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AN ECONOMETRIC ANALYSIS RELATING TO THE DETERMINANTS OF AGRICULTURE DISTRESS CONDITIONS IN THE VIZIANAGARAM DISTRICT OF ANDHRA PRADESH

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ABSTRACT

The national sample survey (NSS) on the situational assessment of farmers undertaken in 2003 reported that on an average, 48.6 per cent of farmer households in the country were indebted. It was as high as 82 per cent in Andhra Pradesh and the average loan per household was RS.23, 965 (NSSO, 2005). The adverse effects of the climate change, drought increase the cost of cultivation and decrease the returns on the agriculture leads to intensive care in farmers livelihood. It cannot be stopped with single stroke and it needs a holistic approach with cooperation from not only all sections of the society but also with cooperation from all the countries throughout the world.

Sample Selection and Methodology: To fulfill the objectives of the study, use multistage cluster sampling for selection of samples, the results show in diagrams and for analysis use logit regression model.

Major Findings: 83 percent of farmers are indebted and average debt per household is Rs. 47,554. It is observed that 88.64 percent of marginal farmers are indebted, followed by small farmers (82.14 percent) and semi-medium farmers (78.95 percent) and medium farmers (44.44 percent). .In the context of crop failure, that all the farm size groups are affected by failure of crop in the study area but this is increasing with decreasing the farm size.

Policy Suggestions: 1. For reducing the cost of cultivation, encourage Zero Budget Natural Farming. 2. Encourage the policies for educated persons are entered into cultivatiopn.3. Minimum Supporting Price is calculated with weighted terms in current prices.

KEYWORDS: *national sample survey (NSS) , holistic approach , cost of cultivation.*

INTRODUCTION :

Rural indebtedness is an obstacle to agriculture and rural development. Despite good expansion of banking net work in rural areas, after nationalization of banks and growth of institutional credit to agriculture the problem of indebtedness is still continuing. Rural indebtedness has remained an important issue in our country.

The farmer in India borrows for productive and unproductive purposes successive years but he is not in a position to clear of the loans, because either the loans are large or because his agricultural income is not large enough to pay off his debt therefore, the debt of the farmer goes on mounting and this is what is known as rural indebtedness. The growth and development of the rural economy depend on the smooth flow of rural credit i.e. agricultural credit. The accumulated principal amount and interest is becoming a great burden and the farmers are forced to mortgage or sell their piece of land and losing their livelihood.

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Here we remember the remarks of Malcolm in the year 1920s, "Indian peasant is born in debt, lives in debt and dies in debt" - depicting a picture of colonial India. More than sixty years after self-governance and independence, this is still true. The national sample survey (NSS) on the situational assessment of farmers undertaken in 2003 reported that on an average, 48.6 per cent of farmer households in the country were indebted. In Andhra Pradesh it was as high about 82 per cent and the average loan per household was RS.23, 965 (NSSO, 2005).

NEED FOR THE STUDY

The adverse effects of the climate change, drought increase the cost of cultivation and decrease the returns on the agriculture leads to intensive care in farmers livelihood. It cannot be stopped with single stroke and it needs a holistic approach with cooperation from not only all sections of the society but also with cooperation from all the countries throughout the world. It is a long-run issue. Now, the only solution to the problem is to mitigate the agricultural risks faced by the farming community through mechanizing the farming, increase the public investment in agriculture research and development, and educate young generation looking at agriculture through making the agriculture profitable and introduction of Crop Insurance. By designing the suitable policies with proper implementation mechanism, the farming community can be saved and filled with confidence levels to face the crop risks. With this background, the agro-climatic region of North Coastal Andhra in the state of Andhra Pradesh, in which more number of the population depends upon agriculture for their livelihood, has been considered to study factors that influence the farmer's distress due to the state face drought quite frequently and commit suicide due to crop loss.

REVIEWS OF EARLIER STUDIES

In his study on irrigation scenario Mahendra Patel (2016) stated that ground water through wells has 60.86 percent share in total irrigation in his study. Almost more than 70 percent of ground water potential has been utilized. This leads to many regions in water table has been falling at an alaramate. As against the rain fall, the ultimate irrigation potential of 140 million hectares estimated in 1997. Currently irrigation facilities of 102.8 million hectares are created and 45 percent of country's net sown area (63.36percent). According to World Development Indicators (1998) in the mid-1990 the percentage of irrigated area in India was less that the Bangladesh, Nepal, and China and less than half that in Japan and Korea. Crop yields in India are relatively lower than that East Asia and have almost stagnated despite a holding size that is larger on an average than in China. Rice yields in India are almost half that in Japan. Current Scenario exhibiting number of incomplete projects accompanied by low utilization of irrigation potential already created shows that returns on capital invested in creating irrigation facilities is in ordinally delayed or almost lost.

In his article "Farmers Income, Distress and Cost in Agriculture", Brajesh Jha (2015) states that Farmers cultivate different kinds of crops depending on their attitude towards risk-return trade-off. Farmers prefer cultivation of crops with more or less assured procurement as fine cereals in North-West India. The study shows that downside risk are significant in many crops other fine cereals. The yield reduced risk reported have been decreasing in the 1980's, experienced no decrease during the reference period (1997-2012). The cost of cultivation of crops has increased during the reference period. The fixed cost now accounts for more than one-half of the total cost of cultivation of crops. Many agricultural crops were competitive as the cultivation of the same was based on family labour. Of, the late importance of hired labour in the cultivation of the same crop has increased. Probably, on account of uncertainty in the availability of hired labour, the contribution of machines in the cost of cultivation of agricultural crops has increased.

OBJECTIVES OF THE STUDY

1. To examine the economic conditions of farmers in the study area.
2. To analyze farmer's opinion on cultivation and related issues in the study area.
3. To analyse the determinants of agriculture distress situation in the study area.

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4. To suggest the initiatives for well-being of agriculture families for policy makers.

METHODOLOGY

To fulfill the objectives mentioned above, the following methodology has been adopted.

a) Selection of the Sample Households: For collecting primary data the study taken into account multi stage cluster random sampling procedure. In the first stage Vizianagaram district from the North Coastal Andhra Pradesh is selected. The selected district is having high density of rural population. In the next stage two agriculturally predominant mandals i.e. Gantyada and Jiyyammavalasa selected. In the next stage one village from each of the selected mandal is selected at random i.e. Korlam village form Gantyada mandal and Chinamerangi village from Jiyyammavalasa mandal. Finally 50 sample farm households' are selected from each village at random. As a whole the selected 100 sample households are classified into marginal (44), small (28), semi-medium (19) and medium (9) The Primary data from the sample households was collected from March 2016 to June, 2017
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b) Model Specification: It is a quite common to use of explanatory variable as dummy variables with Ordinary Least Squares (OLS) linear regression to analyze dichotomous variables. But it is difficult to use it when dichotomous variable is an explained variable (or dependent variable). In such a context probit or logit regression can be used with an advantage. But as an approximate method, OLS linear regression also does a surprisingly good job with dichotomous variables, despite clear-cut violations of assumptions (Paul D, Allison, 2002; Milsap, R. E., 2009). In this context, logit regression model is considered as a suitable model for the analyses and has been adopted. In the study dependent variable is whether the household becoming distress situation can be given a value (1) and otherwise given a value (0). Logistic regression is estimated in the following form:

$$Ln\left(\frac{P}{1-P}\right) = \alpha + \beta_i x_i + u; \quad i=1,2,.......9$$

Where Ln   = natural logarithm

P   = Probability of obtaining a distressed household.

$$Ln\left(\frac{P}{1-P}\right)$$ = the log odds ratio of a distressed household.

α = co-efficient on the constant term
β_i = are the coefficients of the nine independent variables
X_i = are the independent variables
and u_i = error term or random component

Using STATA – statistical package results have been estimated. The binary outcomes of logistic regression method use the chi-square test to identify which variable to add or drop, automatically[1]. The results are interpreted with the help of odds ratio, $e^{\beta i}$, instead of the actual co-efficient, as the interpretation of odds ratio is more intuitive. It would mean that for a unit change in the independent variable there would be a corresponding change in the odds ratio (probability of becoming Distress vs. probability of not becoming distress).

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[1] *In our restriction a variable is added if it increases chi-square significance 0.05 and it is dropped if it increases chi-square significance by 0.1.*

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RESULTS, ANALYSIS AND DISCUSSIONS
Indebtedness of Households – Farm Size Wise:

Farmer gets income from cultivation, allied activities, wage employment, non-farm employment, pension and other sources. The income obtained by a farmer is insufficient to repay the loans taken from various sources. The debt burden of the farmer continues year after year. The status of indebtedness of farm households is presented in Table 1.

Table1. Farm Size Wise debt of the Selected Households in the Study Area

Farming Category	No. of Households	No. of indebted households	Percentage of indebted	Outstanding debt per household (Rs).
Marginal	44	39	88.64	59,769
Small	28	23	82.14	45,769
Semi- Medium	19	15	78.95	37,069
Medium	9	4	44.44	41,805
Total Farmers	100	83	83	47,544

Source: Field Data.
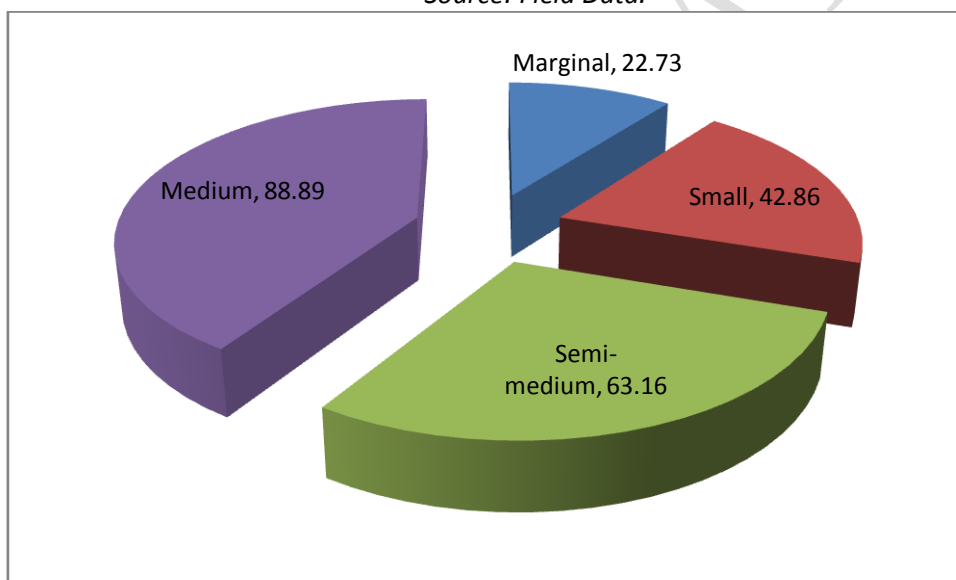
Figure.1. Outstanding debt among farm households in the study area.

The data presented in Table.1 represents the incidence of indebtedness of farm households in the study area. 83 percent of farmers are indebted and average amount of debt per household is Rs. 47,554. It is observed that 88.64 percent of marginal farmers are indebted, followed by small farmers (82.14 percent) and semi-medium farmers (78.95 percent) and medium farmers (44.44 percent).

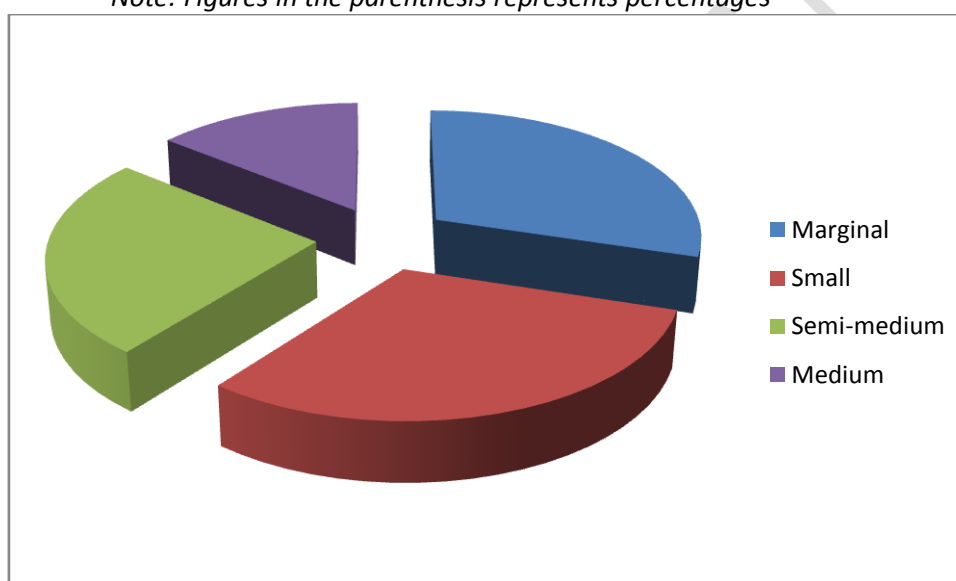### The Extent of Crop Failures in the past three years in Study Area:

Crop failure is one of the reasons for indebtedness, low standard of living of farmers and shortage of capital. Natural disasters like drought, heavy rains, floods etc. are the reasons for crop failure. The data relating to crop failure in the past three years is presented in Table.2.

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Table.2. Status of Crop Failure in Past Three Years

Farming Category	Yes	No	Total
Marginal	41 (93.18)	3 (6.82)	44 (100.00)
Small	27 (96.42)	1 (3.58)	28 (100.00)
Semi- Medium	15 (78.94)	4 (21.06)	19 (100.00)
Medium	4 (44.44)	5 (55.56)	9 (100.00)
Total Farmers	87 (87.00)	13 (13.00)	100 (100.00)

Source: Field Data

Note: Figures in the parenthesis represents percentages

Figure 2. Status of crop failure situation in last three years in the study area

From the above table it is revealed that 93 percent of marginal farmers affected from crop failure, 96 percent of small farmers are affected from the crop failure, about 78 percent of semi-medium farmers are affected from the crop failure and 44 percent of medium farmers are affected from crop failure in the study area. It is concluded that all the farm size groups are affected by crop failure in the study area but this is increasing with decreasing the farm size.

Compensation Extended by the Government:

The State governments are primarily responsible for providing necessary relief measures in the wake of calamities or lost of their crops due to drought, hailstorm, pest attack and so on. In this context government of Andhra Pradesh announce compensation programmes when ever need the cultivated farmers. Table.3. represents the opinion of the farmers in the study area.

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Table.3. Status of Compensation Received by the Farmers in the Study Area

Farming Category	Compensation Received		Total
	Yes	**No**	**Total**
Marginal	10 (22.73)	34 (77.27)	44 (100.00)
Small	12 (42.86)	26 (57.14)	28 (100.00)
Semi- Medium	12 (63.16)	07 (36.84)	19 (100.00)
Medium	8 (88.89)	01 (11.11)	9 (100.00)
Total Farmers	44 (44.00)	56 (56.00)	100 (100.00)

Source: Field Data

Note: Figures in the parenthesis represents percentages

From the Table 3 farm size wise revealed that increase the farm size the compensation received also increased.
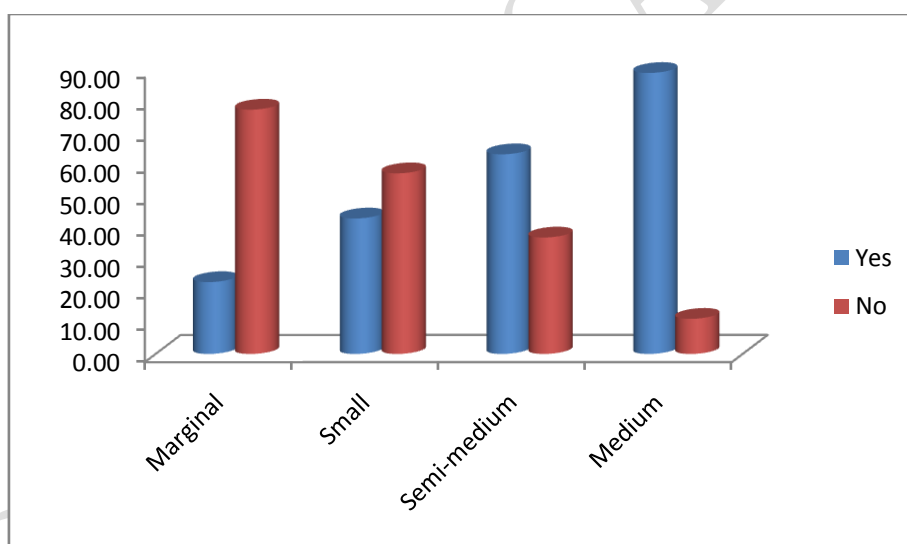
Figure 3 Compensation among the different Farm Size Groups

It is found that the marginal and small farmers are not able to receive sufficient compensation due to lack of political access. On the other hand semi-medium and medium farm size groups are able to get higher proportion of compensation from the government for their crop losses due to their political accessibility with the local leaders.

Results of Logit Regression Model Estimated from Sample Data

It can be noticed that from the Table 4 out of 9 independent variables 7 variables are statistically significant at various probability levels.

Literacy Status of the Head of the Household:

The estimated coefficient of variable literacy status of head of the household is significantly associated with agricultural distress at 1 percent probability level with positive sign. The odds ratio of this

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variable indicates that if the head of the household is illiterate then there may be 83.84 times higher the likelihood of chance is going to be a distress and vice-versa in the total study area.

Agricultural Income per Acre:

The estimated coefficient of the variable (whose agriculture income above Rs. 50,000/-) is statistically significant at five percent level with negative sign. The odds ratio of this variable indicates that if the income per acre decreased by a Rs. 1000/- leads to there may be 41 percent of chance for going to be a distressed situation than their counterpart and vice-versa.

Table 4 . The Results of Logit Model

Number of Observations = 100
LR Chi-Square (10)   = 79.07
Prob > Chi-square   = 0.0000
Pseudo R^2 = 0.6315
Log likelihood   = - 23.070758

S.No.	Independent Variable	Coefficient	Standard Error	P > Z	95% Confidence Interval		Odds Ratio
	Constant	0.8559	2.6999	0.751	-4.4358	6.1476	
1	Age of the Head of the household						
	41-55	-0.5977	1.6409	0.716	-3.8137	2.6183	0.5501
	Above 55	-0.5046	1.7396	0.772	-3.9141	2.9045	0.6038
2	Education level						
	Literate	4.429[*]	1.3276	0.001	1.8268	7.0311	83.8436
3	Farm Size	0.12	1.0093	0.905	-1.8582	2.0981	1.1275
4	Agriculture Income per acre						
	10,000 to 35,000	-1.5132	1.7735	0.905	-1.8582	2.0981	0.2202
	35,001 to 50,000	-2.0877	2.4079	0.386	-6.807	2.6317	0.124
	Above 50,000	-5.48852[**]	2.6188	0.036	-10.6212	-0.3558	0.0041
5	Agriculture Expenditure per acre						
	50,000 to 1,00,000	6.124584[*]	2.3719	0.01	1.4757	10.7735	456.9546
	Above 1,00,000	5.778312[**]	2.6063	0.027	0.67	10.8866	323.213
6	Debt per acre						
	20,000 to 40,000	-1.7212	2.2695	0.448	-6.1693	2.727	0.1789
	40,000 TO 60,000	4.272	3.0316	0.159	-1.6698	10.2137	71.6629
	Above 60,000	0.7641[***]	2.4608	0.056	-4.0591	5.5872	2.147
7	Region						
	Rainfed/Dry	1.5914	1.7691	0.368	-1.8759	5.0587	4.9105
8	Sources of borrowing						
	Institutional	1.1989	2.8219	0.671	-4.3318	6.7296	3.3165
	Institutional & Non-institutional	-0.7897	1.7282	0.648	-4.1769	2.5974	0.454
	Friends or Relatives	-1.4544	1.5418	0.346	-4.4763	1.5674	0.0686
9	Type of Farmer						
	Small	-2.67957[***]	1.4442	0.064	-5.5101	0.151	0.0163
	semi-medium	-4.11709[*]	1.5671	0.009	-7.1887	-1.0455	0.9999
	Medium	0	(empty)				

Source: Field Data
Note: [*]Indicates 1percent probability level, [**]indicates 5 percent probability level, [***]indicates 10 percent level

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Agricultural Expenditure per Acre :

The estimated coefficient of the variable "Expenditure per acre" (i.e. whose agricultural expenditure per acre is Rs. 50,000/- to Rs.1,00,000/-) is turned out to be statistically significant at 1 percent probability level with expected positive sign. The corresponding odds ratio indicates that if the value of expenditure per acre increased by a 1000/- leads to there may be 456.95 times higher the likelihood of chance for going to be a distressed situation than the counterpart and vice-versa in the study area. The coefficient of the variable whose expenditure per acre above Rs. 1,00,000 is turned out be statistically significant at ten percent level. The corresponding odds ratio revealed that if the value of expenditure per acre increased to leads to there may be 323.213 times higher than the likelihood of chance for going to be a distressed situation than the counterpart and vice-versa.

Debt Per Acre :

The estimated coefficient of the variable "debt per acre " (i.e. whose debt above Rs. 60,000) is turned out to be statistically significant at ten percent probability level with expected positive sign. The corresponding odds ratio indicates that if the value of debt per acre increased by a Rs.1/- leads to there may be 2.15 times higher the likelihood of chance for going to be a distressed situation than the counterpart and vice-versa in the study area.

Type of Farmer :

The estimated coefficient of the "Type of Farmer" (i.e. small farmer) is turned out to be statistically significant at ten percent probability level with expected negative sign. The corresponding odds ratio indicates that if the farmers belongs to small leads to there may be 0.016 times lower the likelihood of chance for going to be a distressed situation than the counterpart (marginal) and vice-versa in the study area. The estimated coefficient of the "Type of Farmer" (i.e. semi-medium farmer) is turned out to be statistically significant at one percent probability level with expected negative sign. The corresponding odds ratio indicates that if the farmers belongs to semi-medium farmer leads to there may be 0.999 times lower the likelihood of chance for going to be a distressed situation than the counterpart (marginal) and vice-versa in the study area.

SUMMARY AND CONCLUSION:

The incidence of indebtedness of farm households in the study area, 31 percent of farmers are indebted and average amount of debt per household is Rs. 26,280. It is observed that 40.91 percent of semi-medium farmers are indebted, followed by small farmers (36.84 percent) and marginal farmers (22.22 percent). In the context of crop failure, it is revealed that 96 percent of marginal farmers affected from crop failure, 95 percent of small farmers are affected from the crop failure, about 79 percent of semi-medium farmers are affected from the crop failure and 44 percent of medium farmers are affected from crop failure in the study area. It is concluded that all the farm size groups are affected by crop failure in the study area but this is increasing with decreasing the farm size. About the compensation announced by the states to relief of farm debt and so on. In the study area indicates that cent percent of marginal farmers are not getting any compensation. And it is repeated for small and medium size farm groups. It may be happened that most of the marginal and small farmers are tenants. The second reason for medium size farmers may be they are leased some hectares form large size groups then the marginal and small farm size groups become medium or semi-medium size farmers.

The estimated coefficient of variable literacy status of head of the household is significantly associated with agricultural distress at 1 percent probability level with positive sign. The odds ratio of this variable indicates that if the head of the household is illiterate then there may be 83.84 times higher the likelihood of chance is going to be a distress and vice-versa in the total study area. The estimated coefficient of the variable (whose agriculture income above Rs. 50,000/-) is statistically significant at five percent level with negative sign. The odds ratio of this variable indicates that if the income per acre decreased by a Rs.

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1000/- leads to there may be 41 percent of chance for going to be a distressed situation than their counterpart and vice-versa. The estimated coefficient of the variable "Expenditure per acre" (i.e. whose agricultural expenditure per acre is Rs. 50,000/- to Rs.1,00,000/-) is turned out to be statistically significant at 1 percent probability level with expected positive sign. The corresponding odds ratio indicates that if the value of expenditure per acre increased by a 1000/- leads to there may be 456.95 times higher the likelihood of chance for going to be a distressed situation than the counterpart and vice-versa in the study area. The coefficient of the variable whose expenditure per acre above Rs. 1,00,000 is turned out be statistically significant at ten percent level. The corresponding odds ratio revealed that if the value of expenditure per acre increased to leads to there may be 323.213 times higher than the likelihood of chance for going to be a distressed situation than the counterpart and vice-versa.

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Policy Implications arrived from the Study: 1. For reducing the cost of cultivation, there is need to encourage Zero Budget Natural Farming. 2. To design the policies towards attracting the educated persons to enter into the cultivation. 3. The study suggest for Minimum Supporting Price has to be fixed based on estimate weighted terms in current prices.

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