



## Crop Insurance in India

**Gurdev Singh**

**W.P. No. 2010-06-01**

June 2010

The main objective of the working paper series of the IIMA is to help faculty members, research staff and doctoral students to speedily share their research findings with professional colleagues and test their research findings at the pre-publication stage. IIMA is committed to maintain academic freedom. The opinion(s), view(s) and conclusion(s) expressed in the working paper are those of the authors and not that of IIMA.



**INDIAN INSTITUTE OF MANAGEMENT  
AHMEDABAD-380 015  
INDIA**

## Crop Insurance in India

**Gurdev Singh**

Indian Institute of Management  
Vastrapur, Ahmedabad – 380 015  
Email: gurudev@iimahd.ernet.in

*This working paper discusses the dependence of Indian agriculture on uncertain rains. In addition the farmers experience other production risks as well as marketing risks related to different crop enterprises and for different agro-climatic regions and areas. It then argues on the need for crop insurance as an alternative to manage production risk. It then takes up the historical overview of crop insurance products and their performance. It is followed by the discussion on the currently available crop insurance products for specific crops and regions. It discusses at length the two important products, namely, National Agricultural Insurance Scheme and Weather Based Insurance Scheme. It also reflects on some deficiencies in these products.*

## Crop Insurance in India

### 1. Indian Agriculture: Dependence on Rainfall

Indian agriculture is heavily dependent on rainfall which largely occurs during monsoon season of about two and half months. The abnormal behaviour of monsoon may cause natural disasters such as scarcity conditions or drought, floods, cyclones, etc. Nearly two thirds of the cropped acreage is vulnerable to drought in different degrees. On an average 12 million hectares of crop area is affected annually by these calamities severely impacting the yields and total agricultural production (1).

About two thirds of the cultivated area has no irrigation. Even large part of irrigated area does not get adequate water supply for intensive cropping (double cropping). In rainfed areas sowing of kharif crops commences with the onset of monsoons and the delay in the onset of monsoons delays sowing with its adverse impact on yield. Further the growth of crops and realization of output are determined by the quantum of rainfall and its distribution during the monsoon season. Even sowing of rabi crops is determined by the soil moisture retained from the rains especially during the later part of the monsoon season. Rainfall pattern affects the irrigated crops also. Rainfall during flowering period washes the pollens adversely affecting the crop yield. Excess rainfall may adversely affect the yield realization. Heavy rains may submerge the growing crops in the early stages and may cause lodging in the later stages of crop growth. In the catchments heavy rains may cause floods in the plains. The floods disrupt the sowing schedule and damage the standing crops resulting in reduced yield or even total loss of crops and farm income in addition to loss of property. Other weather variables that affect yield include sunlight, temperature, wind, hails. In fact since time immemorial weather has been the major adversary that the farmers are not able to control. It has been established that 50 per cent of the variations in crop yield is due to variations in rainfall (2).

In any climatic zone crop yield among the farms varies with the soil, topography, tillage operations and use of four complementary inputs, namely, seed, fertilizer, pesticides and irrigation (soil moisture). Seed is the index of productivity which may be realized with the proper tillage practices, irrigation and fertilizer use. Pesticides use avoids the loss in yield because of pests and diseases. Not only quantum of these inputs but also their quality, and timings and method of use affect the yield realization. These four dimensions of complementary inputs vary for the individual farms in a year and for a farm over the years. In

other words given the soil and topography two sets of factors that effect yield on farms are climatic and managerial. Managerial factors are in the control of farmers climatic factors are not.

The loss of crop yield affects the farmer and farming in more than one ways. Their inputs including labour get lost. The low yield of major crops means reduced income and difficulty in arranging the necessities of life as well as inputs for the next season. The repayment of outstanding loans becomes irregular some times resulting in default. Though conversion of loans or their rescheduling helps the farmers for eligibility for fresh loans from formal sources it may not solve their liquidity problems completely. In some cases the farmers are compelled to divest and dispose off some assets created over past years. Some times, they have to resort to costly borrowing from informal sources.

The capacity of agriculture to hedge itself from vagaries of nature is considered crucial for development and growth of the sector in particular and economy in general. The natural calamities can slow the pace and process of development by reducing the food supplies and raw materials in the short run. Successive failure of crops results in indebtedness of farmers with its adverse impact on farming and farm economy and consequently the economy in general.

## **2. Risk and Uncertainty in Agriculture**

Uncertainty refers to an event the outcome of which is not certain i.e. the outcome may be one of the many possible outcomes. As such it can not be measured. But certain probability may be attached to individual outcome. Risk on the other hand refers to the impact of the uncertain outcome on the quantity or value of some economic variable. The value of the economic variable may be on either side of the mean value. Repeated events would result different outcomes having a range of values. Thus risk refers to the variations in value of an economic variable resulting from the influence of an uncertain event. Since the variations in the value are measurable risk can be measured.

Agricultural production is an outcome of biological activity which is highly sensitive to changes in weather. Important weather variables such as temperature, humidity, rainfall, wind etc. influence the biological process directly or indirectly. For instance, low soil moisture due to poor precipitation in the pre-sowing period adversely affects seed germination resulting in reduced plant population. The poor precipitation during growth period results in stunted plant growth. Heavy rainfall during early growth period causes

submersion of plants. Similarly hailstorms, wind and cyclones damage the standing crops by lodging and uprooting especially the perennials (trees and shrubs). High humidity may cause outbreak of pests and diseases. All these result in partial loss in yield and sometimes complete crop failure and hence reduced income to farmers. In other words, deviations in the weather variables from the normal adversely affect the crop yields and hence production and income on individual farms. As variations in weather are more a regular phenomenon crop yields are not stable. As if all this is not enough the sword of uncertain agricultural prices always hangs on the farmers' fate. As a consequence farm incomes fluctuate violently from year to year. These variations in income are referred to as risk. The variations in income due to changes in yield are production risk and due to changes in price marketing risk. As such risk (variations) may be measured in terms of standard deviation or coefficient of variations for yield, prices and income.

In business risk is treated as a cost. Once in the business one has to bear this cost. Since, risk is associated with the activity it cannot be eliminated so long the activity is carried out. It, however, can be managed i.e., can be reduced or minimized but at a certain cost. Risk management, therefore, implies minimization of income loss either by reducing variations in output or ensuring certain minimum price or guaranteeing certain level of income. It is a process of appraising and reducing risk. The ways devised to do so are referred to as risk management alternatives. These are discussed under the following heads.

**a. Avoiding Risk**

Some of the production risks can simply be avoided. For instance, eliminating more risky enterprises would minimize risk but at the cost of decreased total production (returns). Laggards always try to avoid risk. They opt for assured though low income enterprises.

**b. Preventing Risk**

Many a time some risks could be prevented by taking advance action. For instance, risk of loss in crop yield due to pest attack could be prevented by following preventive pest control. The cost of this risk management alternative is the cost of preventive pest control.

**c. Sharing Risk**

This alternative of risk management is quite common in India. Important example of risk sharing is the share lease of land to tenants. The production risks are shared between the landlord and the tenant in the ratio they share some inputs and the output. The cost of this alternative to the landowner would be equal to the difference between the net income tenant earns less the cash rent he would have paid for rental lease.

**d. Transferring Risk**

Risk may be transferred from one entity to another. For instance, marketing risk could be transferred to buyers by way of forward contract. It guarantees to pay an agreed price for the produce to be realized in future. The cost of this alternative is the difference in value of output at post harvest/market price less the value realized at the agreed price. Crop insurance is another example of transferring production risk to another entity i.e., insurance company. In case the crop prospects are reduced below certain minimum, proportionate indemnity is paid for the expenditure incurred. The cost of this alternative is the premium paid by the farmer.

**e. Spreading Risk**

Risk may be spread over a number of enterprises with varying degree of risk and of course with varying level of net income. This is known as diversification. Diversification could be in terms of mixed farming, diversified farming or even mixed cropping. The idea is not to put all eggs in one basket. It would ensure some income realization from enterprises/crops even in the event of adverse weather conditions etc. As net returns from combination of different enterprises/crops would be less than the net returns from the most paying crop (pure) the difference between the two would be the cost of this alternative.

**f. Taking Risk**

Taking risk could be one of the alternatives to manage risk where the management cost is nil because no attempt is made to reduce risk. The idea is to plan for maximum returns even at high risk. Innovators and early adopters are the two categories of people who always are willing to take risk. They go for high return enterprises exposing themselves to high risk.

**3. Need for Crop Insurance**

Crop insurance is one alternative to manage risk in yield loss by the farmers. It is the mechanism to reduce the impact of income loss on the farmer (family and farming). Crop insurance is a means of protecting farmers against the variations in yield resulting from uncertainty of practically all natural factors beyond their control such as rainfall (drought or excess rainfall), flood, hails, other weather variables (temperature, sunlight, wind), pest infestation, etc. (1 & 3). Crop insurance is a financial mechanism to minimize the impact of loss in farm income by factoring in a large number of uncertainties which affect the crop yields. As such it is a risk management alternative where production risk is transferred to another party at a cost called premium. The weather based crop insurance uses weather

parameters as proxy for crop yield in compensating the cultivators for deemed crop losses (4). It provides a good alternative both to farmers and government. Farmers get on actuarially fair insurance with swift payments at little administrative costs to the government (5). Rainfall insurance is a specific form of weather insurance. As such weather insurance is not yield insurance while crop insurance is. In both the cases cultivators pass risk in yield to another party for a premium.

The insurance need for agriculture, therefore, can not be over emphasized as it is a highly risky economic activity because of its dependence on weather conditions. To design and implement an appropriate insurance programme for agriculture is therefore very complex and challenging task. There are two approaches to crop insurance, namely, individual approach where yield loss on individual farms forms the basis for indemnity payment, and homogeneous area approach where a homogeneous crop area is taken as a unit for assessment of yield and payment of indemnity. In both the cases reliable and dependable yield data for past 8-10 years are needed for fixing premium on actuarially sound basis. Homogeneous area approach has the advantage of availability of data on yield variations.

#### **4. Crop Insurance**

Insurance is a technique where losses suffered by few are met from funds accumulated through small contributions made by many who are exposed to similar risk. Crop insurance is a means to protecting the cultivators against financial loss on account of anticipated crop-loss arising out of practically all natural factors beyond their control such as natural fire, weather, floods, pests, diseases etc. The sum insured could be the total expenditure or a multiple of it or a proportion of expected income from crop(s) for which premium is paid. The indemnity (claims payable against the paid out of pocket expenses) is payable on the basis of shortfall in average yield from the guaranteed yield (threshold yield). The claims are paid after the loss in yield is ascertained. Weather based crop insurance is another avenue for transferring production risk to the insurer. It aims to mitigate the hardship of the insured farmer against the likelihood of financial loss on account of anticipated crop loss resulting from incidence of adverse conditions of weather parameters like rainfall, temperature, frost, humidity etc. While crop insurance specifically indemnifies the cultivator against shortfall in crop yield, weather insurance is based on the fact that weather conditions affect crop yield even when a cultivator has taken all the care to ensure good harvest. Studies of historical correlation of crop yield with weather parameters help us in developing weather

thresholds (triggers) beyond which crop starts getting affected adversely. Payout structure may be developed using the weather triggers to compensate cultivators to the extent of losses deemed to have been suffered by them. Actual loss in yield or income is not ascertained for eligibility for claims. In other words, weather insurance uses weather parameters as 'proxy' for crop yields in compensating the cultivators for deemed crop losses due to reduction in yield.

## **5. Evolution of Crop Insurance in India**

The question of introduction of crop insurance in India was taken up for examination soon after independence in 1947. A special study to work out modalities of crop insurance was commissioned in 1947-48 following an assurance given by the Ministry of Food and Agriculture to introduce crop and cattle insurance in the country. The first aspect regarding the modalities of crop insurance considered was whether it should be on Individual Approach or Homogenous Area Approach. The individual approach seeks to indemnify the farmer to the full extent of the losses and the premium to be paid by him is determined with reference to his own past yield and loss experience. As such it necessitates reliable and accurate data of crop yields of individual farmers for a sufficiently long period for fixation of premium on actuarially sound basis. The homogenous area approach envisages that in the absence of reliable data of individual farmers and in view of the moral hazards involved in the individual approach, a homogenous area would form the basic unit, instead of an individual farmer. The homogeneous area would comprise of villages that are homogenous from the point of view of crop production and whose annual variability of crop productivity would be similar. The study favoured homogenous area approach. Various agro-climatically homogenous areas to be treated as units and the individual farmers in those area units would pay the same rate of premium and receive the same benefits, irrespective of differential loss in individual yields. The ministry circulated the scheme for adoption by the state governments but the states did not accept.

In 1965, the Central Government introduced a Crop Insurance Bill and circulated a model scheme of crop insurance on compulsory basis to constituent state governments for their views. The bill provided for the Central Government framing a reinsurance scheme to cover indemnity obligations of the states. However because of very high financial obligations none of the states accepted the scheme. On receiving the responses of state governments, the subject was considered in detail by an Expert Committee headed by the then Chairman,



Agricultural Price Commission set up in July 1970 for full examination of the economic, administrative, financial and actuarial implications of the subject. Different experiments on crop insurance on a limited, *ad hoc* and scattered scale started in 1972-73. By now we have the experience of a number of products including some of weather insurance. In what follows is a brief on the past experience and availability of different products at present.

Though, agricultural insurance is largely in the public domain some private efforts especially in weather insurance have also been there for some time. Their experience is not all that discouraging. The real challenge is to scale up the distribution and ensure fast claim settlement (10). India, thus, has a publicly administered crop insurance scheme since 1972. All the variants of the scheme introduced from time to time had flaws. Nevertheless India is not alone where public crop insurance has not been successful. In both developed and developing countries such insurance schemes have incurred losses without offering an effective product (11). Public crop insurance schemes are available to cultivators as means of reducing the cost associated with crop failure. The schemes, however, suffers from moral hazards and adverse selection and are very costly as payment eligibility is determined by crop damage assessment for each individual farmer. There is a feeling that it is not profitable proposition at all (12).

## **6. Past Experience in Crop Insurance**

### **6.1 First Ever-Individual Approach Scheme**

In 1972-73, the General Insurance Department of Life Insurance Corporation of India introduced a Crop Insurance Scheme on H-4 cotton. Later in 1972, general insurance business was nationalized by an Act of Parliament, and the General Insurance Corporation of India (GIC) was set up. The new corporation took over the experimental scheme in respect of H-4 cotton in Gujarat. The Scheme was based on "Individual Approach". Subsequently the scheme included groundnut, wheat, potato and gram and was implemented in the states of Gujarat, Maharashtra, Tamilnadu, Andhra Pradesh, Karnataka and West Bengal. The scheme continued till 1978-79. However, it covered only 3110 farmers for a premium of Rs.4.54 lakhs against claims of Rs.37.88 lakhs indicating its non-viability and non-popularity.

### **6.2 Pilot Crop Insurance Scheme (PCIS) – 1979**

In the background and experience of the aforesaid experimental schemes for crop insurance, a study was commissioned by GIC and entrusted to eminent agricultural economist, Prof. V.M. Dandekar. Based on the recommendations of Prof. Dandekar, a Pilot

Crop Insurance Scheme was introduced by GIC in 1979. The important features of the scheme were:

- i. The scheme was based on "Area Approach".
- ii. The scheme covered cereals, millets, oilseeds, cotton, potato and gram.
- iii. The scheme was available to loanee farmers only and on voluntary basis.
- iv. The risk was shared between General Insurance Corporation of India and State Governments in the ratio of 2:1.
- v. The maximum sum insured was 100 per cent of the crop loan, which was later increased to 150 per cent.
- vi. A 50 per cent subsidy was provided for insurance charges payable by small and marginal farmers by the State Government and the Government of India on 50:50 basis.

The PCIS launched in 1979 continued till 1984-85 and was implemented in 13 states. During this period it covered 6.27 lakh farmers for total premium of Rs.196.95 lakhs against claims of Rs.157.05 lakhs.

### **6.3 Comprehensive Crop Insurance Scheme (CCIS)**

On the basis of experience gained from implementation of PCIS a Comprehensive Crop Insurance Scheme (CCIS) was introduced with effect from 1st April 1985 by the Government of India with the active participation of State Governments. The Scheme was linked to short term crop credit and implemented on homogeneous area basis. Though the scheme was available to all states it was not mandatory. In all 15 states and 2 union territories implemented the Scheme until Kharif 1999. These were Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, .Meghalaya, Orissa, Tamilnadu, Tripura and West Bengal among the states and Andaman & Nicobar Islands and Pondicherry among union territories. The states of Rajasthan, Uttar Pradesh, Jammu & Kashmir, Manipur and Delhi had initially joined the scheme but subsequently opted out after few years. The main features of the scheme were:

- i. It covered farmers availing crop loans from financial institutions for growing food crops and oilseeds on compulsory basis. The coverage was restricted to 100 per cent of crop loan subject to a maximum of Rs.10 thousand per farmer.

- ii. The premium rates were 2 per cent for cereals and millets and 1 per cent for pulses and oil seeds. Small and marginal farmers were given a subsidy of 50 per cent of the premium payable shared equally by the central and state governments.
- iii. The central and state governments shared the premium and claims in the ratio of 2:1.
- iv. The scheme was optional to state governments.
- v. The scheme was a multi-agency effort, involving Government of India, State Governments, Banking Institutions and General Insurance Corporation of India.

The summary of coverage particulars until Kharif 1999 since inception is given in Table 1. The data clearly reflects on the non-viability of the scheme though it was becoming popular. A majority of claims were paid in the states of Gujarat Rs.1086 crores (47%), Andhra Pradesh Rs.482 crores (21%), Maharashtra Rs.213 crores (9%) and Orissa Rs.181 crores (8%).

**Table 1: Summary of Coverage till 1984-85**

Total number of farmers covered	7,62,65,438
Total area covered (Hectares)	12,75,70,282
Total sum-insured (Rs. Crores)	24,949
Total insurance charges (Rs. Crores)	404
Total claim (Rs. Crores)	2303

#### **6.4 Experimental Crop Insurance Scheme (ECIS)**

While in operation attempts were made from time to time to modify the CCIS as demanded by the states. During 1997 a scheme viz. Experimental Crop Insurance scheme was introduced from Rabi 1997-98 which was implemented in 14 districts of five states. The scheme was similar to CCIS except that it was meant for all small and marginal farmers with 100 per cent subsidy in premium. The central and state governments shared the premium, subsidy and claims in 4:1 ratio. The scheme was discontinued after one season due to administrative and financial difficulties. The scheme covered 454555 farmers. The sum insured was Rs.168.11 crores and claims paid Rs.37.80 crores against premium of Rs.2.84 crores.

#### **6.5 Pilot Project on Farm Income Insurance Scheme**

Under the project comprehensive risk insurance was provided against loss in actual farm income against the guaranteed income in a notified area arising out of adverse fluctuations in yield due to one or more non-preventable perils and adverse fluctuations of market prices as measured against minimum support price (MSP) for the crops covered. The project covered paddy and wheat crops and all farmers (loanee on compulsory and others on

voluntary basis) in selected states and districts which gave their consent for inclusion. The sum insured was guaranteed income per unit area arrived at using average yield of past 7 years, current MSP and indemnity level. The premium rates were actuarial for states and crops (irrigated and un-irrigated separately) at 75 per cent subsidy for small and marginal farmers and 50 per cent subsidy for others. Area approach was followed. Capping and cupping of 20 per cent of MSP was applied. Claims exceeding 100 per cent of premium less components of loading towards administration and marketing expenses were borne by the Government of India. A commission of 5 per cent of gross premium in case of non-loanee farmers was payable to the Rural Agents and 2.5 per cent of gross premium for all farmers was payable to banks as service charges. In all 18 districts from 10 states for wheat and three districts from 3 states for paddy were selected in 2003-04.

#### **6.6 Sookha Suraksha Kavach (Drought Risk Insurance)**

Sookha Suraksha Kavach was specially designed for Rajasthan to cover 23 districts and popular and widely grown crops like guar, bajra, maize, jowar, soybean and groundnut. There is high spatial and temporal variation in rainfall across West Rajasthan. The average rainfall ranges from 10mm in northwest part of Jaisalmer to 40mm along the western fringes of the Aravalli range. Variation in rainfall is as high as 39 per cent. The sum insured per hectare ranged from cost of cultivation to value of produce given in the Benefit Table showing claims at different levels of deficiency in weighted and actual rainfall indices. The premium ranged from 5 to 8 per cent. Claims assessment was based on rainfall indices for June to October using appropriate weights and caps. The weighted actual rainfall index was compared with weighted normal rainfall index to compute deficiency in rainfall index. A claim trigger is basically a threshold deficiency percentage of the weighted actual rainfall index as compared to normal rainfall index. The deficiency greater than or equal to claim trigger makes the participating farmers eligible for claims as per the Benefit Table. Rainfall indices are prepared on the basis of data from specified rain gauge station. Claims are automated and directly credited to bank account. The non-loanee insured are required to submit a proof of insurance. The proposals are received up to 30<sup>th</sup> June.

#### **7. Products in the Market**

A number of crop insurance products are available to farmers in different geographical areas and for different purposes. These include National Agricultural Insurance Scheme, Weather Based Crop Insurance Scheme, [Wheat Insurance \(Weather & Biomass\)](#),

Rabi Weather Insurance, Potato Insurance, Poppy Insurance, Varsha Bima (Rainfall Insurance) for seasonal and annual crops. Insurance products are also available for plantation crops in specific geographical areas such as Uttarakhand Seb Bima Yojana (Apple Insurance), Grapes Insurance, Rainfall Insurance Scheme for Coffee Growers (Coffee Insurance), Bio-Fuel Tree / Plant Insurance, Pulpwood Tree Insurance, Coconut Insurance, Rubber Insurance and Mango Insurance for plantation crops in specific geographic area. We present here a brief description of selected field crop related insurance products, namely, National Agricultural Insurance Scheme (NAIS), Weather Based Crop Insurance Scheme (WBCIS), Varsha Bima 2005, Wheat Insurance.

### **7.1 National Agricultural Insurance Scheme**

Keeping in view the demands of States for improving scope and contents of CCIS, a broad-based National Agricultural Insurance Scheme (NAIS) has been introduced in the country from Rabi 1999-2000 with the following objectives.

- a. To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests and diseases.
- b. To encourage the farmers to adopt progressive farming practices, high value inputs and higher technology in Agriculture.
- c. To help stabilize farm incomes, particularly in disaster years.

Some of the improvements incorporated in the new scheme are visible from the following.

#### **i. Scope of the Scheme**

##### **a. Area Coverage**

The scheme was available to all states and union territories on optional basis. However the states opting for the scheme were required to take up all the crops identified for coverage in a given year and shall have to continue for a minimum period of three years before it may quit. For Rabi 1999 only eight states (Assam, Goa, Gujarat, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra and Orissa) and union territory of Pondicherry opted for the scheme. This number was increased to 17 in Kharif 2000 and to 21 in Kharif 2002. Currently the scheme has been implemented in 23 states and two union territories. Punjab, Manipur, Nagaland, and Arunachal Pradesh among states and Chandigarh, Daman & Diu, Dadra & Nagar Haveli and Lakshadweep among union territories have not yet opted for the scheme.

**b. Farmers covered**

All farmers including sharecroppers and tenant farmers growing notified crops in notified areas are eligible for coverage under the scheme. However, it is compulsory for loanee farmers availing crop loans from financial institutions (PACS, RRBs, and commercial banks). While all loanee farmers would automatically get compulsorily coverage under NAIS through PACS / bank branches extending crop loan for insured crops all non-loanee farmers desirous of availing insurance coverage should contact the nearest bank branch before the stipulated time frame with a proposal for insurance. They must have a bank account and pay the requisite premium to get insurance coverage.

**c. Risks Covered**

The scheme provides comprehensive risk insurance against yield losses due to non-preventable risks, i.e. (a) natural fire and lightning, (b) storm, hailstorm, cyclone, typhoon, tempest, hurricane, tornado etc., (c) flood, inundation and landslide, (d) drought, dry spells, and (e) pests / diseases etc. However losses arising out of war and nuclear risks, malicious damage and other preventable risks shall be excluded.

**d. Crops Covered**

The scheme besides food and oilseed crops also covered annual commercial and horticultural crops. The crops in respect of which the past yield data based on Crop Cutting Experiments (CCEs) are available for past 10 years and the state government agreed to conduct requisite number of CCEs for estimating the average yield during the proposed season are covered. The crops to be covered next year will have to be spelt before the close of preceding year. At present 35 different Kharif and 30 different Rabi season crops are being insured under NAIS in the country. The crops covered in various states fall under the following groups.

- a. Food crops (cereals, millets and pulses): Wheat, paddy, Jowar, Bajra, Maize, Ragi, Korra, Kodokutki, Green gram, Black gram, Red gram, Horse gram, Moth etc.
- b. Oilseeds: Groundnut, Sunflower, Soya bean, Safflower, Sesame, Niger, Caster etc.
- c. Annual commercial/horticultural crops: Sugarcane, Cotton, Potato, Onion, Chilly, Turmeric, Ginger, Coriander, Cumin, Fennel, Fenugreek, Isabgol, Jute, Tapioca, Banana, Pineapple, etc. However mangoes, apples, grapes and oranges are not yet covered.

### **e. Unit of Insurance**

The scheme operates on the basis of area approach i.e., defined areas (unit of insurance) for each notified crop for widespread calamities. The unit area of insurance may be a Gram Panchayat, Mandal, Hobli, Circle, Phirka, Block, Taluka etc. as decided by the state government. However, each participating state was required to reach the level of Gram Panchayat as the unit in a maximum period of three years. The assessment of loss is estimated through CCEs conducted by the state administration.

In case of localized calamities such as hailstorm, landslide, cyclone and flood the scheme operates on the basis of individual approach. To begin with, NAIS was to be implemented in limited areas on experimental basis initially and extended in the light of operational experience gained. The individual farmers would intimate the crop loss within 48 hours to local revenue or agricultural department. The District Revenue administration would assist implementing agency in assessing the extent of loss.

### **ii. Sum Insured and Premium**

In case of loanee farmers the sum insured would be at least equal to the amount of crop loan advanced (scale of finance plus insurance charges). The sum insured may extend to the value of the threshold yield of the insured crop at the option of the insured farmer. For non-loanee farmers the coverage at normal rates of premium is available up to the value of threshold yield (at MSP or market price). Both loanee and non-loanee farmers can obtain additional coverage up to 150 per cent of value of average yield of the notified area by payment of premium at actuarial rates. A non-loanee farmer would produce a proof of ownership of land. In case of sharecropper / tenant farmer a proof showing crop sharing/tenancy arrangements would be needed to obtain the insurance cover.

The threshold yield (TY) or guaranteed yield for a crop in an insurance unit is the moving average based on past three years average yield in case of Rice and Wheat and five years average yield in case of other crops, multiplied by the level of indemnity. Three levels of indemnity, viz., 90, 80 and 60 per cent corresponding to low risk, medium risk and high risk areas would be available for all crops (cereals, millets, pulses and oilseeds and annual commercial and horticultural crops) based on coefficient of variation (C.V.) in yield of past 10 years' data. However, the insured farmers of unit area may opt for higher level of indemnity on payment of additional premium based on actuarial rates.

The premium payable is fixed for groups of crops on the basis of the nature of yield variations observed historically. Over time these would be replaced by actuarial rates. The

actuarial rate may include pure risk premium, administrative costs, reserve for unexpected losses, and allowance for enhanced scale of finance, adverse selection and moral hazards, and profit margin. Pure risk component would be higher for basic crops than for commercial and horticultural crops. Transition to the actuarial regime in case of cereals, millets, pulses and oilseeds would be made in a period of five years. The actuarial rates would be applied at District / Region / State level at the option of the state / union territory. The rates currently fixed are given in Table 2.

**Table 2: Premium Rates for Different Crops**

Season	Crops	Premium Rate
1. Kharif	Bajra and Oilseeds Other Crops (cereals, other millets & pulses)	3.5% of SI or Actuarial rate, whichever is less 2.5% of SI or Actuarial rate whichever is less
2. Rabi	Wheat Other Crops (cereals, other millets & pulses)	1.5% of SI or Actuarial rate whichever is less 2.0% of SI or Actuarial rate whichever is less
3. Kharif & Rabi	Annual Commercial/ Horticultural Crops	Actuarial rates

A subsidy of 50 per cent in premium is allowed in respect of small and marginal farmers, to be shared equally by the Centre and State/Union Territory. The premium subsidy will be phased out on a sunset basis in a period of three to five years, subject to review of the financial results and the response of the farmers at the end of the first year of the implementation of the scheme. The definition of small and marginal farmer would be as defined in the land ceiling legislation of the concerned state. Normally a cultivator with a land holding of up to 1 hectare (2.5 acres) is marginal farmer and 1-2 hectares (5 acres) is small farmer.

### iii. Estimation of Crop Yield, Indemnity and Claim Settlement

The state government or union territory administration would plan and conduct the requisite number of Crop Cutting Experiments (CCEs) for all notified crops in the notified insurance units in order to assess the crop yield and maintain a single series of CCEs and resultant yield estimates, both for crop production estimates and crop insurance. CCEs would be undertaken per unit area for each crop on a sliding scale as indicated in Table 3. A Technical Advisory Committee (TAC) comprising of representatives from NSSO, Ministry of Agriculture (GOI) and Implementing Agency would be constituted to decide the sample size of CCEs and all other technical matters.



**Table 3: Minimum Number of CCEs for Unit Areas**

Sr. No.	Unit Area	Minimum No. of CCEs Required
1.	Taluka / Tehsil / Block	16
2.	Mandal / Phirka/any other smaller unit are comprising 8-10 villages	10
3.	Gram Panchayat comprising 4-5 villages	8

If the Actual Yield (AY) per hectare of the insured crop for the defined area on the basis of requisite number of CCEs in the insured season falls short of the specified TY, all the insured farmers growing that crop in the defined area are deemed to have suffered shortfall in yield (SY). The scheme seeks to provide coverage against such contingency. Indemnity shall be calculated as per the following formula:

$$\text{Indemnity} = (\text{SY} / \text{TY}) * [\text{Sum Insured for the Farmer}]$$

where,  $\text{SY} = \text{TY} - \text{AY}$  for the defined area

In case of occurrence of localized perils such as hailstorm, landslide, cyclone and flood where settlement of claims would be on individual basis, loss assessment and modified indemnity procedures would be formulated by the implementing agency in coordination with state / UT. The broad seasonality discipline to be followed is given in Tale 4. It may be modified, if and where necessary, in consultation with state / UT and the Government of India.

**Table 4: Seasonality Discipline for Kharif and Rabi**

Activity	Kharif	Rabi
Loaning period (loanee)	April – September	October – Next March
Cut-off date for receipt of declarations (loanee)	November	May
Cut-off date for receipt of proposals (non-loanee)	31 <sup>st</sup> July	31 <sup>st</sup> December
Cut-off date for receipt of yield data (for all)	January – March	July – September

Once the yield data is received from the state/UT as per the prescribed cut-off dates, claims are worked out and settled by the implementing agency. The claim cheque along with claim particulars is released to the individual Nodal Banks. The Banks at the grass-root level, in turn, credit the accounts of the individual farmers and display the particulars of beneficiaries on their notice board. In the context of localized phenomenon viz. hailstorm, landslide, cyclone and flood, the implementing agency would evolve a procedure to estimate such losses at individual farmer level in consultation with DAC / State / UT. Settlement of such claims would be on individual basis. The A&O expenses would be shared equally by the

Central Government and respective State Government on sunset basis (100% in year 1, 80% in year 2, 60% in year 3, 40% in year 4, 20% in year 5 and 'zero' thereafter).

#### **iv. Management of the Scheme**

In respect of loanee farmers, the banks play the same role as under CCIS. In respect of non-loanee farmers, banks collect the premium along with the declarations and send it to IA within the prescribed time limits. However, in areas where IA has requisite infrastructure, a non-loanee farmer has the option to pay premium along with declaration directly to IA within the time limits. The selection of the banks would be on the basis of Service Area Approach of the RBI or at the option of the Banks (where Co-operative Banks have good network). The Department of Agriculture, Directorate of Economics and Statistics, Department of Co-operation, Revenue Department of the state governments would be actively involved in smooth implementation of the scheme.

The scheme is to be implemented in accordance with the operational modalities as worked out by IA, in consultation with Department of Agriculture and Co-operation. During each crop season, the agricultural situation is closely monitored in the implementing state / UT. Department of Agriculture and district administration set up a District Level Monitoring Committee (DLMC), who would provide fortnightly reports of agricultural situation with details of area sown, seasonal weather conditions, pest incidence, stage of crop failure (if any) etc. The operation of the scheme would be reviewed annually, and modifications as may be required would be introduced. Periodic Appraisal Reports on the Scheme would be prepared by Ministry of Agriculture, the Government of India or Implementing Agency. Efforts would be made by IA to obtain appropriate reinsurance cover for the proposed NAIS in the international Reinsurance market.

Risk is shared by Implementing Agency (IA) and the Government for different groups of crops as explained below.

- a. **Food crops and Oilseeds:** Till complete transition to actuarial regime in a period of five years takes place, claims beyond 100 per cent of premium would be borne by the Government. Thereafter, all normal claims, i.e., claims up to 150 per cent of premium would be met by IA and claims beyond 150 per cent shall be paid out of Corpus Fund for a period of three years. After this period of three years, claims up to 200 per cent would be met by the implementing and above this ceiling out of the Corpus Fund.
- b. **Annual Commercial and Horticultural crops:** Implementing Agency would bear all normal losses, i.e. claims up to 150 per cent of premium in the first three years and 200

per cent of premium thereafter subject to satisfactory claims experience. The claims beyond 150 per cent of premium in the first three years and 200 per cent of premium thereafter would be paid out of Corpus Fund. However, the period of three years stipulated for this purpose would be reviewed on the basis of the financial results after the first year of implementation and the period may be extended to five years if considered necessary.

To meet catastrophic losses a Corpus Fund has been created with contributions from the Central and State / UT government on 50:50 basis. A portion of Calamity Relief Fund (CRF) was used for contribution to the Corpus Fund. The fund is managed by Implementing Agency (IA).

#### **v. Benefits Expected from the Scheme**

The scheme is expected to:

- a. be a critical instrument of development in the field of crop production, providing financial support to the farmers in the event of crop failure,
- b. encourage farmers to adopt progressive farming practices and higher technology in Agriculture,
- c. help in maintaining flow of agricultural credit,
- d. provide significant benefits not merely to the insured farmers, but, to the entire community directly and indirectly through spill-over and multiplier effects in terms of maintaining production and employment, generation of market fees, taxes etc. and net accretion to economic growth, and
- e. streamline loss assessment procedures and help in building up huge and accurate statistical base for crop production.

The scheme has been administered by the Ministry of Agriculture and was initially implemented by General Insurance Corporation of India and from Rabi 2003-04 by Agricultural Insurance Company of India Limited on behalf of MOA. NAIS is to cover food crops, oilseeds, sugarcane, cotton, potato and other commercial and horticultural crops. It is available to all states opting for implementation for at least three years. The Scheme covered the farmers, sharecroppers and tenants growing notified crops in notified areas on compulsory basis for loanees and voluntary basis for non-loanees. The scheme is in operation since then. However, so far the scheme has been adopted by 23 states and two union territories (1, 3, 6 & 7). The scheme had covered more than 110 million farmers and 11.42 million hectares of cropped area in 2008. The premium collected was Rs.36673 million of

which Rs.3055 million was subsidy. Against this, Rs.98817 million was the indemnity paid and another Rs.2955 million was the indemnity yet to be paid. In all, 27.96 million farmers were the beneficiaries. The subsidy is more than 8 per cent of the total premium while claims are 2.8 times the premium (3, 7 & 12). Not all the loanee farmers in the states were happy with the mandatory aspect of the scheme. Similarly non-loanee farmers came forward for selected crops only. They perceived a number of problems with the product (8 & 9). The fixing of threshold yield on the basis of past performance ignores the future improvement and yield estimation process for average yield on the basis of crop cutting experiments are not easy for them to comprehend. The average yield benefits the poor performers more than the good performers. Delay at various points in the implementation adds to the disappointment of the insured. For the insurers viability of the scheme is the major concern. Monitoring has been the most difficult job for them.

## **7.2 Weather Based Crop Insurance Scheme**

Weather Based Crop Insurance Scheme (WBCIS) is a unique weather based insurance product designed to provide insurance protection against losses in crop yield resulting from adverse weather incidences. It provides payout against adverse rainfall incidence (both deficit and excess) during Kharif and adverse incidence in weather parameters like frost, heat, relative humidity, un-seasonal rains etc. during rabi season. As such it is not yield guarantee insurance. WBCIS has been piloted in the country since Kharif 2003 season. Some of the states where the scheme is piloted over the years are Andhra Pradesh, Bihar, Chattisgarh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh etc.

### **i. Reference Unit Area**

Weather Based Crop Insurance Scheme (WBCIS) operates on the concept of area approach. That is, for the purposes of compensation, a 'Reference Unit Area (RUA)' is deemed to be a homogeneous unit of Insurance. The RUA is notified before the commencement of Kharif season by the State Government and all the insured cultivators of a particular insured crop in that area are deemed at on par in the assessment of claims. Each RUA is linked to a Reference Weather Station (RWS), on the basis of which current weather data and the claims would be processed. Adverse weather incidences during the season entitle the insured a payout, subject to the weather triggers defined in the 'Payout Structure' and the terms and conditions of the scheme.

For Rabi season the weather triggers are broadly fixed to capture the adverse incidence of weather parameters on yield. Claims arise when there is a certain adverse deviation in actual weather parameter incidence in RUA as per the weather data measured at RWS. The actual may be more or less than compared to what has been specified in the Benefit Table leading to crop losses. In such case all the insured cultivators under a particular crop are deemed to have suffered the same adverse deviation and become eligible for claim subject to terms and conditions of the scheme. The claim settlement is automatic process based on weather readings at the RWS. Insured cultivators are not required to make a claim. In a given RUA the payout given per unit area is the same for all cultivators under the same RWS. Weather insurance payouts are assured within 45 days from the end of insurance period. For traditional crops where payout is linked to yield estimates claim processing may take more time.

## ii. Sum Insured

The amount of insurance protection is broadly the cost of inputs expected to be incurred by the insured in raising the crop. Sum insured is pre-declared per unit area by AIC at the beginning of each crop season in consultation with the experts in state government, and it may be different for different crops in different RUA. Sum insured is further distributed under key weather parameters used in the insurance in proportion to the relative importance of the weather parameters. For a loanee the sum insured per crop is calculated by multiplying per unit area value of inputs with crop specific acreage declared in the loan application form by the loanee cultivator for the purpose of maximum borrowing limit fixed for him by the lending bank. For the non-loanee the acreage figure is the expected area sown / planted under the particular crop as declared in the insurance proposal form.

## iii. Premium Payable

### a. Food Crops and Oil Seeds

S.No	Crops	Premium Payable by the Insured Cultivator
1	Wheat	1.5% or Actuarial Rate, whichever is less
2	Other Crops (other cereals, Millets, Pulses, Oilseeds)	2.0% or Actuarial Rate, whichever is less

### b. Annual Commercial or horticultural Crops

S. No	Premium Slab	Subsidy and Premium
1	Up to 2%	No Subsidy
2	>2 - 5%	25%, subject to minimum net premium of 2% payable by farmer
3	>5 - 8%	40%, subject to minimum net premium of 3.75% payable by farmer
4	>8%	50%, subject to minimum net Premium of 4.8% & Max 6% payable by farmer

### iv. Advantages of WBCIS

Weather based crop insurance scheme has many advantages which make it beneficial for cultivators in their production risk management such as the following.

- a. Trigger events like adverse weather can be independently verified and measured.
- b. It allows speedy settlement of claims
- c. All farmers can buy WBCIS
- d. Government provides subsidy in premium and hence premium payable is affordable
- e. It provides transparent, fully objective, efficient and direct payouts for adverse weather incidences
- f. Insured is not required to submit claim form or other documents as proof for loss
- g. Since the weather data decides the compensation the insured is willing to put extra effort for getting better yield of crop.

## 7.3 Varsha Bima-2005

### i. Background

Nearly two thirds of Indian agriculture is heavily dependent on unpredictable and uncertain natural factors, particularly rainfall. Studies have established that rainfall variations account for more than 50% of variability in crop yields. Although there is no way of controlling weather-factors, there is now a hope of mitigating the adverse financial effects that rainfall can have on the rural economy, particularly farm incomes through insurance.

### ii. Scope of the Scheme

Varsha Bima covers anticipated shortfall in crop yield on account of deficit rainfall. Varsha Bima is voluntary for all classes of cultivators who stand to lose financially upon adverse incidence of rainfall. Varsha Bima is meant for cultivators for whom National Agricultural Insurance Scheme (NAIS) is voluntary. The insurance operates during June to September for short duration crops; June to October for medium duration crops; and June to November for longer duration crops. Further, these periods are state-specific. In case of

Sowing Failure option is from 15th June to 15th August. A cultivator can buy Varsha Bima only up to 15th June for sowing failure option and 30th June for other options

Proposal forms are available at all the loan disbursing outlets viz PACS, branches of all Cooperative / Commercial / Regional Rural banks. The coverage under Varsha Bima at the grass-root level is made mostly through the existing network of Rural Finance Institutions (RFIs) as in NAIS. AIC also directly market / provide insurance subject to the availability of its network. The network of formal and informal institutions working in the rural areas such as NGOs, Self Help Groups, Farmers Groups, etc. could also be utilized for delivery of Varsha Bima. The cultivators proposed for insurance under Varsha Bima are required to have a bank account at the nearest bank branch to facilitate their insurance transactions.

### **iii. Coverage Options**

#### **Options - I: Seasonal Rainfall Insurance**

Coverage is against negative deviation of 20 per cent and beyond in actual rainfall from normal rainfall for the entire season. Actual rainfall is the monthly cumulative rainfall from June to November for different crops. The pay-out structure is designed in such a way that the yield is correlated to various ranges of adverse deviation in rainfall. The sum insured per hectare is the maximum pay-out corresponding to the maximum potential loss. The claim pay-out is on a graded scale (in slabs), corresponding to different degrees of adverse deviation in actual rainfall.

#### **Options - II: Rainfall Distribution Index**

Coverage is against adverse deviation of 20 per cent and beyond in actual rainfall index from normal rainfall index for the entire season. The index is constructed to maximize the correlation, for weekly rainfall within the season. The indices vary from IMD station to station and crop to crop. The sum insured per hectare is the maximum pay-out corresponding to the maximum potential loss. The claim pay-out shall be on a graded scale (in slabs), corresponding to different degrees of adverse deviation in actual rainfall index.

#### **Options - III: Sowing Failure**

Coverage is against adverse deviation in actual rainfall from normal rainfall beyond 40 per cent between 15th June and 15th August. The sum insured per hectare is the maximum input cost incurred by the cultivator till the end of the sowing period, and is pre-specified. The claim pay-out is on a graded scale, corresponding to different degrees of rainfall deviation. The maximum pay-out of 100% of sum insured is available at deviations of 80% and above.

#### **Options - IV: Vegetative Phase**

Coverage is against adverse deviation in actual rainfall from normal rainfall beyond 20 per cent between 1st August/16th August and 30th September/31st October to 30th November. The sum insured per hectare is the maximum pay-out corresponding to the maximum potential loss. The claim pay-out is on a graded scale, corresponding to different degrees of rainfall deviation. The maximum pay-out of 100 per cent of sum insured is available at deviations of 80 per cent and above.

#### **iv. Sum Insured and Claim Payment**

Sum Insured is pre-specified and normally is between cost of production and value of production. In case of sowing failure option, it is the maximum input cost incurred by the cultivator till the end of the sowing period, which again is pre-specified. Premium varies from option to option and crop to crop. The premium rates have been optimized vis-a-vis benefits, and starts from one per cent.

The procedure for working out claims is automated i.e., there is no necessity for submission of loss information or claims intimation by insured cultivator. Normally claims are paid on the basis of actual rainfall data within a month from end of indemnity period.

#### **7.4 Rabi Weather Insurance**

Weather Insurance (Rabi) is a mechanism for providing effective risk management aid to those individuals and institutions likely to be impacted by adverse weather incidences. The most important benefits of Weather Index Insurance are:

- a. Trigger events like adverse weather events can be independently verified and measured.
- b. It allows for speedy settlement of indemnities, as early as a fortnight after the indemnity period.
- c. All growers, be it Small /Marginal; Owners or tenants/Sharecroppers can buy the weather insurance.

Wheat, Mustard, Gram, Potato, Masoor, Barley and Coriander are the major Rabi season crops mostly in the states of UP, MP, Maharashtra and Rajasthan. These crops are extremely vulnerable to weather factors, such as excess rainfall, frost, and fluctuation in temperature etc.

Agriculture Insurance Company of India would compensate the insured, against the likelihood of diminished crop output/ yield resulting from: Maximum Temperature ( $^{\circ}$  C) above the trigger level and / or Deviation in Temperature Range from the normal above the trigger value and / or Minimum Temperature ( $^{\circ}$  C) below the trigger level and / or Minimum



Temperature below 4° C resulting frost and / or Rainfall in excess of the trigger levels (calculated on daily/ weekly/ monthly basis) and / or Bright Sunshine Hour below the trigger level. The insurance operates during the months of December to April. However the period is different for different parameters and crops.

Claims are automated; and settled on the basis of actual maximum temperature, minimum temperature, rainfall and BSH received from the concerned agencies/ institutions as applicable to each crop separately. Claims when become payable, are paid at a uniform rate to all the insured growers in the area (jurisdiction of reference weather station) growing the insured crop with in 4-6 weeks after insurance period. Maximum liability is linked to cost of cultivation and varies from crop to crop.

### **7.5 Wheat Insurance Policy**

Wheat insurance policy is a unique technology based insurance product combining crop vigour / biomass (Normalized Difference Vegetative Index - NDVI) and weather (temperature / rainfall) parameters. The NDVI component of cover measured at peak vigour stage provides effective risk management aid to those wheat growers who are likely to be impacted by poor growth of the crop arising out of non-preventable natural factors. It is insurance against the likelihood of diminished wheat yield resulting from lower NDVI within the specified taluka preferably during February and/or high temperature consecutively for specified number of days above specified levels in 1<sup>st</sup> and / or 2<sup>nd</sup> fortnight of March as measured at RWS.

The insurance is linked to biomass triggers. Trigger events could be measured using high technology standards based in satellite imagery from remote sensing technology which could be independently verified and measured, and accurate and allows for speedy settlement of indemnities even before the crop is ready for harvesting.

When the current NDVI falls short of the specified trigger level, the benefits payable to the insured will be the sum specified corresponding to trigger level and or the maximum temperature of specified number of days as recorded at RWS is higher than the specified trigger level during 1<sup>st</sup> and / or 2<sup>nd</sup> fortnight of March the benefit payable to insured shall be the sum specified corresponding to trigger level. The premium chargeable is statistically / actuarially calculated based on the geographical area, the triggers specified and biomass and temperature patterns of the specified area in the historical periods.

## 8. Comparison of NAIS and WBGIS

S. No.	National Agricultural Insurance Scheme (NAIS)	Weather Based Crop Insurance Scheme (WBCIS)
1	Practically all risks covered (drought, excess rainfall, flood, hail, pest infestation, etc.)	Parametric weather related risks like rainfall, frost, heat (temperature), humidity etc. are covered. However, these parametric weather parameters appear to account for majority of crop losses
2	Easy-to-design if historical yield data up to 10 years' is available	Technical challenges in designing weather indices and also correlating weather indices with yield losses. Needs up to 25 years' historical weather data
3	High basis risk [difference between the yield of the Area (Block / Tehsil) and the individual farmers]	Basis risk with regard to weather could be high for rainfall and moderate for others like frost, heat, humidity etc.
4	Objectivity and transparency is relatively less	Objectivity and transparency is relatively high
5	Quality losses are beyond consideration	Quality losses to some extent gets reflected through weather index
6	High loss assessment costs	No loss assessment costs
7	Delays in claims settlement	Faster claims settlement
8	Government's financial liabilities are open ended, as it supports the claims subsidy	Government's financial liabilities could be budgeted up-front and close ended, as it supports the premium subsidy

## 9. Private Participation

ICICI Lombard, a national Indian insurance company piloted in 2003 a formal rainfall insurance scheme for groundnut and castor in semi-arid tropical areas of India. The insurance policy was developed with the technical assistance of Agricultural and Rural Development Department of the World Bank and was designed as insurance against deficit rainfall. Similar products adapted to the specifics of the local environment were also developed and sold in northern India. Two insurance policies were designed for the two crops. The coverage of both the policies was for the prime crop season, the Kharif. The policy triggers, phases and payouts try to maximize the correlation between economic loss and rainfall events. The triggers are set in mm of accumulated rainfall as measured in local weather stations. If it rains less than 1<sup>st</sup> trigger level within a given period there is a payout per mm of deficient accumulated rain per acre insured. If the accumulated rainfall is below the 2<sup>nd</sup> trigger level then there is a maximum lump sum payout of the insurance. In order to maximize the correlation between rainfall and crop production Kharif season is divided into three different phases each with its own trigger and payout: sowing, flowering and harvest. In addition to

deficit rainfall in some areas there is also a risk of excess rainfall towards the end of Kharif. The policy has additional payout for excess rain for those areas. The amount of the payout is calibrated to the expected economic loss for the area (mandal).

### References

1. Government of India, Report of the Working Group on Risk Management in Agriculture for Eleventh Five Year Plan (2007-12), Planning Commission, New Delhi
2. India Development Gateway, Varsha Bima - 2005, [www.indg.in/agriculture](http://www.indg.in/agriculture)
3. Government of India, Crop Insurance, [www.indiaagronet.com](http://www.indiaagronet.com)
4. India Development Gateway, Weather Based Crop Insurance Scheme (WBCIS), [www.indg.in/agriculture](http://www.indg.in/agriculture)
5. Lilleor, Helene Bie et. Al., Weather Insurance in Semi-Arid India, March 23, 2005, [www.rff.dk](http://www.rff.dk)
6. Venkatesh, G, Crop Insurance in India – A Study, Mumbai
7. Government of India, State-wise Progress of CCIS from Kharif '85 to Kharif 1999
8. Ifft, Jennifer, Government vs Weather: The True Story of Crop Insurance in India, **Research Internship Papers 2001**, Centre for Civil Society, [www.cci.in](http://www.cci.in)
9. Sinha, Sidharath, Agriculture Insurance in India: Scope for Participation of Private Insurers, **Economic and Political Weekly**, June 19, 2004, P 2605-2612
10. World Bank, Piloting Weather Insurance Scheme in India, August 27, 2003, [web.worldbank.org](http://web.worldbank.org)
11. Raju, SS and Ramesh Chand, Agriculture Insurance in India: Problems and Prospects, **NCAP Working Paper No. 8**, March 2008
12. Agriculture Insurance Company of India, Performance of NAIS, Country Profile, [www.aicofindia.org](http://www.aicofindia.org)