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Impact of Restructured Weather Based Crop Insurance Scheme on Grape Beneficiary Farmers

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Agriculture in India is extremely vulnerable to incidence of extreme weather events which leads to agrarian distress. Farmers are sensitive to agricultural risks and, as a result require insurance. Climate variability and extreme weather events have become a great threat to agricultural production in India. The projected increase in droughts, floods, heat and cold waves, cyclones, extreme precipitation events will result in greater instability in food production. Grape fruit crop is extremely sensitive to climate change; year by year many farmers are indebted due to very meager yields. Restructured Weather Based Crop Insurance Scheme (RWBCIS) is one such scheme which was recent crop insurance launch by Government of India to mitigate the hardship of the insured farmers against the likelihood of financial loss on account of crop loss resulting from adverse weather conditions. Grape fruit crop was taken into consideration to assess the impact of the 'RWBCIS' on beneficiaries. The study was conducted in the year 2021-2022 in Nasik district of Maharashtra state. The sample consists of total 150 farmers, 75 beneficiary farmers and 75 non-

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beneficiary farmers of RWBCIS. With the help of tools like Crop diversification, Cropping intensity and Incremental cost benefit ratio an attempt is made to find out the impact of the RBWCIS on beneficiary farmers in comparison to non-beneficiary farmers. The results showed that there is no significant difference in crop diversification and cropping intensity between the two groups. Also, there is no noticeable difference between the creditworthiness of beneficiary and non-beneficiary farmers of RWBCIS. Incremental Cost Benefit Ratio for beneficiaries and non-beneficiaries was more or less unity. There is no noticeable impact of RWBCIS on Grape beneficiary farmers.

Keywords: Crop insurance; RWBCIS; impact; grape beneficiary farmers.

1. INTRODUCTION

Agriculture is a critical sector of the Indian economy and forms the resource base for a number of agro-based industries and agro-services. It is the provider of food and nutritional security to billions of people [1]. In most of the states minimum support price has not been implemented for most of the crops. In recent times, mechanisms like contract farming and future trading have been established which are expected to provide some insurance against price fluctuations directly or indirectly [2]. Since agricultural production and productivity are highly dependent on weather conditions, any weather aberrations cause atmospheric and other forms of stresses and in turn, will increase the vulnerability of these farmers to economic losses [3]. In order to withstand such risks and to smoothen consumption, farmers utilise a range of farm financial management options such as borrowing from formal and informal sources, selling assets and cattle, disinvestment, purchasing formal insurance, etc. [4]. Crop insurance initially evolved and implemented in Mexico, Japan, Australia, United States and Brazil. These experiences and those of other countries provide lessons, the design and management of agricultural insurance programmes about the role of crop insurance as a public risk management policy [5]. Crop insurance concept was introduced in India for risk management in agriculture sector in the beginning of last century. However, despite large public subsidy, a significant majority of India's farmers have remained uninsured largely due to issues in design, particularly the long delays in claims settlement [6] and high basis risk. Unfortunately, agricultural insurance in the country has not made much headway even though the need to protect farmers from agriculture variability has been a continuing concern of agriculture policy [7].In view of challenges in implementation of NAIS, MNAIS &WBCIS(previous crop insurance schemes), specially delay in settlement of claims, low risk coverage in terms of reduced sum insured due to capping in MNAIS & WBCIS, huge difference of farmer premium in neighbouring districts, low transparency in calculation and settlement of claims, fragmented information with different stakeholders, the Government of India reviewed the erstwhile Crop Insurance schemes [8] and came up with two most relevant systems in the recent past, i.e. Pradhan Mantri Fasal Bima Yojna(PMFBY) and Restructured Weather based Crop Insurance Scheme (RWBCIS) based on restructured weather. These schemes are area-based schemes and were launched on 18th February 2016 for providing a comprehensive insurance cover against crop failure and help stabilize the income of the farmers. The PMFBY 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 &diseases whereas the RWBCIS aims to mitigate the hardship of the insured farmers against the likelihood of financial loss on account of crop loss resulting from adverse weather conditions using weather parameters as "proxy for crop yields in compensating the cultivators for deemed crop [9].

The farmers' share of premium rates is capped at 1.5%for Rabi and 2% for kharif, 5% for horticultural crops of sum insured as per the RWBCIS operational guidelines. Institutional credit was designed to play a significant part in India's agricultural development. The disbursement of loans to agriculture involves a significant number of institutional bodies [10]. Agriculture is the main source of livelihood of farmers in Maharashtra. Maharashtra's economy is predominately agrarian. Both food crops and cash crops are grown in the state. The state has huge area under Fruit cultivation of which mango, banana, grape, and pomegranate and orange are the main ones. Climate plays a crucial role in the growth of grapevines. The amounts of rainfall per year, day and night temperatures, and severity of winter snowfall, are

all important factors to consider. High air temperatures (usually greater than 38°C) and bright sunshine cause sunburn damage on exposed fruits. In grapes, higher temperatures may advance the ripening of berries and alter the berry composition in both table and wine grapes, thereby affecting the quality of the produce [11]. Heavy rainfalls, unseasonal rainfalls develop serious downy mildew diseases. *Extreme cold affects the growth and size of the fruit. Hence, weather based crop insurance as a tool helps grape farmers to cope up with the losses*. A close assessment is required to study the impact of the RWBCIS. Considering the objectives of the scheme few parameters like Crop Diversification, Creditworthiness and Incremental Cost Benefit Ratio were identified to measure the impact of RWBCIS by comparing beneficiary and non-beneficiary farmers. The findings and suggestions of the study will help the policy makers, administrators, extension personnel and researchers delineate the loopholes in implementing the scheme and to know to what extent the RWBCIS scheme is reaching the beneficiaries.

2. METHODOLOGY

For the present study Grape beneficiary and non-beneficiary farmers of RWBCIS are taken in sampling frame . The study was conducted in Nasik district of Maharashtra. Three tehsils Niphad, Sinnar and Dindori were purposively selected based on the maximum number of Grape beneficiary farmers. From each tehsil three villages were selected. Total nine villages were selected. Total 75 beneficiary and 75 non-beneficiary farmers from same village shaving similar socio-economic conditions were selected. The sample consists of total 150 farmers. The interview schedule was drafted so as to collect the information in line with the objectives of the study. The interview schedule developed was pre-tested for its accuracy, simplicity and practicability with a group of thirty beneficiaries of scheme. Data is acquired by personal interview. The data is tabulated and analyzed using appropriate statistical tools.

Following tools and methods were used for the study:

2.1 Simpson Index of Crop Diversification (Sid)

Crop diversification refers to addition of new crops to the field in order to mitigate the risk and maintain a stable income throughout the year. Accordingly, to measure the extent of crop diversification of beneficiary and non-beneficiary farmers, Simpson index of crop diversification was calculated using the below formula. Values of Simpson index near to one indicate good crop diversification.

$$SID = 1-\sum(a_j/A)^2$$

Where,

a_j is the area under the j^{th} crop
A is the gross cropped area

2.2 Cropping Intensity(Ci)

$$CI = \frac{Gross\ cropped\ area}{Net\ cropped\ area}\ x\ 100$$

2.3 Credit Worthiness

Credit worthiness is farmers ability to repay the loan and also, when the farmer wants to avail the loan, he gets the loan without much difficulty based on his credit history. Based on the loan amount disbursed, farmers source of credit and their repayment frequency, are taken into consideration for measuring the credit worthiness of the farmers.

2.4 Incremental Cost: Benefit Ratio (ICBR)

Incremental Cost: Benefit Ratio is a method is used to determine the margin by which beneficiary farmers are profitable or not than non-beneficiary farmers after availing RWBCIS.

ICBR = (Gross Returns (Beneficiary) – Gross Returns (Non-Beneficiary) / Gross Expenditure (Beneficiary) – Gross Expenditure (Non- Beneficiary)

3. RESULTS AND DISCUSSION

3.1 Crop Diversification

The Table 1 shows the cropping pattern of beneficiary and non- beneficiary grape farmers. Cropping intensity of the insured farmers is 123 per cent and for non-insured farmers is 119 per cent. There is 4.06 per cent change in cropping intensity between insured and non-insured farmers.

From the Table 2 it is evident that the net cropped area and gross cropped area of insured

farmers is 214.8 and 263.9 respectively. In case of non- insured farmers net cropped area and Gross cropped area is 241.2 and 289.2 respectively .After calculating the Simpson index of crop diversification, it is found that for grape beneficiary farmers the index is 0.72 and for non- beneficiary farmers , the index is 0.70. Hence, it can be concluded that there is no much difference in the diversification of the crops in insured and non-insured farmers (0.02%).

To see whether the difference in cropping intensity and crop diversification is statistically significant or not, z-test was carried

Table 3 shows the Z-test carried out to test the significant difference between the beneficiaries and non-beneficiaries, it is revealed that there is no significant difference between the cropping intensity and crop diversification between the two groups. The findings are contradicting to the findings of Vardhan et al. [12]. In their research they stated that rice non-insured farmers had more diversified crops than insured farmers to minimize risk. The probable reason of the current results might be, grape farmers whether they are insured or not, are progressive and are experienced in grape cultivation. In Nashik district the grape growers are not dependent on the government for the services; rather they opt for private extension services which help them to get information on weather and other advisory services accurately. Grape farmers have knowledge of the all the risk involved in the grape cultivation and both the groups have gone for diversification of the crops to the same extent (0.72 and 0.70). Grape farmers due to recent climate change issues are involved in growing crops other than grape with can fetch them minimum income in case of grape crop failure.

3.2 Credit Worthiness

Credit worthiness is farmers ability to repay the loan and also, when the farmer wants to avail the loan, he gets the loan without much difficulty based on his credit history. Based on the loan amount disbursed, farmers source of credit and their repayment frequency, are taken into consideration for measuring the credit worthiness of the grape farmers. Table 4 shows the results of the same, it is evident that the loan amount disbursed is 3.65 cores (Rs. 36510000) for beneficiary farmers and for non-beneficiary farmers, the loan amount disbursed is 2.99 crores (29960000). The loan amount disbursed, says that beneficiary farmers are having more access to credit when compared to non-beneficiary farmers. Majority of the farmers source of credit is commercial banks (74.24 %), followed by Regional Rural Banks (15.15 %), Co-operative societies (9.09 %) and other sources like money lenders, friends, relatives is 1.50 per cent. In case of Non-beneficiary farmers, majority of the farmers source of credit is commercial banks (53.33 %), followed by Regional Rural Banks (9.33 %), Co-operative societies (22.66 %) and other sources is 14.66 per cent. Maximum number of farmers, loan repayment frequency is regular for beneficiary and non-beneficiary farmers. 27.11 per cent of non-beneficiary farmers are repaying loan rarely, when compared to beneficiary farmers (13.63 %). The findings of Jamanal et al. [13] stated that 39.58% of the insured farmers borrowed loan of less than Rs.49000 and few farmers (15.42%) have not availed loan from any financial institutions. In this scenario we can conclude that there is no noticeable difference between the creditworthiness of beneficiary and non-beneficiary farmers of RWBCIS. When farmers do not pay the previous due loans, they are not eligible for next loan , the reasons for less creditworthiness of few farmers may be due to crop losses and COVID Pandemic in recent years , farmers are not availing good returns resulting in more loan defaulters.

3.3 Incremental Cost Benefit ratio

Table 5 reveals that Gross returns per hectare of Non-beneficiary and a beneficiary farmer was Rs 14.05 lakhs and 15.5 lakhs respectively. The added returns for beneficiary farmers were Rs 1.49 lakhs. The gross expenditure per ha of beneficiary and non-beneficiary is Rs 8.72 lakhs and 7.35 lakhs respectively. It's interesting to note that the gross expenditure is more for beneficiary farmers and the added cost for the same is Rs 1.37 lakhs. When ICBR is calculated the ratio is found to be 1.09. However, the ICBR for beneficiaries and non-beneficiaries was more or less unity, indicating there is no margin for beneficiary farmers compared to non-beneficiary farmers after availing the scheme ICBR (Added returns/Added Expenditure). Grape farmers in general we can observe whether insured or not , are having same gross returns . This indicates that the RWBCIS is not showing meaningful impact on beneficiary farmers of Grape. These results are in opposition to the findings of Yanuarti et al.[14], insurance had a positive impact on farmers' income. Also, Cariappa et al.[15]. in their study suggested that households with access to crop insurance had positive effect crop income.

Table 1. Cropping pattern of grape farmers (ha)

Crop	Beneficiaries (n=75)		Non- Beneficiaries (n=75)	
	Area	Percentage (%)	Area	Percentage (%)
Vegetables	22	8.34	18.20	6.29
Pulses	23	8.72	22.20	7.67
Cereals	39.32	14.91	47.9	16.56
Onion	20.30	7.7	22.3	7.71
Sugarcane	11.60	4.40	8.4	2.90
Fruits	148.2	56.22	173.2	59.88
GCA	263.9	100	289.2	100
NCA	214.8		241.2	
Cropping intensity	123		119	

Table 2. Extent of crop diversification in beneficiary and non- beneficiary grape farmers (ha)

Farmers	Cropping pattern(ha)										NCA (ha)	GCA (ha)	Simpson index of Diversification
	Tomato	Soybean	Maize	Bajra	Wheat	Onion	Sugarcane	Grape	Guava	Pomegranate			
Beneficiary	22	23	9.8	1	28.52	20.30	11.60	138.64	8.4	1.4	214.8	263.6	0.72
Non-Beneficiary	18.20	22.20	17.4	1.2	29.3	22.3	8.4	157.6	3.4	12.2	241.2	289.2	0.70

.Table 3. Testing significance of selected impact indicators

Sr.No.	Particulars	Beneficiary (n=75)	Non- Beneficiary (n=75)	Difference	Per centchange	Z value (Calculated)
1.	Cropping Intensity	123	119	5	4.06	0.61
2.	Crop Diversification	0.72	0.70	0.02	2.77	1.02

Table 4. Credit worthiness of Grape farmers (n=150)

Particulars		Beneficiaries(n=75)	Non- Beneficiaries (n=75)
	Loan amount disbursed (Rs)	36510000(3.65 crores)	29960000(2.99 crores)
	Loanee	66	59
	Non Loanee	9	16
Sources of credit	Commercial Banks	49 (74.24 %)	35 (53.33 %)
	RRB	10(15.15 %)	7 (9.33 %)
	Co-operative societies	6(9.09 %)	11 (22.66 %)
	Other sources	1(1.50 %)	6 (14.66%)
Loan repayment frequency	Regular	36(54.50 %)	29(49.15 %)
	Occasional	21(31.81 %)	14(23.72 %)
	Very Rare	9(13.63 %)	16 (27.11 %)

Table 5. Incremental Cost Benefit Ratio

Sr. No.	Particulars	Non-beneficiaries (n=75)	Beneficiaries (n=75)
1.	Gross returns Rs/ha	1405408	1554963
2.	Added returns Rs/ha	-	149,555
3.	Gross expenditure Rs/ha	735315	872325
4.	Added cost Rs/ha	-	137010
5.	ICBR		1.09

4. CONCLUSION

In case of grape farmers the impact results showed that there was no significant difference between cropping intensity and crop diversification between beneficiary and non-beneficiary farmers, similar is with the creditworthiness. The incremental cost benefit ratio depicted very less difference. Hence, we can conclude that there is no noticeable impact of RWBCIS on grape beneficiaries. Even though the farmers are aware of the scheme, there is no favorable attitude of grape growers towards the scheme. This is because when there is actual crop loss, compensation paid by the insurance companies is very less or sometimes nil. This leads to lack of trust of farmers towards them. Hence Credibility should be maintained from the side of Insurance companies. Auditing the insurance companies at regular intervals is need of the hour. During the crop loss assessment stage there must be co-ordination between the insurance agents, agriculture officials and farmers to assess the crop loss in appropriate manner. Poor management and implementation can cause potentially promising scheme to face failure.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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