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## International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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# The Role of Crop Insurance in Agriculture Risk Management in Nandura Region

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**ABSTRACT:** Agriculture in the Nandura region is highly vulnerable to risks such as unpredictable weather patterns, pest infestations, and market fluctuations, which can severely impact farmers' livelihoods. Crop insurance serves as a vital tool in agricultural risk management by providing financial security and stability to farmers. This study examines the role of crop insurance in mitigating agricultural risks in the Nandura region, analyzing its effectiveness, adoption rates, and challenges faced by farmers. Through surveys and data analysis, the research explores farmers' awareness, accessibility, and satisfaction with existing insurance schemes. The findings highlight the impact of crop insurance on income stability, investment in modern farming techniques, and overall resilience against losses. The study also identifies key barriers, including bureaucratic hurdles, claim settlement delays, and lack of awareness, and suggests policy improvements for enhancing insurance penetration. The research concludes with recommendations for making crop insurance more efficient and farmer-friendly, thereby strengthening agricultural sustainability in the Nandura region.

## I. INTRODUCTION

Agriculture plays a vital role in India's economy, particularly in rural areas where it serves as the primary source of employment. A significant portion of India's GDP is derived from agriculture, highlighting its importance for food security, rural livelihoods, and sustainability. About 70% of rural households depend on agriculture for their income, with small and marginal farmers making up around 82% of the farming community.

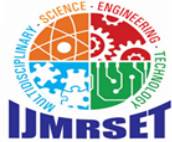
India's agriculture sector has undergone transformative changes through movements like the Green and White Revolutions, leading to increased food production. In 2017-18, food grain production reached approximately 275 million tones, reflecting the sector's productivity. Agriculture supports several industries, including textiles, sugar, tea, and leather goods, demonstrating its integral role in the economy.

Major agricultural states like Uttar Pradesh and Maharashtra play a crucial role, with Uttar Pradesh leading in food grain production and Maharashtra having a significant agricultural base. A large portion of Maharashtra's rural population depends on agriculture, continuing its traditional significance in the state's economy.

Agriculture has historically been the backbone of India's economy, contributing significantly to GDP and providing livelihoods to millions of people. The agricultural sector supports more than half of India's workforce, particularly in rural areas where farming is not just a profession but a way of life. However, despite its economic importance, agriculture remains vulnerable to a variety of risks, including climate variability, natural disasters, price fluctuations, and pest infestations. These risks create financial instability for farmers, many of whom rely solely on their agricultural output for survival.

India's agricultural landscape is highly diverse, influenced by factors such as geographical location, soil type, and climate conditions. While technological advancements, irrigation projects, and government interventions have helped increase productivity, small and marginal farmers continue to struggle with economic uncertainty due to erratic weather patterns and inadequate financial support.





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One of the major concerns in Indian agriculture is the prevalence of small and marginal farmers, who own less than two hectares of land. These farmers constitute the majority of the agricultural workforce but often lack access to resources such as credit, modern farming techniques, and adequate insurance coverage. The unpredictable nature of agriculture, coupled with rising production costs and market uncertainties, often pushes them into cycles of debt, making them highly susceptible to economic distress. In extreme cases, these financial burdens have contributed to a rise in farmer suicides, particularly in states like Maharashtra, Andhra Pradesh, and Karnataka.

Given these challenges, the role of crop insurance has become increasingly important. Crop insurance serves as a risk management tool designed to protect farmers from financial losses resulting from crop failures due to natural calamities, pests, or diseases. By ensuring compensation for losses, insurance policies help stabilize farm incomes and reduce distress migration among rural populations. However, despite the availability of government-backed insurance schemes like the Pradhan Mantri Fasal Bima Yojana (PMFBY), implementation gaps, bureaucratic delays, and lack of awareness have hindered their effectiveness.

The introduction of crop insurance in India dates back several decades, with various schemes being launched to provide financial security to farmers. However, many of these initiatives have faced challenges such as low enrollment rates, delayed compensation payments, and lack of transparency in claim settlements. While the government has made efforts to improve these schemes, the need for more effective implementation remains a critical issue.

This study aims to analyze the effectiveness of crop insurance policies in mitigating agricultural risks and their impact on rural development. By assessing the performance of current insurance schemes and identifying gaps in their implementation, this research seeks to offer recommendations for improving financial security in the agricultural sector. The study will also explore how crop insurance influences rural livelihoods, migration patterns, and overall economic stability. In doing so, it aims to provide insights into how policy improvements can enhance the resilience of India's agricultural sector and ensure sustainable growth for the farming community.

## II. LITERATURE REVIEW

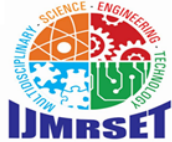
Agriculture is a high-risk sector because of its dependence on unfortunate events such as weather fluctuations, market fluctuations, pest outbreaks, and invasions by diseases. Therefore, crop insurance has already been conceived as a strategic risk management tool that gives financial protection to farmers against the ground losses or bad weather associated with their crops. In this literature review, the role of crop insurance in risk management is a semblance of how other insurance-based leadership strategies for agricultural innovations-in their foundations system on their promises to support farmers appropriately within and outside the boundaries of a lot of the reals.

### Crop Insurance in Agricultural Risk Management

Crop insurance is designed to protect farmers from losses due to unforeseen climatic variations such as crop failure due to drought, flood, and pest outbreaks. With farmers being compensated, crop insurance mitigates the risks against variability of factors influencing this farming activity. maintain that crop insurance is important in protecting farm incomes such that farmers would find it easier to undertake recovery measures after fuel seasons. (Goodwin and Smith, 1995) This smoothens the slopes of losses in farmers' incomes and allows them a chance of good financial planning and long-term capital investment for agricultural production. In similar (vein, Cafiero et al., 2007) assert that crop insurance reduces the negative effect of climatic events that due to climate change are becoming increasingly unpredictable.

### Farmers Awareness About Crop Insurance Schemes: An Analytical Study.

In India, agriculture has been crucial for economic development. Approximately 70 percent of the population relies on agriculture, which is heavily dependent on the unpredictable monsoon ( Kartik, T.T. Ramalingam, L. P.). In Tamil Nadu, agriculture remains a key sector, with over 56 % of the population engaged in agriculture and related activities for their livelihoods. Tamil Nadu accounts for 7 % of population, 4 % of the land area, and 3 % of the water resources in 12 India. Crop production in India is often affected by climate variability. Additionally, Indian agriculture faces challenges such as significant damage from pests and diseases. In this context, crop insurance becomes essential for ensuring the stable growth for agricultural sector. Crop insurance provides financial support for managing agricultural risks. To effectively manage these risks, farmers need to be well-informed about crop insurance schemes. This paper examines farmers' awareness levels regarding crop insurance schemes, categorizing them as low,



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medium, or high, and discusses the reasons for insuring crops.

### Risk Mitigation and Crop Insurance in India

This paper explores the nature and scope of crop insurance in India, conducting a performance analysis of the area yield and weather-based crop insurance schemes currently in operation. According to a study by Reshmy Nair (2011), the significance of crop insurance as a vital tool for risk mitigation is well-recognized. However, the study highlights that there has been insufficient policy intervention to address its inherent shortcomings. As a result, crop insurance has not yet reached its full potential as an effective risk-mitigation resource for farmers across various regions of the country. Income Stabilization and Investment Encouragement Crop insurance plays a crucial role in stabilizing farmers' incomes and encourages investments in modern agricultural techniques.. Since they have an insurance net supporting them, farmers have more of an incentive to use improved seed varieties or efficient irrigation if they think that many of these new techniques are more risky. stress that crop insurance gives farmers an incentive to undertake calculated risks toward boosting their productivity, enhancing both their yield and sustainability of agricultural production. (Mahul and Stutley 2010) research show that Due to farmers regular income restores affected by 13 devastating threats, insured farmers are more favourable candidates for credit, as lenders are willing to extend loans to borrowers covered with insurance.

M.S. Reddy and P.N. Mehta (2021) explored various approaches and challenges associated with agricultural insurance in India. They suggested that peril-indexed insurance and options could be effective techniques for managing risks and stabilizing revenue for Indian farmers, who are heavily impacted by weather conditions. The authors also addressed the implementation challenges of crop insurance schemes, highlighting issues such as administrative inefficiencies and delays in the settlement of claims.

V.M. Dandekar, often referred to as the father of crop insurance in India, made significant contributions to the development of various crop insurance schemes, highlighting their importance in supporting agricultural sustainability. His work in the (1970s and 1980) helped establish the foundation for crop insurance programs.

### III. RESEARCH METHODOLOGY

#### The Role of Crop Insurance in Agricultural Risk Management in Nandura Region

Crop insurance is a crucial tool for managing financial risks in agriculture, helping farmers mitigate losses and sustain their livelihoods. In the Nandura region, where agriculture is the primary occupation, farmers face various uncertainties that impact their productivity and income. While government and private crop insurance schemes aim to provide financial protection, the key question remains: How effective is crop insurance in reducing financial risks and ensuring sustainable growth in rural Nandura?

This study explores whether different types of crop insurance, including yield-based and revenue protection policies, adequately cover farmers' risks. Additionally, it examines farmers' awareness and understanding of revenue protection insurance, which safeguards against both yield reductions and market price declines. Furthermore, the research evaluates the impact of government policies on minimizing financial losses and promoting economic stability in the agricultural sector of the Nandura region.

#### Objectives of the Study

This research aims to analyze the penetration and effectiveness of crop insurance in villages and semi- urban areas of the Nandura region. The key objectives include:

- Understanding the current scenario of crop insurance in India.
- Assessing farmers' awareness levels regarding crop insurance in Nandura.
- Examining major agricultural risks and the strategies farmers use to mitigate them.
- Evaluating the effectiveness of crop insurance in managing climate-related risks and its impact on farmers' income.
- Comparing different crop insurance options to identify the best coverage for various risks and sustainable growth.
- Analyzing the role of government policies in enhancing crop insurance programs and ensuring farmers' economic stability in Nandura.



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### Scope of the Research

This study focuses on assessing the impact of crop insurance on farmers' income stability, risk management, and overall economic efficiency in the Nandura region.

### Research Design –Descriptive Research

### Data Sources & Methods

This study utilizes both primary and secondary data to analyze the role of crop insurance in agricultural risk management in the Nandura region.

#### ➤ Primary Data Collection:

- Surveys through questionnaires (online via Google Forms and in-person).
- Personal interviews with farmers in their native language.
- Group discussions with farmers to gather insights.

#### ➤ Secondary Data Collection:

- Reports and statistical bulletins from government sources (India and state-level).
- Publications from insurance companies, journals, magazines, and newspapers.

### Sampling Procedure

The study follows a questionnaire-based approach for primary data collection. Respondents are provided explanations if needed to ensure clarity in answering the questions.

### Sample Size

For the research the sample size is 150 farmers

**The Sampling Techniques:-** Random sampling technique

## IV. DATA ANALYSIS AND INTERPRETATION

### ROLE OF CROP INSURANCE IN AGRICULTURE RISK MANAGEMENT IN NANDURA REGION

Counts in Numbers

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
Climate risk (drought, floods) have impacted farm's productivity	1	5	36	71	37	150



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Crop insurance is an effective tool in reducing financial losses	2	8	45	63	32	150
Education play important role for understand benefits of crop insurance	6	20	64	41	19	150
Government agencies provide guidance about insurance scheme	2	21	61	35	31	150
The claim settlement process was timely	6	26	62	44	12	150
The claim settlement process was transparent and easy	3	32	62	43	10	150
The process of filling an insurance claim is simple and easy to understand	5	25	65	42	13	150
Government program like PMFBY are beneficial for small-scale farmers	3	18	73	38	18	150



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Better implementation of government insurance schemes	2	24	55	48	21	150
Income has increased after using insurance	3	14	61	49	23	150

### V. HYPOTHESIS TESTING

To analyze the effectiveness of crop insurance in the Nandura region, the following hypotheses can be formulated based on the research objectives:

1. Importance of Various Risk Factors and Mitigation Strategies Used by Farmers

H<sub>0</sub>: Farmers do not consider crop insurance an essential risk management strategy.

H<sub>1</sub>: Farmers consider crop insurance an essential tool for managing agricultural risks.

2. Effectiveness of Crop Insurance in Mitigating Climate-Related Risks and Its Impact on Farmers' Income

H<sub>0</sub>: Crop insurance does not significantly reduce financial losses caused by climate-related risks.

H<sub>1</sub>: Crop insurance significantly helps farmers mitigate financial losses due to climate-related risks.

These hypotheses can be tested using statistical methods like Chi-square tests, t-tests, correlation analysis, and regression models to determine relationships between crop insurance awareness, adoption, effectiveness, and farmers' financial stability.

#### Chi-Square Test Results for the Aspects

Aspect	Chi-Square Statistic ( $\chi^2$ )	p-value	Interpretation
Climate risk (drought, flood) impact on productivity	107.73	2.21e-22	Highly significant
Crop insurance as an effective risk reducing tool	86.2	8.44e-18	Highly Significant



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Education role in awareness of crop insurance benefits	75.69	1.43e-15	Highly Significant
Role of government policies in crop insurance adoption & economic stability	244.57	1.25e-12	Highly Significant
Timeliness of claim settlement process	71.2	1.27e-14	Highly significant
The claim settlement process was transparent and easy	77.53	5.80e-16	Highly significant
The process of filling an insurance claim is simple and easy to understand	76.93	7.77e-16	Highly significant
Government program like PMFBY are beneficial for small-scale farmers	97.67	3.09e-20	Highly significant
Better implementation of government insurance schemes	61.67	1.29e-12	Highly significant
Income has increased after using insurance	78.53	3.56e-16	Highly significant

### Interpretation

The chi-square test results indicate a highly significant relationship ( $p < 0.01$ ) across all analyzed factors, suggesting that the observed variations are not due to random chance. Each aspect related to crop insurance and agricultural risk management shows a statistically significant pattern in how respondents perceive them.

### VI. FINDINGS

#### 1. Impact of Climate Risks on Productivity

The high chi-square value (107.73) confirms that climate risks (droughts, floods) significantly affect farmers' productivity. This indicates strong agreement among respondents regarding the adverse effects of climate uncertainties on agriculture.

#### 2. Effectiveness of Crop Insurance as a Risk-Reduction Tool

The result ( $\chi^2 = 86.2$ ,  $p < 0.01$ ) suggests that respondents overwhelmingly perceive crop insurance as an effective way to mitigate financial losses from unpredictable events

#### 3. Role of Education in Crop Insurance Awareness

With a chi-square statistic of 75.69, the data supports the idea that education plays a crucial role in improving awareness





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and adoption of crop insurance policies.

#### 4. Role of Government Policies in Crop Insurance Adoption & Economic Stability

The highest chi-square value (244.57) suggests that government policies have a substantial impact on insurance adoption and farmers' economic stability. This highlights the need for effective policy frameworks and better implementation.

#### 5. Timeliness and Transparency of Claim Settlement

The claim settlement process was analyzed in two aspects: timeliness ( $\chi^2 = 71.2$ ) and transparency ( $\chi^2 = 77.53$ ). Both results indicate significant dissatisfaction with claim processing, implying that improvements in efficiency and transparency are necessary.

#### 6. Ease of Filing an Insurance Claim

With a chi-square value of 76.93, the results suggest that many farmers find the claim process challenging, indicating a need for simplification and better support mechanisms.

#### 7. Perception of Government Programs like PMFBY

The significant value ( $\chi^2 = 97.67$ ) reflects that many farmers find schemes like PMFBY beneficial. However, the perception varies, suggesting possible gaps in outreach and implementation.

#### 8. Implementation of Government Insurance Schemes

The chi-square result ( $\chi^2 = 61.67$ ) shows that farmers have mixed experiences with the execution of government-backed insurance programs, highlighting the need for improvements in policy enforcement and accessibility.

#### 9. Impact of Insurance on Farmers' Income

A chi-square value of 78.53 indicates that most farmers recognize an increase in income after using insurance. This suggests that insurance contributes to financial stability, though more efforts may be needed to enhance its benefit.

### VII. CONCLUSION

The research on crop insurance in the Nandura region confirms its critical role in safeguarding farmers against agricultural risks, particularly those related to climate variability and financial instability. The highly significant chi-square test results indicate a strong association between farmers' awareness, the perceived importance of crop insurance, its effectiveness in mitigating risks, and the role of government policies in its adoption.

Government interventions, such as subsidies and policy support, play a crucial role in encouraging participation. However, improving awareness through targeted education campaigns, simplifying the enrollment process, and leveraging technology for efficient claim settlements are necessary steps to enhance its impact. The findings emphasize the need for customized insurance schemes that align with local agricultural conditions and climate risks. By addressing these gaps, crop insurance can be further strengthened as a reliable tool for risk management, ensuring economic stability and resilience for farmers in the

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