Crop Insurance- Strategy to minimize risk in Agriculture

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Abstract

The enterprise of agriculture is subject to lot many uncertainties. Still, more people in India earn their livelihood from this sector, than from all other economic sectors put together. Agricultural associated with several risks which include adverse changes in both input and output prices, Agricultural risk can be categorized as production risk, price or market, financial or credit, and institutional risks etc. The farmers are not assured of good quality and disease free crop which is essential for obtaining reasonable yield sufficient to recover expenses. Crop insurance is one of the major management strategies to overcome risk to greater extent. It is regarded as an essential part of well rounded agricultural programme designed to provide protection to farmers against physical failure of crops due to weather and other unavoidable natural hazards. Compared to other traditional risk reducing strategies, such as crop diversification, inter-cropping, mixed farming, integration of farm etc., available to farmers crop insurance is more efficient. If a farmer is assured of financial compensation when his income is considerably low for reasons beyond his control, he would more likely allocate his resources in a manner that would maximize his return. Crop insurance not only helps the farmers to withstand the shock from uncertain situation but also acts as incentive to use the resources efficiently and achieve higher level of productivity. It is important for us to encourage farmers to get into the crop insurance scheme so that there will be some amount of assured income for them in case of any unexpected loss in production process.

Key Words: Crop insurance, risk, uncertainty, resource use, insured and non insured.

Introduction

The enterprise of agriculture is subject to lot many uncertainties. Still, more people in India earn their livelihood from this sector, than from all other economic sectors put together. In rural India, households that depend on income from agriculture (either self-employed or as agricultural labour), accounted for nearly 70 per cent of the population. Seventy five percent of all rural poor are in households that are dependent on agriculture, in some way or other. Households that were self-employed in agriculture, account for 28 per cent of all rural poor, while households that were primarily dependent on agriculture as labour, account for 47 per cent of all rural poor. All this facts shows the need for the development of agricultural sector in India. Since agricultural depends on large number of factors which includes climatic factors which are not under the control of farmers, and hence, risk associated with agriculture is more. Because of this reason, achieving development goals in agriculture is not so easy unlike other sectors of the economy.

Agricultural risk is associated with negative outcomes that stem from imperfectly predictable biological, climatic, and price variables. They also include adverse changes in both input and output prices. Production, price or market, financial or credit, and institutional risks are the different categories under which agricultural risks can be classified. Taking steps to overcome these risks associated with agriculture will be the major step in the development of agriculture. Some of the formal and non formal risk management strategies are given in Table 1. Hazell and Valdes (1985) indicated that risk and uncertainty pose a serious impediment to agriculture development. One method of setting risk to farmers is through crop insurance. He also suggested that if the crop insurance programme is to be useful in agricultural development, it must be carefully reworked to maximize their efficiency for both farmers and governments.

Agricultural crop insurance is one of the major management strategies to overcome risk to greater extent. Insurance of crops is regarded as an essential part of well rounded agricultural programme designed to provide protection to farmers against physical failure of crops due to weather and other unavoidable natural hazards. Crop insurance advances the process of stabilizing the agricultural industry to a stage of production, making such a process more comprehensive, effective and useful.

Table 1: Risk Management Strategies in Agriculture

		Informal Mechanisms	Formal Mechanisms	
			Market based	Publicly provided
Ex-Ante Strategies	On-farm	• Avoiding exposure to risk • Crop diversification and inter-cropping • Plot diversification • Mixed farming • Diversification of income source • Buffer stock accumulation of crops or liquid assets • Adoption of advanced cropping techniques (fertilization, irrigation, resistant varieties)		• Agricultural extension • Supply of quality seeds, inputs, etc • Pest management systems • Infrastructures (roads, dams, irrigation systems)
	Sharing risk with others	• Crop sharing • Sharing of agricultural equipment, irrigation sources, etc • Informal risk pool	• Contract marketing • futures contracts • Insurance	
Ex-Post Strategies	Coping with shocks	• Reduced consumption patterns • Deferred / low key social & family functions • Sale of assets • Migration • Reallocation of labor • Mutual aid	• Credit	• Social assistance (calamity relief, food-for-work, etc) • Rescheduling loans • Agricultural insurance • Relaxations in grain procurement procedures • Supply of fodder • Cash transfer

Source: Government of India, Planning Commission, 2007.

Ahsan *et al*. (1982) provided a simple, yet general theoretical framework of agriculture insurance that may be used to explore its possibilities as a market enterprise or a state run programme. Walker and Jodha (1982) have highlighted a few implications of crop insurance. It was indicated that the programme should be designed with a minimum of lacuna so that integrity of the farm risk management was preserved. Nadkarni (1971) measured the uncertainty in yield in terms of deviations from the "normal yields". It was indicated that in general the regions

which have higher level of yields also have higher rate of increase in yields and a higher level of uncertainty. Singh (1972) conducted a feasible study of crop insurance in Uttar Pradesh wherein he has emphasized that crop insurance should be based on the principle that a portion of savings in the good years is used to compensate farmers by giving them indemnity for their low yields in years of natural calamities. Botts and Boles (1958) presented a paper wherein the normal curve principle was used in premium rate calculation. This technique is presently used by the Federal Crop Insurance Corporation of the United States Department of Agriculture. A crucial condition to be fulfilled in using this technique is that the frequency distribution at annual yields of individual farms must be relatively normal, so as to facilitate the use of density and frequency functions. Botts (1962) indicated that the premium amount should be a variable cost depending upon the yield obtained by the farmers and the number of hectares on which the insured crop is grown as well as a predetermined price. If this method is adopted, then the farmer would make most of the premium payments in years when he obtains high yields and would pay little in years when the yields are low. Jerry *et al*. (1997) made study on designing and rating an area yield crop insurance contract. This study documents the design and rate making procedures used in the development of the group risk plan (GRP), the new federal crop insurance product that insures based on area yield. The study suggested that the GRP indemnity payments are made based on percentage shortfalls in actual country yield and historical country yield data are used to develop forecasted yields and premium rates.

Crop Insurance in India

Agriculture is prone to systemic and co-variate risks where a single risk affecting a large number of properties across large geographical regions, doesn't easily lend itself to insurance. Lack of past yield data, small sized farm holdings, low value crops and the relatively high cost of insurance; have further made it more difficult to design a workable crop insurance scheme. Despite these constraints, India debated the feasibility of crop insurance schemes, since independence. However, the first concrete attempt could be made only in the 1970s. The summary of important schemes evolved, is as follows:

(a) Scheme based on 'Individual' approach (1972-1978): The first ever scheme started on H-4 cotton in Gujarat was extended later, to a few other crops and states. The scheme covered 3,110 farmers for a premium of Rs. 4.54 lakhs and paid claims of Rs. 37.88 lakhs.

(b) Pilot Crop Insurance Scheme– PCIS (1979-1984): PCIS was introduced on the basis of report of late Prof. V.M. Dandekar and was based on the 'Homogeneous Area' approach. The scheme covered food crops, oilseeds, cotton and potato; and was confined to loanee farmers on a voluntary basis. The scheme was implemented in 13 states and covered 6.27 lakh farmers, for a premium of Rs. 196.95 lakhs and paid claims of Rs. 157.05 lakhs.

(c) Comprehensive crop Insurance Scheme–CCIS (1985-1999): The scheme was an expansion of PCIS, and was made compulsory for loanee farmers. Premium rates were 2 per cent of the sum insured for cereals and millets and 1 per cent for pulses and oilseeds, with premium and claims, shared between the Centre and States in 2:1 ratio. The scheme was implemented in 16 States and 2 UTs and covered 7.63 crore farmers for a premium of Rs. 403.56 crores and paid claims of Rs. 2,319 crores.

(d) National Agriculture Insurance Scheme–NAIS (1999): NAIS was introduced during Rabi 1999-00 by improving the scope and content of the erstwhile CCIS. The salient features are as follows:

(i) States and Areas covered: The Scheme is available to all States and Union Territories, on an optional basis. A State opting for the Scheme, will have to continue it, for a minimum period of three years.

(ii) Farmers covered: All farmers including sharecroppers and tenant farmers, growing the notified crops in the notified areas, are eligible for coverage. The scheme is compulsory, for farmers availing crop production loans and voluntary for others.

(iii) Crops covered: The Scheme covers food crops (Cereals, Millets and Pulses), Oilseeds and Annual Commercial / Horticultural crops - sugarcane, cotton, potato, onion, chilly, turmeric, ginger, jute, tapioca, coriander, cumin, isabgol, fennel, fenugreek, annual banana, annual pineapple, etc. However, mangoes, apples, grapes and oranges are not yet covered.

(iv) Sum insured: The minimum Sum Insured (SI) in case of loanee farmers, is the amount of loan availed, which can be further extended up to 150 per cent of the average yield. For non-loanee farmers, it can be up to a value of 150 per cent of the average yield.

(v) Premium Rates: The premium rates are 3.5 per cent for oilseeds and bajra and 2.5 per cent for cereals, millets and pulses, during Kharif; in the Rabi season, they are :1.5 per cent for wheat and 2 per cent for other food crops and oilseeds. The rates for annual

commercial / horticultural crops are actuarial.

(vi) Premium subsidy: Small / Marginal farmers are subsidized in premium to the extent of 50 per cent, to be shared equally between the Centre and States. The premium subsidy is, however, to be phased out over a five year period, on a sunset basis. Accordingly, the eligible subsidy between 2004-07, is 10 per cent.

(vii) Scheme approach: The scheme covers loses from sowing to harvesting, and operates on an 'area approach' for widespread calamities. For this purpose, a unit of insurance (IU), is defined. It may be a Village Panchayat, Mandal, Hobli, Circle, Phirka, Block, Taluka, etc., to be decided by the State govt. / UT. However, each participating state government. / UT, was required to reach the level of Village Panchayat, as the unit, within a maximum period of three years. The scheme is to operate on 'individual' basis for specified localized calamities. However, individual assessment of losses is currently researched in only in a few areas – one block / taluka in each state.

(viii) Loss assessment, Levels of Indemnity & Threshold Yield: The Threshold Yield (TY) or Guaranteed Yield for a crop in a Insurance Unit, shall be the moving average yield based on the past three years, in case of Rice & Wheat, and five years 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 & High Risk areas, will be available for all crops. The insured farmers of a unit area may also opt for higher level of indemnity, on payment of an additional premium.

(ix) If the 'Actual Yield' (AY) per hectare of the insured crop for the defined area falls short of the specified 'Threshold Yield' (TY), all the insured farmers growing that crop in the defined area, are deemed to have suffered a shortfall in their yield.

(x) Sharing of Risk: Until transition is made to an actuarial regime, Govt. of India and States shall share claims beyond 100 per cent of the premium collected, for food crops and oilseeds, on 50:50 basis. In case of annual commercial / horticultural crops, claims beyond 150 per cent of premium in the first 3 or 5 years, and 200 per cent thereafter, are borne by the Centre and State, on a 50:50 basis.

Table 2: National Agricultural Insurance Scheme (NAIS) – Season-wise coverage

Seasons	Farmers Covered(No)	Area (in Ha)	(Rs. in Crore)			
			Sum Insured	Premium	Subsidy	Total Claims
Rabi 1999-00	579940	780569	356.41	5.42	1.66	7.69
Kharif 2000	8409374	13219828	6903.38	206.74	47.40	1222.48
Rabi 2000-01	2091733	3111423	1602.68	27.79	8.23	59.49
Kharif 2001	8696587	12887710	7502.46	261.62	47.62	493.53
Rabi 2001-02	1955431	3145873	1497.51	30.15	7.79	64.66
Kharif 2002	9768711	15532349	9431.69	325.47	44.86	1824.31
Rabi 2002-03	2326811	4037824	1837.55	38.50	6.73	188.55
Kharif 2003	7970830	12355514	8114.13	283.33	24.44	652.68
Rabi 2003-04	4421287	6468663	3049.49	64.06	6.24	497.06
Kharif 2004	12687104	24273394	13170.62	458.94	20.09	1038.16
Rabi 2004-05	3531045	5343244	3774.21	75.85	4.12	160.59
Kharif 2005	12673833	20531038	13519.10	449.95	20.44	1059.94
Rabi 2005-06	4048524	7218417	5071.66	104.82	5.23	338.30
Kharif 2006	12934050	19672929	14759.25	467.29	26.55	1774.91
Rabi 2006-07	4977980	7632882	6542.21	142.88	7.97	515.96
Kharif 2007	13398561	20754384	17007.56	524.31	26.65	913.37
Rabi 2007-08	5044016	7387156	7466.63	158.71	14.69	810.71
Kharif 2008	12983876	17693192	15658.32	511.66	34.10	2373.78
Rabi 2008-09	6175771	8820465	11029.45	290.39	69.72	1489.81
Kharif 2009	17642349	25673016	26492.69	832.70	50.49	144.78*
Rabi 2009-10	5641184	7903351	10927.27	1151.28	72.79	31.67
Kharif 2010	11443443	17803556	20453.56	629.70	33.88	-
Total	**158321393**	**245134957**	**197305.4**	**6801.61**	**524.4**	**14227.99**

Source: Ministry of Agriculture, Govt. of India, 2011.

Till Kharif 2010, NAIS covered 158.32 million farmers for a premium of Rs. 6,801.61 crores and finalized claims of Rs. 14,227.99 crores (Table 2).

(e) Weather Based Crop Insurance: it aims to mitigate the hardship of the insured farmers 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.

Weather based Crop Insurance is based on the fact that weather conditions affect crop production even when a cultivator has taken all the care to ensure good harvest. Historical correlation studies of crop yield with weather parameters help us in developing weather thresholds (triggers) beyond which crop starts getting affected adversely. Payout structures are developed to compensate cultivators to the extent of losses deemed to have been suffered by them using the weather triggers. In other words, Weather based Crop Insurance

uses weather parameters as 'proxy' for crop yields in compensating the cultivators for deemed crop losses.

Weather Insurance has been piloted in the country since Kharif 2003 season. Some of the States where it's piloted are Andhra Pradesh, Chattisgarh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan etc.

Crop Insurance-Risk Management and Efficient Resource Use

Crop insurance is a more efficient risk management tool than the traditional risk reducing strategies, such as crop diversification, inter-cropping, mixed farming, integration of farm etc., available to farmers. If a farmer were assured of financial compensation when his income is considerably low for reasons beyond his control, he would more likely allocate his resources in a manner that would maximise his return. He would grow more of the most profitable crops even if they are more risky and also he is more likely to adopt advanced technologies despite involvement of high risk. In India conditions where crop insurance is linked to crop credit, it would also improve the position of credit recovery (GOI, 2002).

Crop insurance not only helps the farmers to withstand the shock from uncertain situation but also acts as incentive to use the resources efficiently and achieve higher level of productivity. Many studies have been taken up to assess the performance of crop insurance and to identify limitations of different schemes, so as to make improvements in the future schemes. In this background, some of the studies on crop insurance have indicated favourable opinion on crop insurance. A study undertaken (Kiran, 2010) to assess the impact of crop insurance on resource use efficiency and production of potato in Hassan district of Karnataka considering the data on potato production of both insured and non insured farmers showed that, the insured farmers used resources more efficiently compared to non insured farmers (Table 3). Loanee insured farmers were found 32.26 per cent economical efficient compared to non insured farmers. As insurance acted as incentive for them to use resources efficiently, insured farmers used 6.25 and 20.89 per cent more of seed and FYM than non insured farmers which resulted them 9.08 per cent more yield. A study by Hasanabadi (2005) reported similar results while assessing the influence of crop insurance on onion production.

Table 3: Impact of Crop Insurance on Resource use and Returns from Potato Cultivation

(per cent)

Sl. No.	Particulars	Farmers	
		Loanee insured Vs. non insured	Non loanee insured Vs. non insured
1	Seeds (kg)	06.25	03.34
2	Fertilizers (kg)	-03.79	-01.39
3	FYM (tones)	20.89	03.76
4	Cost on PPC	09.53	08.15
5	Labours cost	-01.27	-00.81
6	Yield (q/ac)	09.08	15.48
7	Gross return	08.06	12.51
8	Net return	07.07	12.81
9	Technical efficiency	-16.00	-17.33
10	Allocative efficiency	58.54	-9.76
11	Economic efficiency	32.26	-25.81

Source: Kiran, 2010

Note: Negative sign implies decrease

Further, the opinion survey conducted by Hasanbadi (2005) and Kiran (2010) to know the positive and negative aspects of NAIS scheme from the farmers point of view has indicated some of the major advantages and limitations that are presented in tables 4 and 5. Inadequate compensation, delay in the settlement of compensation and lack of proper information about operation of the scheme to the farmers were the major limitations as opined by the beneficiaries. They also gave their opinion for the improvement of the scheme which include, covering market risk and giving more advertisements to popularize as well as to help farmers in getting more information regarding crop insurance scheme. Iyengar (1989) conducted a study on economic analysis of crop insurance for paddy in Bangalore district. The study revealed a promising sign about the viability of the programme in Karnataka and it was indicated that there was a lack of supervision by the bank officials after disbursement of loan. The economic analysis (Shobarani, 1989) of crop insurance for ragi in Bangalore rural district and found that lack of awareness among the farmers about the scheme as a major lacuna. Vyas and Singh (2006) comprehensively reviewed the National Agricultural Insurance Scheme (NAIS) (its market penetration and coverage, as well as the premia and claims) and suggested changes to make it more effective. Khonarkar (1995) found that farmers have been definitely benefited by the crop insurance scheme. It was suggested that there is need to extend the scheme to non borrowers in addition to beneficiaries availing crop loans, so as to safeguard the interest of large farming community.

Table 4: Drawbacks Associated with Crop Insurance

(per cent)

Sl. No.	Particulars	Farmers	
		Loanee insured	Non loanee insured
1	Compensation amount is not adequate	35 (87.50)	33 (82.50)
2	Delay in settling compensation	31 (77.50)	23 (62.50)
3	Lack of proper information	21 (52.50)	16 (40.00)
4	Premium charged is high	18 (45.00)	09 (22.50)
5	Existing coverage of crop is not enough	13 (32.50)	18 (45.00)

Source: Kiran, 2010

Table 5: Strategies to improve Crop Insurance

(per cent)

Sl. No.	Particulars	Farmers	
		Loanee insured	Non loanee insured
1	Should cover market risk also	35 (87.50)	33 (82.50)
2	Give advertisements to popularize crop insurance	31 (77.50)	23 (62.50)
3	Adoption of individual basis for compensation	21 (52.50)	16 (40.00)
4	Minimum compensation should be given always	18 (45.00)	09 (22.50)
5	Early settlement of compensation	13 (32.50)	18 (45.00)

Source: Kiran, 2010

Conclusion

With focus to the development of agriculture especially in management of risks associated with agriculture crop insurance plays key role. It is important for us to encourage farmers to get into the crop insurance scheme so that there will be some amount of assured income for them in case of any unexpected loss in production process. It is very important for the government and crop insurance implementing agencies to take up more studies to evaluate the performance of crop insurance scheme in each and every region so that, the problems/constrains can be identified and appropriate actions can be initiated for making the scheme more effective and efficient. Though we know that the NAIS is a good scheme compared to other previous schemes, it requires some improvements as opined by the beneficiaries. Similarly, WBCIS is yet another improved format in terms of overcoming most of drawbacks of earlier and NAIS

schemes but serious efforts from the concerned are required to extend the scheme to cover all weather prone area as well as farmers.

References

Ahsan, S.M., Ali, A.G. and Kurian, J.N., 1982, Towards the theory of agricultural insurance. *American Journal of Agricultural Economics,* **64** (3): 520.

Botts, R. R. and Boles, J.N., 1958, Use of normal curve theory in crop insurance rate making. *Journal of Farm Economics,* **40** (3): 733-740.

Botts, R. R., 1962, Federal crop insurance tied to a bushel quota farm program. *Journal of Farm Economics,* **44**: 769-780.

GOI (2002), Report of working group on *Risk Management in Agriculture*, New Delhi: Planning Commission, GOI.

GOI (2007), Report of working group on *Risk Management in Agriculture*, New Delhi: Planning Commission, GOI.

Hazell, P.P. AND Valdes, A., 1985, *Crop insurance for agricultural development: Issues and experiences*, Baltimore, Maryland, USA John Hopkins University Press, International Food Policy Research Institute, Washington, DC USA.

Iyengar, H. (1989), An Economic Analysis of Crop Insurance for Paddy in Bangalore rural district. *M.Sc. (Agri.) Thesis* (Unpublished), University of Agricultural Sciences, Bangalore.

Jerry, R.S., Black, J.R. and Bernett, B.J., 1997, Designing and rating an area yield crop insurance contract. *American Journal of Agricultural Economics,* **79**: 430-438.

Khonarkar, M.R. (1995), An Economic Analysis of Crop Insurance in Nagpur district. *Thesis Abstract,* **21**: 8.

Kiran, S., (2010), Impact of Crop Insurance on Production and Resource Use Efficiency in Potato in Hassan District, Karnataka, *M.Sc. (Agri.) Thesis* (Unpublished), University of Agricultural Sciences, Bangalore.

Mallikarjun, S. Hasanabadi (2005), An Economic Analysis of Crop Insurance for Onion in Dharwad, Karnataka, *M.Sc. (Agri.) Thesis* (Unpublished), University of Agricultural Sciences, Dharwad.

Ministry of Agriculture, Govt. of India, 2011.

Nadkarni, M.Y., 1971, Yield uncertainty in Maharashtra agriculture. *Indian Journal of Agricultural Economics,* **26** (4): 327-333.

Shobharani, S., 1989, An economic analysis of crop insurance for ragi in Bangalore rural district. *M.Sc. (Agri.) Thesis* (Unpublished)*,* University of Agricultural Sciences, Bangalore.

Singh, I.J., 1972, A feasibility study of crop insurance in Uttar Pradesh. *Indian Journal of Agricultural Economics*, **38** (2): 112-121.

Vyas, V.S. and Surjit Singh (2006), Crop Insurance in India - Scope for improvement. *Economic and Political Weekly,* **41**(43/44): 4585-4594.

Walker, T.S. AND Jodha, N.S., 1982, Efficiency of risk management by small farmers and implication for crop insurance. *Progress Report-45,* Economic Programme, ICRISAT.