather is 3%. The probability of the risk of crop failure for each growing season caused by OPT factors is 44% and the probability of the risk of crop failure due to weather is 13%. The calculation results, the risk probability due to pests is greater than the weather factor (Kasmiati, 2020).

Calculation of the impact of risk is carried out to determine how much possible loss will be received by farmers due to existing sources of risk. The most effective method used in measuring the impact of risk is VaR (Value at Risk). (Fariadi et al., 2023). The confidence level used to calculate of the impact of production risk is 95% and an error of 5%, so the Z-table value is 1.645. Analysis of the impact of production risk is carried out to determine how much possible loss will be received by farmers as a result of existing risk sources. The amount of impact that will be received can be calculated using the VaR method which can be seen in Table 6.

Table 6. Risk Impact Calculation Results

Description	Loss Impact		
	Both	Pest Factors	Weather Factors
Average loss (IDR)	2.039.688	1.340.028	2.859.081
Standard Deviation	3.418.712	805.038	4.735.700
Z	1,645	1,645	1,645
Var (Rp)	2.726.743	1.500.000	3.810.800

Source: Primary Processed Data, 2023.

The average loss experienced by rice farmers due to pest and extreme weather reached Rp2,039,688/planting season (Table 4). The maximum level of losses felt by farmers due to crop failure due to pest and extreme weather factors reached Rp2,726,743/ha/growing season.

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Weather factors will cause rice farming losses of Rp3,810,800/ha/growing season and the value is higher than the losses caused by pest factors of Rp1,500,000/ha/growing season. This is in line with research by Ramadhana (2013) that in Sukaratu Village, Gekbrong Subdistrict, Cianjur the impact of risk due to weather is greater than the pest factor.

Risk Management

The calculation of probability and impact obtained a low level of risk probability and high impact of losses. The probability of risk to rice production is 3% (below 28.5 percent). The risk probability value is included in the low category but the impact of losses received by rice farmers is high at Rp2,726,743 per hectare per growing season. Through the mapping, the risk position of rice production can also be known in the risk management matrix. The position of production risk is in Quadrant 3, meaning that the risk of rice farming production has a low probability value and a high loss impact. Based on these results, the appropriate technique to handle this type of risk is the insurance method. Crop insurance aims to help farmers with risk management, which can reduce risk by guaranteeing crop yields or income (Si et al., 2023). The following presents the results of the risk mapping of rice production in Pringsewu Regency in Figure 3.

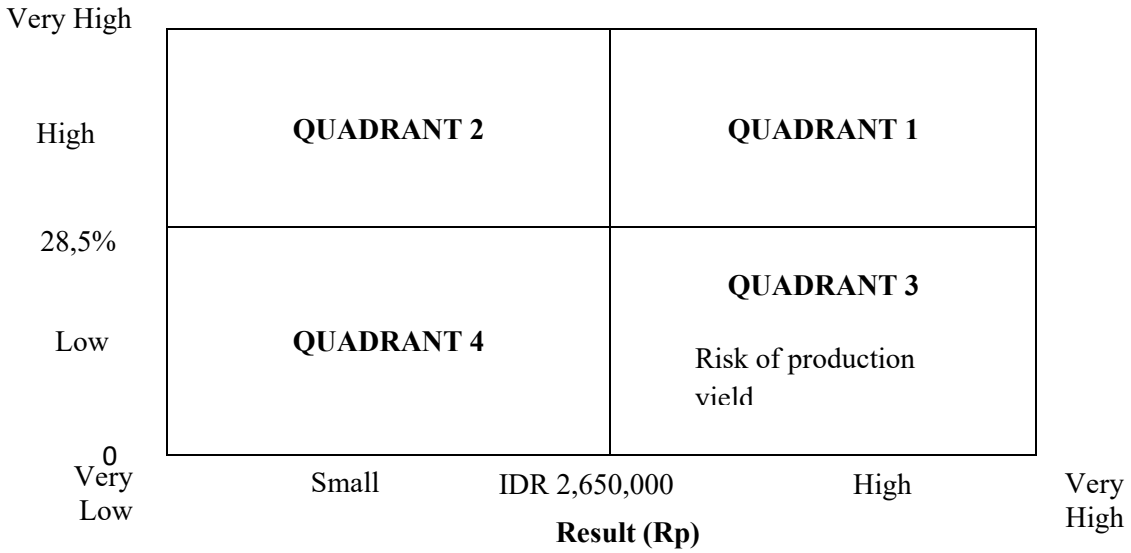

Figure 3. Results of Risk Mapping of Rice Production in Pringsewu District
Source: Primary Data, 2023

Pringsewu Regency is the region with the most insurance participants in Lampung Province. However, in reality, there are still many farmers who have not participated in the AUTP program. (Suari et al., 2021). The area of land that participated in AUTP in 2022 in Pringsewu District is 4,507 ha. It is only 10% of the total farmers' land area in Pringsewu District that is enrolled in the AUTP Program (Ministry of Agriculture, 2020).

Factors affecting the participation of AUTP Program are the lack of information about AUTP, the influence of farmers' social environment, the limited role of extension workers as facilitators, the

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delay in compensation payment and the late submission of documents due to the lack of technical and claims staff. This is in line with research by Suari, 2021 which shows that the obstacles experienced by farmers when participating in the AUTP Program are during the registration process and the claim submission process.

The results also show that the intensity of damage ≥75% on rice paddy fields of rice farmers in Pringsewu Regency is still rare. Thus, farmers consider that the coverage value set in the AUTP program is not proportional to the total costs incurred by farmers. This causes farmers to be reluctant to re-enroll their rice fields in the AUTP program. The risk management carried out by farmers in Pringsewu Regency is appropriate by becoming a member of the AUTP program, but insurance companies need to review the registration system and insurance claim procedures for further insurance development. Research conducted by Philip & Suresh, 2024 shows that obstacles to the successful implementation of insurance programs include farmers' minimal knowledge about the benefits of insurance, limited access to insurance providers, and delays in ordering insurance claims. Another risk management undertaken by farmers in Pringsewu District to deal with production risks is the construction of irrigation channels.

The form of prevention for drought disasters can be in the form of programs using appropriate technology, for example, such as the construction of reservoirs or reservoirs and the installation of irrigation water so that the water needs of rice plants can be available throughout the dry season. (Neritarani, 2019). The installation of irrigation water in Pringsewu Regency has only been carried out by some farmers. 40% of farmers use irrigation channels, while 60% of rice farmers rely on irrigating rice fields with rainfed water. The reason why farmers do not have irrigation channels is access to various types of irrigation infrastructure. Better irrigation infrastructure and farmers' easy access to irrigation water can improve farmers' preparedness in facing the dry season. Irrigation systems are critical for ensuring that crops receive consistent water, which is essential for their growth and higher yields Ismaya et al., 2016; Wang et al., (2018) The Pringsewu Regency Agriculture Office has implemented the Pompanization Program as part of its efforts to achieve food self-sufficiency. This program aims to enhance irrigation capacity, leading to a significant increase in crop yields by 47.12%, as demonstrated by research from Anzhari et al., (2023)The program's success highlights the importance of improving irrigation infrastructure to support agricultural productivity and food security in the region.

Simultaneous planting and pesticide spraying are carried out by farmers in Pringsewu Regency to avoid production risks caused by Plant Disturbing Organisms (OPT). Simultaneous planting is one way to reduce pest attacks. Simultaneous spraying of pesticides allows pest attacks due to pest movement from field to field to be reduced (Mutiara & Kholil, 2022). The most widely used pesticides by rice farmers in Pringsewu District for rat pests are petrocum and pospit. Meanwhile, pesticides used for leafhoppers and birds include sidabas, plenum, crown, and pexalon. In addition, farmers also sanitize the land before planting to remove potential threats to crop growth, such as weeds, pests, and pathogens.

The AUTP program in Pringsewu Regency has been running since 2016. However, until now the number of agricultural insurance participation in Pringsewu Regency is still very small compared to the total amount of harvested land area in Pringsewu Regency. In addition, based on the research

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results, it is known that many rice farmers do not know that they are registered as insurance participants, so they do not claim when crop failure occurs. Therefore, it is necessary to develop agricultural insurance to increase the participation of the insurance. Some steps that can be taken to develop agricultural insurance in Pringsewu District are increasing access and awareness of farmers, implementing the Agricultural Insurance Information System (SIAP) application, creating a communication forum for all agricultural insurance actors from both the government, insurance service providers and users of agricultural insurance services, increasing human resource capacity, and conducting evaluation and monitoring. (Adriana et al., 2022)..

CONCLUSION AND SUGGESTION

The main sources of production risk in rice farming in Pringsewu District are Plant Disturbing Organisms (PEST) consisting of rats, leafhoppers, and birds, as well as weather factors that become external factors of farming such as floods and droughts. The frequency of crop failure due to drought is more frequent than flooding. The probability of the risk of crop failure in rice production in Pringsewu District is 3% with a maximum loss impact of IDR 2,726,743/ha/MT. The type of risk of rice production in Pringsewu Regency according to the *risk management matrix*, is included in quadrant 3, namely with a low probability and a large risk impact. The right risk management in Quadrant 3 is the insurance method.

Strategies for developing agricultural insurance in Pringsewu District include increasing access and awareness of farmers, implementing the SIAP application, establishing a communication forum, increasing human resource capacity, and periodic monitoring and evaluation. Other risk management includes the creation of irrigated land, pompanization programs, simultaneous planting, and simultaneous pesticide spraying. This study suggests that the government increase pompanization assistance to anticipate drought, increase the number of agricultural extension workers to intensify socialization, form a group of contract employees to facilitate field surveys, and simplify the insurance claim process so that farmers do not experience difficulties.

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