

Risk attitude of farmers in climate extreme region of Andhra Pradesh

Abstract

Aim: The objective of the current study was to assess the risk attitude of the both insured and non-insured farmers and identifying the factors influencing risk attitude of the insured and non-insured farmers.

Study Area and Design: An ex-post-facto study was conducted, stratified random sampling method was used to collect the data at selected villages in prakasam district, Andhra Pradesh.

Methodology: A sample of 150 farmers of chilli and cotton was collected (90 insured and 60 non-insured). Data regarding agriculture year 2021-22 was analysed using Moscardi and de Janvry approach. The socio-economic, institutional and farm characteristics were analysed by using discriminant analysis to identify the factors influencing farmer's risk attitude.

Results: The present study results showed that majority of the farmers are risk neutral. In case of risk preferes insured farmers are more compared to non-insured farmers. Insured chilli farmers more than non-insured chilli farmers in case of risk averse but, it is reverse in case cotton farmers. Occupation, constraints in getting credit facility, membership of association, proportion of crop income to the total farm income and family size of insured chilli farmers and family size, education level membership of association, constraints in getting credit facility, proportion of crop income to total farm income of non-insured chilli farmers are significant. Variables like age, occupation, farming experience, constraints in getting credit facility and age, occupation, education level, farming experience of insured cotton and non-insured cotton farmers were found to be significant.

Conclusion: Majority of the farmers (both insured and non-insured) are risk neutral.

Key words: Risk attitude, Crop insurance, Cotton, Chilli

1. INTRODUCTION

The agriculture in India faces a lot of uncertainties. Still, more than 70 per cent people in India engaged in this sector. In India agriculture and allied activities contributes 18.3 per cent of GVP. It also provides employment opportunities to nearly two-third of the working force. Farmers face a lot of risks and uncertainties including pest outbreaks, Market fluctuations and variations in weather conditions like drought, flood etc. Due to these farmers face losses in their crop yield and financial stability if these risks were not managed properly [1] There is an immense diversity of agricultural practices because of the climate and other environmental factors, farm characteristics, institutional, and socio-economic factors and their interactions [2] Most of the agriculture production activities in India are highly susceptible to uncontrollable weather events that can severely impact both quality and quantity yield of a [3]. In crops requiring higher initial investment, the weather risks may prevent the farmers to opt for high value crops [4] Farmers need to make decisions about steps to take to reduce the potential impact of a risk [5] Given the close relationship between economic and agricultural growth, risk management in agriculture may present significant challenges for decision-makers and researchers. [6] Generally, most of the farmers show risk aversion behaviour in the decision-making process. The risks, to which farmers are facing, may result from extreme climate and weather conditions, insect pests and diseases, to market vacillation and indiscretion of product prices [7] Crops insurance helps the farmers in stabilizing their income and production. It is considering as essential part of agricultural programs designed to provide protection to farmers against physical failure of crops due to weather and other natural hazards. Compared to other risk reducing strategies, such as intercropping, crop diversification, mixed farming, etc., available to farmers crop insurance is more efficient. [8].it is necessary to protect the farmers from natural calamities and ensure their credit eligibility for the next season [9]. Government introduced many crop insurance schemes present two most important schemes are functional i.e., Pradhan Mantri Fasal Bhima yojana (PMFBY) and Weather Based Crop Insurance Scheme (WBCIS) are in operation [10] A weather-based crop

insurance scheme is a type of insurance program that provides financial protection to farmers against losses due to adverse weather conditions such as drought, excessive rainfall, hailstorms, and other natural calamities. As agricultural output is the main source of income for agricultural household, therefore it is imperative for the farmers to acknowledge and manage production risks [11] In order to manage the risks at farm level, farmer's risk attitude plays an important role in farmers' management and adaptation decisions against exposed risks at farm level. Accurate and timely perception of risks may also assist farmers to assess the probability and consequences of exposed risks [12] If farmers were given assurance financially, they will allocate resources optimally. Risk averse farmers apply fewer fertilizers than other farmers [13]. However, some other studies have shown that farmer consistently over apply fertilizers [14]. Insurance will induce the use of the risk-increasing factor and reduce the use of the risk-decreasing factors thereby increasing production risk and indicating moral hazard [15] To analyze the farmer's decision in risky and uncertain conditions it is necessary to observe how they perceive risk and behave against various kinds of risks [16].

Y.S.R Free Crop Insurance Scheme is launched by Government of Andhra Pradesh on 15th December 2020 to provide financial assistance to the farmers. All farmers cultivators, sharecroppers and tenant farmers are eligible under YSR Free Crop Insurance Scheme. Earlier farmers used to pay a high premium on crop insurance but now with the introduction of this scheme, farmers would pay a charge of one rupee only. But now this insurance scheme is completely free of premium. The YSR free crop insurance is divided into yield-based crop insurance and weather-based crop insurance. In Yield based Crop Insurance farmers will be provided financial assistance on the basis of post-harvest losses. In Weather Based Crop Insurance financial assistance will be given on the basis of crop losses due to adverse weather conditions. There are around 22 notified crops that are covered under this scheme. Chilli and cotton crops are among it [17]. The objective of the current study was to assess the risk attitude of the both insured and non-insured farmers and identifying the factors influencing risk attitude of the insured and non-insured farmers.

2. METHODOLOGY

2.1 Study area

The study was purposively conducted in western region of Prakasam district Andhra Pradesh which is one of the climate-extreme regions of Andhra Pradesh. This district has moderate climate in the coastal areas and hot climate in the non-coastal areas. The normal maximum and minimum temperatures recorded in the district are 40.20 C and 20.30 C respectively and mean annual rainfall was maximum during 2 seasons i.e., post monsoon, monsoon period with 419.65 mm, 404.14 mm respectively [18] Stratified random sampling method was used to collect the data. Survey was conducted in Yerragondapalem and Dornala mandals of Prakasam district. A total of 150 samples were collected ninety insured farmers and sixty non-insured farmers of both chilli and cotton.

2.2 Methodology

2.2.1 Cobb-Douglas production function.

Before going to estimate the risk attitude of the farmers first we have to determine the variable which are determining the yield. For that we used cobb-Douglas production method was used.

Using the data collected, cobb-Douglas (double log) production function was formed. we ran the data to ordinary least square (OLS) was used to obtain the regression coefficient and coefficient of determinants. The function is expressed as

$$Y=f(X_1, X_2, X_3, X_4, X_5, X_6, U)$$

$$Y= \alpha X^\beta$$

$$\ln Y= \alpha+\beta_1 \ln X_1+ \beta_2 \ln X_2+ \beta_3 \ln X_3+ \beta_4 \ln X_4+ \beta_5 \ln X_5+ \beta_6 \ln X_6+U \dots\dots\dots (1)$$

Where, Y is output, X₁ is Quantity of seed (kg/acre) used X₂ is Quantity of Nitrogen (kg/acre) used, X₃ is Quantity of Phosphorus (kg/acre) used, X₄ is Quantity of Potassium (kg/acre) used, X₅ is Number of times irrigated for crop, X₆ is Labour utilization in labour day/ha U is Error term [19]

2.2.2 Moscardi and de Janvry Approach

The estimated model is Moscardi and de Janvry model it was first introduced by Moscardi and de Janvry (1977).

Assume that the random net income that a farmer obtained from yield uncertainty and also from the relationship between input (X) and yield (Y) is represented by production function, the coefficients of variation (cv) of yield is

$$\theta = \frac{\delta_y}{\mu_y} \quad \text{-----(2)}$$

where θ is the coefficient of variation yield; δ_y is the standard deviation of yield; μ_y is the mean yield and given factor cost (P_i) and a given product price (P_y), the preferences order can be maximized with respect to input levels. The resulting first order condition are

$$P_y f_i \frac{\mu_y}{X_i} = \frac{P_i}{1-\theta K_s} \quad \text{-----(3)}$$

Where p_i is the input cost; X_i the input vector (most significant input); P_y the output price; f_i is the elasticity of production of the i^{th} input; K_s is the risk attitude parameter, while θ and μ are as defined in equation (2)

The value of risk attitude parameter was deduced from observed levels of products and inputs by solving equation (2) as follows

$$K(S) = \frac{1}{\theta} (1 - P_i X_i / P_y f_i \mu_y) \quad \text{..... (4)}$$

Equation (4) provides a measure of risk attitude K_s that was derived from each farmer knowledge of production function, the coefficient of variation of yield, product price and input cost and observed levels of inputs use.

Following Moscardi and de Janvry approach, the risk attitude parameter K_s was equally distributed among the groups: i) risk-prefer ii) risk-neutral and iii) risk-averse [20].

2.2.3 Discriminant Analysis:

Discriminant analysis is done using SPSS software to find out the factors influencing the risk attitude of the farmers. Socio-economic, institutional and farm characteristics like age, occupation, education levels, family size, proportion of crop cultivated area to the total farm area, proportion of crop income to total farm income, farming experience, constraints in getting institutional credit facilities and membership of association were used as the factors. It is estimated that discriminant function estimates would assign the farmers to the same group as would have done the classification variables (parameter K_s).

3. RESULTS AND DISCUSSION

3.1 Risk attitude

The results of the analysis done within frame work of specified methodology and also with reference to each of the objectives set forth for the study are presented. The significant determinants of the crop yield have been found to determine the risk attitude of the farmers' based on Moscardi and Janvry econometric approach. Based on this approach, the risk attitude parameter K_s for each farmer was estimated and classified farmers into three distinct risk attitude groups. The results of the analysis are presented and discussed under this section.

Table: 1 Risk attitude of the sample farmers

Risk Type	Chilli		Cotton	
	Insured	Non-insured	Insured	Non-insured
Risk Preferer	5 (10)	2 (7.6)	15 (37.5)	10 (29.4)
Risk Neutral	23 (46)	16 (61.5)	19 (47.5)	11 (32.3)
Risk Averse	22 (44)	8 (30.76)	6 (15)	13 (38.3)
Total	50 (100)	26 (100)	40 (100)	34 (100)

(Note: numbers in parentheses indicates per cent to the total)

Majority of the sample farmers 46 per cent, 61.5 per cent of insured and non-insured chilli farmers and 47.5 per cent and 32.3 per cent of insured and non-insured cotton farmers are risk neutral. Risk preferers and Risk averse are more in insured chilli farmers compared to non-insured chilli farmers but, risk averse are more in non-insured cotton farmers than insured cotton farmers.

3.2 Factors influencing Risk attitude of the farmers

Table: 2 Factors Influencing the risk attitude of the chilli sample farmers

	Variable	Insured chilli Farmers		Non-insured chilli farmers	
		Wilks Lambda	significance	Wilks Lambda	significanace
1	Age (years)	0.938	0.222	0.840	0.135
2	Occupation (Farming=1, others=0)	0.846	0.020**	0.867	0.193
3	Educationlevel (illiterate=0, primary=1, secondary=2, higher=3)	0.995	0.149	0.805	0.083*
4	Family size (No.)	0.888	0.062*	0.572	0.002***
5	Proportion of crop cultivated area to total farm area	0.930	0.183	0.890	0.263
6	Proportion of crop income to total farm income	0.902	0.090*	0.804	0.081*
7	Farming experience	0.943	0.253	0.851	0.156
8	Constraints in getting credit facility (yes=1, No=0)	0.883	0.018**	0.745	0.034**
9	Membership of association (Yes=1, No=0)	0.870	0.049**	0.722	0.024**

(Note:- *** indicates one per cent significance

** indicates five per cent significance

* indicates ten per cent significant)

Five out of nine variables are statistically significant. Major occupation, constraints in getting credit facilities membership of association are statistically significant at 5 per cent level and family size, proportion of crop income to the total farm income are statistically significant at 10 per cent level for insured chilli farmers. In case of non-insured chilli farmers. Family size is statistically significant at 1 per cent level. Constraints in getting credit facility, membership of association are statistically significant at 5 per cent level and educational level, proportion of crop income to the total farm income is statistically significant at 10 per cent level.

Table: 3 Factors influencing risk attitude of the cotton farmers

	Variable	Insured cotton Farmers		Non-insured cotton farmers	
		Wilks Lambda	significance	Wilks Lambda	significanace
1	Age	0.875	0.084*	0.727	0.008***
2	Occupation (Farming=1, others=0)	0.849	0.048**	0.816	0.047**
3	Educationlevel (illiterate=0, primary=1, secondary=2, higher=3)	0.945	0.352	0.797	0.033**
4	Family size (No.)	0.914	0.188	0.918	0.278
5	Proportion of crop cultivated area to total farm area	0.929	0.256	0.895	0.190
6	Proportion of crop income to total farm income	0.946	0.355	0.840	0.73
7	Farming experience	0.833	0.034**	0.842	0.076*
8	Constraints in getting credit facility (yes=1, No=0)	0.0853	0.052*	0.894	0.186

9	Membership of association (Yes=1, No=0)	0.916	0.196	0.877	0.140
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(Note:- *** indicates one per cent significance
 ** indicates five per cent significance
 * indicates ten per cent significant)

Four variables were found to be statistically significant at ten per cent, five per cent and one per cent level of probability, they were age, occupation, education, farming experience and proportionate of crop income to the farm income of insured cotton farmers. In case of non-insured cotton farmers age, major occupation and education level and farming experience were statistically significant at 1 per cent, 5 per cent level and 10 per cent level.

4. Conclusion

Farmers attitude towards risk is most important aspects of farming for production, investment and adoption of different technologies and strategies of risk management. In agriculture most of the farmers shows tendency towards risk aversion even though there is a chances of high profits. Farmers observes the risk of natural calamities, pest and diseases as probable dangers which alters the farm income. Quantity of seeds, nitrogen, phosphorus, potassium, labour utilization and number of times irrigated for crops are factors taken into consideration for estimation of risk attitude of the insured and non-insured farmers of chilli and cotton.

The present study results showed that majority of the farmers are risk neutral and insured farmers are mostly risk preferers compared to non-insured farmers (in comaparison of risk preferers) in both chilli and cotton crops and non-insured farmers are mostly risk averse farmers. The discriminant analysis result indicated that occupation, constraints in getting credit facility, membership of association, proportion of crop income to the total farm income and family size of insured chilli farmers and family size, education level membership of association, constraints in getting credit facility, proportion of crop income to total farm income of non-insured chilli farmers are significant. Variables like age, occupation, farming experience, constraints in getting credit facility and age, occupation, education level, farming experience of insured cotton and non-insured cotton farmers were found to be significant.

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