



Safeguarding Indian Agriculture: Understanding the Nation's Crop Insurance Framework

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Agriculture is the backbone of India's economy, employing nearly 45% of the workforce and contributing about 17% to the national GDP (Ministry of Agriculture & Farmers Welfare, 2023). However, Indian agriculture is highly dependent on monsoon rainfall and is vulnerable to natural calamities such as droughts, floods, cyclones, and pest infestations. These uncertainties often lead to severe crop losses, resulting in financial distress for millions of farmers. To mitigate such risks, crop insurance has emerged as a critical policy tool that provides financial protection to farmers against crop failure. By compensating for losses due to natural and climatic factors, crop insurance helps stabilize farmers' income and sustain agricultural productivity. The Government of India has introduced several crop insurance schemes over the decades, with the Pradhan Mantri Fasal Bima Yojana (PMFBY) and the Restructured Weather-Based Crop Insurance Scheme (RWBCIS) being the most comprehensive programs currently in operation.

History of Crop Insurance Schemes in India

Comprehensive Crop Insurance Scheme (CCIS) – 1985: Introduced to cover loanee farmers against yield losses. It was linked to agricultural credit.

National Agricultural Insurance Scheme (NAIS) – 1999: Expanded coverage to all farmers and crops but was criticized for delayed settlements.

Modified NAIS (MNAIS) – 2010: Introduced actuarial premiums and faster claim processes.

Pradhan Mantri Fasal Bima Yojana (PMFBY) – 2016: A yield-based scheme offering comprehensive coverage at subsidized premium rates.

Restructured Weather-Based Crop Insurance Scheme (RWBCIS) – 2016: A weather-index-based model designed to protect against adverse climatic conditions (Department of Agriculture, Cooperation & Farmers Welfare, 2023).

Other schemes: Many states also have state-specific crop insurance or allied schemes (sometimes with special premium subsidies, or covering horticulture/vegetables, tenant farmers etc).

Operational Crop Insurance Schemes in India

1. Pradhan Mantri Fasal Bima Yojana (PMFBY)

PMFBY was launched in 2016 to provide a large-scale crop-insurance cover for farmers. It replaced or merged earlier schemes like the National Agricultural Insurance Scheme (NAIS) and the Modified National Agricultural Insurance Scheme (MNAIS). It aims to stabilise farmer incomes by protecting against crop loss due to natural calamities, pests, disease, unseasonal weather, pre-sowing to post-harvest. PMFBY is a yield-based insurance scheme that compensates farmers when the actual yield of a notified crop in an area falls below the threshold yield. It uses data from Crop Cutting Experiments (CCEs), satellite monitoring, and other field assessments to determine yield loss.

Key features

- Premiums: Farmers pay a small portion of the “sum insured” (value of the crop) and the rest is subsidised by Central + State governments.
- For Kharif crops: ~2% of sum insured.
- For Rabi crops: ~1.5%.
- For annual/horticultural/commercial crops: ~5%.

Coverage

All farmers (including sharecroppers/tenant farmers) growing notified crops in notified areas (both loanee & non-loanee) are eligible. The scheme is voluntary (since Feb 2020) for non-loanee farmers. Covers events like: prevented sowing, mid-season adversity, natural calamities (drought, flood), localised calamities (hail, landslide), post-harvest losses (in notified areas) depending on state notification. Technology push: Use of remote sensing, satellites, drones, yield estimation systems to speed up claim settlement.

Data Inputs & Technology

- Historical yield data from State Agriculture Departments.
- Crop Cutting Experiment (CCE) data captured via mobile apps with geo-tagging.
- Remote sensing and satellite imagery for yield validation (MNCFC support).
- Actuarial premium rates computed using yield variance and probability distributions.

Methodology Steps

1. Identification of the Unit Area of Insurance (village/block/tehsil).
2. Collection of 7–10 years of historical yield data for each notified crop.
3. Calculation of Threshold Yield (TY) using the formula $TY = AY \times L$.
4. Conducting Crop Cutting Experiments (CCEs) to determine Actual Yield (AYield).
5. Comparison of Actual Yield with Threshold Yield to compute indemnity.
6. Settlement of claims via Direct Benefit Transfer (DBT).

Implementation & important points

The scheme is executed by general insurance companies authorised by the Government of India in conjunction with state governments. Timing & notification: Each state lists which crops in which areas (“notified crops / notified areas”) are covered for each season (Kharif/Rabi). E.g., in Uttarakhand, rice & mandua in Kharif, wheat in Rabi, etc. Farmers need to enrol, provide land-records, crop details etc. Non-loanee farmers may need records showing tenancy etc. Claims are processed once the loss assessment is done (yield cut-off or area-based trigger). The “area approach” is used in many cases (if average yield in an area falls below a threshold, then claims are paid for all insured farmers in that area) under earlier schemes.

Benefits

- Helps to reduce risk for farmers so that a calamity doesn’t wipe out their investment or push them into debt.
- Encourages uptake of credit (banks more willing to lend if crops are insured).
- Modern practices: With less risk, farmers may adopt better inputs, technology.

Limitations / things to watch

- Since the scheme is “area-based” in many cases, individual farmers may feel unfair if they suffered but the area trigger wasn’t crossed.
- Timeliness of claim settlement is crucial; delays reduce the value.\
- Awareness among farmers, enrollment logistics, clarity of land-records & tenure matter.
- Not all crops/areas may be notified – check if your specific crop and area are covered.
- Premiums, subsidy sharing, administrative cost.

2. Restructured Weather Based Crop Insurance Scheme (RWBCIS)

This scheme is designed to cover “weather risk” for crops — i.e., adverse weather conditions like insufficient/excessive rainfall, temperature variation, humidity, wind speed, etc. It works more via “index-based” triggers (weather indices) rather than individual area yield assessments in all cases. RWBCIS is a weather-index-based scheme that compensates

farmers for crop losses due to adverse weather events such as deficit/excess rainfall, frost, temperature variation, or humidity stress. It relies on objective weather data from Automatic Weather Stations (AWS) and IMD sources. In regions where crop loss is strongly correlated with specific weather events rather than known yield history, this scheme helps. Similar premium share and subsidy model as PMFBY in many states. Aimed at smaller unit of implementation and faster settlement because it is time-based on weather data. It supplements or works parallel to the main crop insurance scheme in certain states or areas.

Data input and technology

- Historical weather data from IMD and Automatic Weather Stations.
- Real-time data integration from IoT-based sensors and AWS network.
- Regression and correlation models linking weather parameters to yield.
- Automated claim processing through index algorithms and IMD verification.

Methodology steps

1. Define weather station and homogeneous zone for each crop.
2. Collect 10–15 years of historical weather data (rainfall, temperature, humidity).
3. Identify key weather parameters affecting crop yield at each phenological stage.
4. Establish critical thresholds and payout structure in a Term Sheet.
5. Compute weather index deviations during the insured period.
6. Trigger payout automatically when deviation exceeds the threshold.

Comparison of Crop Insurance Schemes in India: PMFBY vs RWBCIS

Feature	PMFBY	RWBCIS
Type of coverage	Crop yield-based insurance (loss in actual production)	Weather index-based insurance (loss due to adverse weather parameters)
Trigger for claim	Shortfall in yield (below a threshold yield decided for that area)	Deviation in weather (rainfall, temperature, humidity, wind) from the normal pattern
Data used	Crop-cutting experiments (CCE), remote sensing, satellite data	Weather station data or automated weather stations (AWS)
Risk covered	Drought, flood, pests, diseases, hailstorm, cyclone, etc.	Deficit/excess rainfall, temperature variation, frost, heat stress, etc.
Speed of claim settlement	Relatively slower (depends on CCE results)	Faster (objective weather-based triggers)
Premium (farmer's share)	1.5% Rabi, 2% Kharif, 5% commercial/horticultural crops	Similar subsidized rates (depends on state/product design)
Best suited for	Areas with good yield data and broader risk coverage	Areas with unpredictable weather and less yield data
Claim calculation formula	Indemnity = ((Threshold Yield - Actual Yield) / Threshold Yield) × Sum Insured	Payout = f(weather deviation), linear or step-wise as per Term Sheet
Basis risk	Low (if yield data reliable)	High (if weather data not representative)
Claim data source	CCE app, satellite imagery, ground verification	Automatic Weather Station (AWS) readings
Settlement approach	Area-based yield loss trigger	Index-based payout structure
Implementation agencies	Empanelled general insurance companies under GoI & State Govts	Empanelled insurers using weather-index models verified by IMD data
Technology integration	CCE App, drones, MNCFC satellite data analytics	IoT-based weather sensors, AWS, IMD API integration

What farmers should do – Practical checklist

1. **Check eligibility:** Is your crop a “notified crop” in your state for that season? Is your land in a “notified area”?
2. **Enroll on time:** There will be registration deadlines for Kharif/Rabi seasons. Missing deadlines may mean no coverage.
3. **Submit correct land/tenant/sharecropper documents:** If you are a tenant/sharecropper, you must submit relevant legal/contract documents.
4. **Pay premium:** Though small, you must pay your share of the premium (2%, 1.5%, 5% etc) what your state charges.
5. **Maintain records:** Of sowing date, crop type, input investment etc. In case of loss, you’ll need to report it according to guidelines.
6. **Report crop loss ASAP:** After an adverse event, follow the claim process (notify agriculture/insurance authority).
7. **Follow up on claim settlement:** Check status, get claim amount timely. Use the official portals/apps (for PMFBY there is Krishak portal).
8. **Keep an eye on final guidelines for your state:** Because each state may have special conditions (e.g., post-harvest loss cover, horticulture crops, etc).

Conclusion

Crop insurance is an indispensable component of India’s agricultural risk management framework. It safeguards farmers against unpredictable losses, promotes investment, and ensures agricultural sustainability. By integrating technology, policy reforms, and institutional support, crop insurance schemes like PMFBY and RWBCIS are making Indian agriculture more resilient to climate shocks. However, continuous improvement in transparency, data accuracy, and farmer awareness remains vital for maximizing the effectiveness of these schemes. Strengthening crop insurance will ultimately secure farmers’ livelihoods and reinforce India’s journey toward sustainable and inclusive agricultural growth.

References

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