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Agricultural risk and insurance: The case of Kerala, India

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Abstract

The agriculture in Kerala state of India is diverse and riskier due to its special agroclimatic and geographic peculiarities. Further, the instability in agriculture production has increased due to the changes in climatic patterns. Insurance interventions are the major tool considered in supporting rural population to mitigate vulnerabilities and agricultural insurance is considered as a prime mechanism that address the risks to agricultural production and income resulting from various natural and manmade events. The study first analyses the instability in agriculture in the state. The status of crop insurance coverage and related problems are analysed and crop specific risk coverage, major shortcomings etc are discussed at the end. The last ten-year data on area and production of major crops were collected. The risks associated with farming of major crops were estimated using instability index. Descriptive statistical methods, Compound annual growth rate were also used. The instability index values were high for production than for area and yield. Among the food crops, highest instability index was for the crop banana. All the major spices show high instability in production and yield. The non loanee farmers has less rate of participation in the insurance scheme than loanee farmers. The percentage of insured area to total gross cropped area is less than 2 per cent. On an average, less than 15 per cent of the sum insured is approved as claim. The number of farmers benefitted out of the insurance stood at less than 1 per cent of the total number of farmers in the state. Even though there are multiple insurance schemes, none of them neither fully cater the needs of farming community nor the major risks. The low insurance coverage in the state, despite high literacy level indicates the requirement of a well-designed, farmer friendly, farming system specific insurance schemes.

Keywords: Agricultural risk, Agriculture insurance, Instability index

JEL codes: Q10, G22

Introduction

Agriculture production involves a variety of risks. The risks can be categorized as production related risks, output price related risks and input price related risks. Out of these some risks can be managed but others are simply accepted as costs involved in the activity. The Indian agriculture has achieved progress in some area, but sharp fluctuations are seen in production and farm income. These fluctuations seriously affect the viability and potential of this sector in contributing towards economic growth and food security (Raju and Chand 2010). Therefore, the risks must be properly estimated, and then appropriate strategies are to be developed.

The agriculture in Kerala is diverse and riskier due to its special agroclimatic and geographic peculiarities. Further, the instability in agriculture production has increased due to the changes in climatic patterns. In the context of vulnerability to climate change and disaster risk management, social protection systems can play an important role in development of long-term interventions that helps in resilience of rural communities. A social protection system consists of set of policies and programs that address environmental, economic, and social vulnerabilities by protecting and promoting livelihoods (FAO 2017).

Insurance interventions are the major tool considered in supporting rural population to mitigate vulnerabilities. Among insurance interventions, agricultural insurance is considered as a prime mechanism that address the risks to agricultural production and income resulting from various natural and manmade events. In this context, the study first analyses the risks in agriculture in the state. The status of crop insurance coverage and related problems are analysed next. Finally, an overview of crop specific insurance schemes and its shortcomings are discussed.

Materials and Methods

The Kerala state in India is highly vulnerable to natural disasters due to its peculiar geography. The state lies between the Lakshadweep Sea and the Western Ghats Mountain ranges and known as 'God's on country' owing to its unique natural beauty. The state has a coastal line of 590 Km, numerous rivers, lakes, lagoons, Ramsar wetlands, backwaters, ecologically fragile western ghats supporting rich biodiversity and high population density. Most of the land area is highly susceptible to various types of natural disasters and was selected for the case study. The study is based on the secondary data. The data on area and production were collected from the online publications of Directorate of Economics and Statistics, Kerala state in India. The information on various insurance scheme and their statistics were collected from websites and online publications of Agriculture Insurance Company of India Ltd, Kerala State department of Agriculture, VFPC (Vegetable and fruit promotion council Keralam), commodity boards etc. The data for past ten years were collected to estimate the last decadal agricultural risks. The major crops selected for this study are Paddy, Tapioca, Banana, Plantain, Mango, Pineapple, Pappaya, Pepper, Ginger, Turmeric, Cardamom, Nutmeg, Cashew, Coconut, Tea, Coffee, Cocoa, Arecanut and Rubber. The selection was based on the area and production

statistics and its economic importance in the state. The selected crops were grouped under three major categories as food crops, spices and plantation crops.

The study first estimates the risks associated with farming of above-mentioned crops individually using instability index. The literature review reveals that the commonly used index in agriculture risk assessment is instability index and different variants of this index has been used to examine instability, impact of drought, technology change etc (Ray 1983 ; Rao et al 1988). The instability index as an indicator of risks associated with agriculture is calculated as:

$$\text{Instability index} = \text{Standard deviation of natural logarithm } (Y_{t+1} / Y_t)$$

Where, Y_{t+1} is the area or production or yield in the succeeding year and Y_t represent the same in current year. This index measures deviations from the underlying trend and is unit free (Chand and Raju 2009). The constant ratio Y_{t+1}/Y_t indicates the absence of deviations from trend and standard deviation will be zero. If there is a high degree of fluctuation in the series, the Y_{t+1}/Y_t ratio varies more and there is an increase in standard deviation. The study then examines the coverage of various insurance scheme in the state. Descriptive statistical methods were used to reach valid conclusions. Compound annual growth rate (CAGR) is also estimated as per the requirement. The data analysis is done using R x64 4.0.2 version of software.

Results and Discussion

Risk in Agriculture

The risk is indicated by estimated instability indices for major crops for the last decade. The indices are estimated at the state level. The variability in agriculture production consists of variability in yield and area. The variation in area occurs due to change in pattern of rainfall and other climatic factors, non-timely supply of required inputs, price instability, natural and manmade disasters etc. The variation in yield is caused by pest and disease attack, improper crop management, natural and manmade disasters etc. Any variation in above two factors will contribute to the variation in production. The natural and climatic factor patterns have shown drastic changes in last decade with more frequent and intense weather events. The instability indices estimated for various crops indicates the risk associated with that agricultural activity.

Instability in area, production and yield of major food crops grown in Kerala for the last decade is given in table 1. The instability index values were generally high for production than for area and yield. In case of paddy, instability in production was high may be due to the unexpected heavy rainfall at the time of harvesting and prolonged dry spells. The highest instability index was for the crop banana among the major food crops. The crop pineapple shows comparatively high instability in area, production, and yield. The instability index value shows that papaya cultivation in the state was relatively stable. Despite several support measures available to paddy, banana and pineapple, the cultivation exhibits immense risk, which point towards the need of effective strategies for risk management.

Table 1: Instability indices of major food crops grown in Kerala State

Time period	Crops	Instability Index (%)		
		Area	Production	Yield
2009-10 to 2019-20	Paddy	7.37	12.69	6.66
	Tapioca	6.67	9.83	4.45
	Banana	8.92	15.12	6.81
	Plantain	4.07	10.39	9.95
	Mango	6.78	8.69	7.05
	Pineapple	6.70	11.96	9.26
	Pappaya	4.22	4.50	3.43

The index values presented in table 2 shows that the last decade was not favourable for the spice cultivation in Kerala. The ginger and pepper cultivation exhibits very high risks in area, production, and yield. Generally, all the major spices show high instability in production and yield. This may be highly related to damages due to change in climatic factors, quality reduction and price fluctuations in domestic and international markets. The results suggest the requirement strong intervention with the help of public and private sector investments to reduce the risks associated with spices cultivation, marketing, and export.

Table 2: Instability indices of major Spices grown in Kerala State

Time period	Crops	Instability Index (%)		
		Area	Production	Yield
2009-10 to 2019-20	Pepper	22.18	27.18	29.70
	Ginger	18.52	66.27	76.26
	Turmeric	10.23	17.51	11.17
	Cardamom	1.76	22.82	23.32
	Nutmeg	6.19	5.32	4.75

The scenario of major plantation crops (table 3) was also like spices in terms of production and yield. On comparison, cashew and cocoa exhibit high instability in production and yield indicating the deep crisis in cultivation and marketing. Both crops were cultivated mainly as rainfed crops.

Table 3: Instability indices of major plantation crops grown in Kerala State

Time period	Crops	Instability Index (%)		
		Area	Production	Yield
2009-10 to 2019-20	Cashew	8.83	19.59	18.99
	Coconut	2.64	6.21	4.72
	Tea	9.27	5.51	12.77
	Coffee	0.40	5.03	4.98
	Cocoa	2.70	20.87	20.64
	Arecanut	2.68	13.97	13.67
	Rubber	0.68	13.95	14.11

From the given value of instability indices for three groups of crops, spices cultivation was subjected to more risks compared to other two groups. The sharp instability in area is evident in case of spices cultivation. The area change can be related to the shift from spices cultivation to other remunerative and newly introduced crops. All the three groups exhibit considerable amount of risk in cultivation indicating the requirement of support to cope up with the situation. The basic agricultural risk management measures include using superior plant varieties, crop diversification, preventive and adaptive measures against irregular weather events etc. The agricultural insurance is the most often used instrument to handle the risk in agriculture. The effectiveness of any agricultural insurance tool is based on the cost effectiveness in addressing the wide range of risks (FAO 2005). An effective agricultural insurance product can address the serious instabilities related to agricultural activities. It can act as an effective tool to increase resilience against various shocks that primarily affect rural population and has an important place among the social protection measures (FAO 2021).

Crop insurance status

The major insurance schemes currently available are Pradhan Mantri Fasal Bhima Yojana (PMFBY), Restructured Weather Based Crop Insurance Scheme (RWBCIS), Restructured state crop insurance scheme and other crop specific insurance products. All the four products are offered by public sector agencies. The statistics of insurance coverage in the state under PMFBY and RWBCIS is given in table 4. The statistics of other two insurance products are not available to public.

Table 4: Combined statistics of PMFBY and RWBCIS in Kerala State

Year	Loanee farmers	Non-loanee Farmers	Total no. of farmers	Area Insured (Ha)	Sum Insured (Rs in lakhs)	Approved claim (Rs in lakhs)	No. of farmers benefitted
2016	42063	7883	49946	34340.91	23782.83	2284.75	28766
2017	46651	9243	55894	47861.21	30132.89	1095.53	38137
2018	47271	9694	56965	43202.57	31583.35	2674.38	40159
2019	46850	11285	58135	37179.07	30780.2	8590.12	45693
2020	47798	19327	67125	43961.96	35824.61	6883.75	*NA
CAGR (%)	3.25	25.13	7.67	6.37	10.78	31.75	12.26

Source: <https://www.aicofindia.com> *NA – Not available

The table 4 and 5 shows an increasing trend in the agricultural insurance registration in terms of farmer number. The non loanee farmers has less rate of participation in the insurance scheme than loanee farmers. The percentage of insured area to total gross cropped area is less than 2 per cent. On an average, less than 15 per cent of the sum insured is approved as claim. The number of farmers benefitted out of the insurance stood at less than 1 per cent of the total number of farmers in the state. The agricultural insurance coverage in the state is very low despite the high instability in production as well as high level of literacy among farmers.

Crop specific availability of insurance products

There are 4 major types of insurance scheme being implemented in the state. The restructured state crop insurance scheme is the one which covers highest number of crops grown in the state. The scheme covers 27 crops and can be insured year around depending upon the stage of crop. The premium as well as sum insured is low when compared to other schemes. Some types of losses, for example in paddy crop the undue delay from the side of procurement agency and absence of accessible storage space forces most of the farmers to leave the harvested paddy at field risking summer rains (Rose and Prema 2020), is not specifically covered. This has resulted in post-harvest losses too. The difficulty in getting the claim approval, lengthy procedures, heavy documentation, less awareness among farmers etc are the other constraints which limits the coverage of the scheme.

Table 5: Crop insurance schemes for major food crops in Kerala State

Crops	PMFBY	RWBCIS	Restructured state crop insurance scheme	Other insurance schemes
Paddy	ND	FC	FC	Nil
Tapioca	FC	Nil	FC	VFPCCK insurance
Banana	FC	FC	FC	VFPCCK insurance
Plantain	ND	Nil	FC	Nil
Mango	Nil	Nil	FC	Nil
Pineapple	Nil	ND	FC	Nil
Pappaya	Nil	Nil	FC	Nil

Note: ND – Insurance coverage available in notified districts, FC -Full coverage in state, VFPCCK – Vegetable and fruit promotion council Keralam

The insurance scheme offered by VFPCCK is crop specific but covers all the district in the state. PMFBY and RWBCIS have full coverage for selected crops and for other crops insurance coverage is available in notified districts only (partial coverage). The number of crops covered by PMFBY and RWBCIS is low in number when compared to restructured state crop insurance scheme. In terms of sum insured and claim processing PMFBY and RWBCIS is better when compared to restructured state crop insurance scheme and other insurance schemes.

Table 6: Crop insurance schemes for major spice crops in Kerala State

Crops	PMFBY	RWBCIS	Restructured state crop insurance scheme	Other insurance schemes
Pepper	Nil	ND	FC	Nil
Ginger	Nil	ND	FC	Nil
Turmeric	Nil	ND	FC	Nil
Cardamom	Nil	ND	FC	Nil
Nutmeg	Nil	ND	FC	Nil

Note: ND – Insurance coverage available in notified districts, FC -Full coverage in state
 From table 6, it is obvious that the insurance scheme available for spice crops are limited. The RWBCIS have partial coverage. The fully covered restructured state crop insurance scheme sum insured amount and indemnity amount is very low, which makes it less popular among farmers.

Table 7: Crop insurance schemes for major plantation crops in Kerala State

Crops	PMFBY	RWBCIS	Restructured state crop insurance scheme	Other insurance schemes
Cashew	Nil	ND	FC	Nil
Coconut	Nil	Nil	FC	Coconut Palm Insurance Scheme (CPIS)
Tea	Nil	Nil	FC	Revenue insurance scheme on plantation crops (RISPC)
Coffee	Nil	Nil	FC	Coffee rainfall insurance
Cocoa	Nil	ND	FC	Nil
Arecanut	Nil	ND	FC	Nil
Rubber	Nil	Nil	FC	Rubber plantation insurance

Note: ND – Insurance coverage available in notified districts, FC -Full coverage in state

The other insurance schemes are more popular in case of plantation crops. The fully covered restructured state crop insurance scheme pays very low amount of indemnity. The RWBCIS scheme has partial coverage. There is an urgent requirement of well-designed insurance products for the plantation sector.

Conclusion

The instability in agricultural production is high during the last decade in accordance with the increase in frequency of extreme weather events. The instability was highly evident in spice crops that that of food crops and plantation crops. Therefore, a well-designed tool for managing the agricultural risks is required. The agricultural insurance is most popularly used tool to manage agricultural risks arising especially due to the change in climatic factors. There are four types of insurance schemes available in Kerala state. The restructured state crop insurance scheme is covering almost all crops but constrained with several factors such as low insured amount, lengthy procedure for claim approval, minimum area requirement for registration etc. The PMFBY and RWBCIS have better insured amount and indemnity payouts but lacks full coverage in the state. The discrepancy in settling the claim is also creating confusion among the farmers. The other insurance products are crop specific and demand heavy documentation which enhances the transaction cost for agricultural insurance. Even though there are multiple insurance schemes, none of them neither fully cater the needs of farming community nor the major risks. The farming in the state is mostly integrated or diversified or homestead farming type which triggers the difficulty of farmer to meet the minimum area requirement or minimum number requirement criteria for the insurance. This also causes confusion during inspection and approval of claim. The low insurance coverage in the state, despite high literacy level and high level of instability indicates the requirement of a well-designed, farmer friendly and farming system specific insurance schemes. The good governance in implementation of the scheme and digitalization are key factors to reach greater number of farmers with less transaction cost.



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