

Crop Insurance Safeguards Farmers Livelihoods in an Era of Growing Climate Uncertainty

L. Vijay, Ch. Shekhar², R. Rakesh³ and B. Kiranmai⁴

¹Msc in Agricultural Extension, ICAR-NDRI Karnal.

^{2&4}Ph.D. Research Scholar, Department of Agricultural Economics, PJTAU, Hyderabad -500030

³Ph.D. Research Scholar, Department of Agricultural Extension Education, PJTAU, Hyderabad -500030

1. Introduction

Agriculture remains the backbone of rural livelihoods in India, supporting the income and food security of millions of farm families. However, farming today has become increasingly risky due to unpredictable weather patterns, frequent natural calamities, pest attacks, market uncertainties. For most farmers, especially small and marginal ones, a single crop failure can lead to serious financial stress, indebtedness, disruption of household welfare. In this challenging environment, crop insurance has emerged as a vital risk-management tool, offering financial protection against crop losses and helping farmers recover from unforeseen shocks. By sharing risk between farmers and the government, crop insurance aims to stabilize farm incomes, encourage investment in agriculture, strengthen resilience in the face of growing climate uncertainty.

2. Indian Agriculture and Rising Climate Risk

Indian agriculture remains deeply dependent on weather conditions, with nearly 55 percent of the net sown area being rainfed and highly exposed to variations in rainfall, temperature, humidity. Unlike irrigated agriculture, rainfed farming depends entirely on timely and adequate monsoon rains, making it extremely vulnerable to even small deviations in weather patterns. Delayed onset of monsoon, prolonged dry spells, uneven rainfall distribution, or early withdrawal of rains can significantly reduce crop yields. For millions of farmers, especially small and marginal ones, such variability directly translates into income instability.

In recent decades, the impact of climate change has further intensified agricultural risks. Scientific evidence and field experience show an increase in the frequency and severity of extreme weather events such as droughts, floods, cyclones, hailstorms, heat waves, unseasonal rainfall. These events often occur unexpectedly and affect large areas simultaneously, leading to widespread crop damage. For example, heavy rainfall during harvesting can destroy standing crops, while heat stress during critical growth stages can sharply reduce yields. Pest and disease outbreaks have also become more frequent

due to changing climatic conditions, adding another layer of risk for farmers.

The consequences of such climatic shocks extend far beyond crop loss. When agriculture fails, farm households experience sharp declines in income, forcing them to reduce spending on food, education, healthcare, other essential needs. Farmers may be compelled to borrow from informal sources, sell productive assets, or migrate temporarily in search of wage employment. These coping strategies often have long-term negative effects on household welfare and rural development. Repeated exposure to climate shocks can trap farming families in cycles of poverty and indebtedness.

Moreover, climate-related risks have wider implications for national food security and price stability. Large-scale crop losses can lead to supply shortages, price volatility, increased pressure on public food distribution systems. This makes agriculture not only a livelihood issue but also a macroeconomic concern. As climate uncertainty continues to grow, traditional coping mechanisms such as crop diversification or savings alone are no longer sufficient to protect farmers.

In this context, the need for a reliable and structured financial safety net has become increasingly urgent. Crop insurance offers a practical solution by transferring a part of the production risk away from farmers and providing timely financial support during adverse seasons. As climate risks intensify, strengthening crop insurance systems becomes essential to protect farm livelihoods, ensure agricultural stability, enhance the resilience of India's rural economy.

3. What Is Crop Insurance and How Does It Work?

Crop insurance is a risk-sharing mechanism designed to protect farmers against losses caused by natural calamities, pests, diseases. Under this system, farmers pay a small premium, in return receive compensation when crop damage occurs due to factors beyond their control. In India, most crop insurance schemes follow an area-based approach, where compensation is determined based on average yield loss in a defined area such as a village or mandal.

This approach reduces administrative complexity and allows insurance coverage at a large scale. Crop insurance also supports institutional credit, as insured farmers are considered less risky borrowers by banks.

4. Evolution and Scale of Crop Insurance in India

India has experimented with crop insurance for more than five decades, gradually refining schemes to address the changing risk environment in agriculture. The evolution of crop insurance reflects continuous efforts by the government to move from small-scale, experimental approaches to large, nationwide risk-management programmes. The major crop insurance schemes introduced in India over time are presented in Table 4.1.

Table 4.1: Evolution of Crop Insurance Schemes in India

S. No.	Year / Period	Crop Insurance Scheme
1	1971–78	First Individual Approach Scheme
2	1979–84	Pilot Crop Insurance Scheme
3	1985–99	Comprehensive Crop Insurance Scheme
4	Rabi 1999–2000 to Rabi 2013–14	National Agricultural Insurance Scheme (NAIS)
5	Rabi 2010–11	Modified National Agricultural Insurance Scheme (MNAIS)
6	2007–08	Weather-Based Crop Insurance Scheme (WBCIS)
7	2009–10	Coconut Palm Insurance Scheme
8	2016 onwards	Pradhan Mantri Fasal Bima Yojana (PMFBY)

The First Individual Approach Scheme (1971–78) was India's earliest attempt at crop insurance, where losses were assessed at the individual farm level. Although conceptually attractive, the scheme faced serious problems such as high administrative costs, moral hazard, difficulty in accurately assessing individual losses. These limitations led to the introduction of the Pilot Crop Insurance Scheme (1979–84), which experimented with an area-based approach to reduce costs and improve feasibility.

The Comprehensive Crop Insurance Scheme (1985–99) marked the first nationwide effort to link crop

insurance with institutional credit, making it compulsory for loanee farmers. While this expanded coverage, issues related to delayed claims and limited crop coverage persisted. To further strengthen the system, the National Agricultural Insurance Scheme (NAIS) was introduced from Rabi 1999–2000, significantly expanding crop and area coverage, though challenges such as large insurance units and delayed settlements remained.

To address these shortcomings, reform-oriented schemes such as the Modified NAIS (MNAIS) and the Weather-Based Crop Insurance Scheme (WBCIS) were introduced. MNAIS aimed to improve accuracy by reducing insurance unit size and including post-harvest losses, while WBCIS focused on faster claim settlement using weather indices. Crop-specific schemes like the Coconut Palm Insurance Scheme were also launched to protect perennial crops.

The introduction of the Pradhan Mantri Fasal Bima Yojana (PMFBY) in 2016 marked a major milestone in the evolution of crop insurance in India. By offering low, uniform premium rates and expanding coverage to millions of farmers, PMFBY transformed crop insurance into a central pillar of agricultural risk management. This long evolution highlights India's gradual shift from experimental insurance models to a large-scale, structured, technology-driven crop insurance system.

5. How Crop Insurance Benefits Farmers

Crop insurance offers several important benefits that go far beyond simple compensation for crop loss. The most significant benefit is income stability. When crops fail due to drought, floods, or other natural calamities, insurance payments help farmers maintain a basic level of income. This financial support enables farm families to meet essential household expenses such as food, education of children, healthcare, repayment of loans. Without insurance, crop failure often forces farmers into debt or distress sales of assets.

Another major advantage of crop insurance is that it encourages the adoption of improved agricultural technologies. Insured farmers are more confident in investing in high-yielding seeds, fertilizers, pesticides, irrigation equipment, mechanization, as the fear of losing the entire investment due to crop failure is reduced. This risk coverage promotes productivity-enhancing practices and supports long-term agricultural growth.

Crop insurance also plays a crucial role in improving access to institutional credit. Banks and other financial institutions prefer lending to insured farmers because insurance reduces the risk of loan default in the event of crop loss. As a result, insured farmers are more likely to obtain crop loans on time and at lower interest rates compared to those who depend on informal sources. Additionally, crop insurance provides psychological security, reducing stress and uncertainty associated with farming. By lowering the fear of total income loss, insurance helps farmers avoid distress migration, asset liquidation, other negative coping strategies during adverse seasons.

6. Claims, Compensation, Financial Protection

The effectiveness of crop insurance can be assessed using indicators such as the claims-to-premium ratio, which compares the total compensation paid to farmers with the premium they contribute. In recent years, this ratio has exceeded 300 percent, meaning that farmers have received significantly higher payouts than the premium they paid. This clearly demonstrates the protective role of crop insurance, especially during years marked by widespread crop losses due to extreme weather events.

High claim payouts ensure that farmers receive timely financial relief during difficult periods, allowing them to recover and continue farming in the following season. However, such high compensation levels also reflect the heavy fiscal responsibility placed on governments, as a large share of the premium is subsidized by public funds. For the insurance system to function smoothly, it is essential that governments release their share of the premium subsidy on time. Delays in subsidy payments can lead to delays in claim settlement, reducing the effectiveness of insurance as a timely support mechanism.

7. Challenges in the Current Crop Insurance System

Despite its benefits, the crop insurance system in India faces several operational and institutional challenges. One of the most common problems reported by farmers is delay in claim settlement. In many cases, farmers receive compensation several months after the crop loss has occurred. Such delays reduce the usefulness of insurance, as farmers require financial support immediately after harvest to prepare for the next cropping season.

Another major challenge is related to loss assessment under the area-based approach. Since compensation is determined based on average yield

loss at the village or mandal level, individual farmers who experience severe losses may not receive adequate compensation if the overall area average does not reflect their situation. This mismatch between actual loss and assessed loss often leads to dissatisfaction and loss of trust among farmers.

Limited awareness and understanding of crop insurance schemes also pose significant challenges. Many farmers are not fully aware of scheme provisions, enrollment deadlines, premium rates, or claim procedures. Inadequate communication and extension support further weaken farmer participation and confidence. Addressing these challenges requires better awareness campaigns, timely claim settlement, improved assessment methods, stronger coordination among implementing agencies.

8. Role of Technology in Improving Crop Insurance

Technology has emerged as a powerful tool to address many of the long-standing problems in crop insurance implementation. Traditional methods of loss assessment, which rely heavily on manual crop-cutting experiments and paperwork, are time-consuming and often lead to delays in claim settlement. The use of modern technologies such as satellite imagery, remote sensing, drones, GPS-enabled crop-cutting experiments, mobile applications can significantly improve both the accuracy and speed of crop loss assessment.

Satellite and remote-sensing technologies help in monitoring crop health, vegetation growth, damage caused by droughts, floods, or cyclones over large areas in a short time. Drones can provide high-resolution field-level images, enabling more precise identification of damaged areas. GPS-enabled crop-cutting experiments ensure transparency and reduce manipulation in yield estimation. In addition, mobile applications allow farmers to enroll digitally, upload crop details, track the status of their claims in real time.

Digital platforms also improve transparency and accountability in the insurance process. Online dashboards enable governments and insurers to monitor coverage, premium payments, claim settlements efficiently. When used consistently, these technologies can reduce disputes related to loss assessment, minimize human error, shorten the time taken to process claims. Most importantly, faster and more transparent systems help build farmer confidence and trust in crop insurance schemes.

9. The Way Forward: For crop insurance to become truly farmer-centric, future reforms must focus on three

key pillars: timeliness, transparency, trust. Timely settlement of claims is crucial, as farmers need financial support immediately after crop loss to prepare for the next season. Ensuring that premium subsidies from governments are released on time is essential for avoiding delays in claim payments.

Improved coordination among central and state governments, insurance companies, banks, local implementing agencies is equally important. Clear roles, shared data systems, streamlined procedures can enhance efficiency and reduce administrative bottlenecks. Strengthening awareness programs through Krishi Vigyan Kendras (KVKs), ATMA, extension workers, farmer producer organizations (FPOs) can help farmers better understand scheme provisions, enrollment processes, claim procedures.

In the long run, crop insurance should move beyond being viewed as a post-disaster relief mechanism. Instead, it should evolve into a proactive agricultural risk-management system that works alongside other strategies such as crop diversification, climate-resilient varieties, irrigation development, weather advisories. Integrating insurance with these

measures can strengthen the overall resilience of Indian agriculture.

10. Conclusion

In an era of increasing climate uncertainty, crop insurance is no longer optional—it is essential for the survival and sustainability of Indian agriculture. With a large proportion of farming still dependent on rainfall, farmers remain highly exposed to weather-related risks that are beyond their control. Crop insurance provides a vital safety net by protecting farmers against unpredictable losses and helping them recover during adverse seasons.

By stabilizing farm incomes, crop insurance encourages investment in modern agricultural practices, supports access to institutional credit, strengthens national food security. However, its success depends on effective implementation, timely claim settlement, widespread farmer awareness. With greater use of technology, improved governance, farmer-friendly administration, crop insurance can truly serve as a financial shield for Indian farmers, ensuring stability, confidence, long-term resilience in farming.
