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Socio Economic Factors Affecting Farm Income and Constraint Analysis of Redgram and Redgram Based Cropping Systems in Prakasam District of Andhra Pradesh

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ABSTRACT

The present study is on the socioeconomic conditions and constraints of Redgram based cropping systems farmers in Prakasam district of Andhra Pradesh during the year 2014-15. A sample size of 120 farmers were selected using multiple stage random sampling method. To study the socio-economic conditions of the farmers based on age, educational status, farm size, family size and farming experience and their effect on farm income. From regression analysis, it can be concluded that only age and farm size were influencing the farm income of Redgram and Redgram based cropping systems farmers positively in study area. The Garrett ranking analysis revealed that inadequate credit, lack of knowledge of intercropping technology, low price of produce, non-availability of quality seeds, high cost of chemical fertilizers, non-availability of farmyard manure, diseases and pests, scarcity of owned funds, price fluctuations and lack of storage facilities were the major constraints faced by the farmers in study area.

Key words: *Redgram, Cropping system, Socio economic, Garrett ranking analysis.*

Redgram is an important pulse crop, commonly known as pigeon pea. Globally pigeonpea (*Cajanus cajan* (L.) Millsp) is the fifth most important pulse crop. It is mainly grown in developing countries by resource-poor farmers in drought prone areas and on degraded soils. Because of having versatile, compatable and stable nature of redgram, it is suitable for inter-cropping with different crops *viz*., cotton, sorghum, pearl millet, greengram, blackgram, castor, maize, soyabean, groundnut and it increases production and maintains soil fertility. In AP, most of the area is cultivated as rainfed monocrop as well as with intercrops in black soils. Intercropping is an old cropping practice, possibly as old as the settled agriculture, and is widespread especially in low – input cropping systems. Intercropping can provide numerous benefits to cropping systems through increasing yield and land use efficiency (Dhima *et al*., 2007) and improving yield stability of cropping systems (Lithourgidis *et al*., 2006). The present study was undertaken to examine how the socio economic factors affecting the farm income and constraints faced by sample farmers of redgram and redgram based cropping systems.

MATERIAL AND METHODS

Sampling and Data Collection

Prakasam district of Andhra Pradesh state was selected purposively as redgram is extensively grown in the district covering an area of 53,000 ha and 48,000 tonnes of production during the year 2013-2014. A pre-tested schedule was used to collect the requisite information from the sample farmers through survey method. Secondary data was collected from different resources of the district. In Prakasam district, all the mandals were listed out in the descending order of magnitude of the area under redgram cultivation and top three mandals were selected. Similarly, top four villages with maximum area under redgram cultivation from each of the selected mandals were selected. From each village, 10 farmers were selected randomly with five farmers cultivating redgram as sole crop and another five farmers practicing redgram based cropping systems making 40 farmers from each selected mandal. Thus, in Prakasam district, three mandals, twelve villages and 120 farmers constituting 60 farmers cultivating redgram sole crop and 60 farmers practising redgram based cropping systems were selected for the study. The 60 farmers practising redgram based cropping systems were post stratified into four identified redgram based cropping systems viz., redgram + bajra, redgram + greengram, redgram + castor and redgram + sorghum (fodder) cropping systems with 30, 10, 10 and 10 farmers respectively.

Regression analysis: A model has been developed in which farm income (expressed in Rs./ha)) is hypothesised to depend on eight explanatory variables, namely:

a) Age (years)	(X_1) - The age of the respondent, normally household head, at the time of data collection
b) Age square	(X_2) – The age square of the respondent, normally household head, at the
c) Family size (no)	(X_3) – The total number of members in respondent's household, including adults and children;
d) Farm size (ha)	(X_4) – The area of redgram sole cropping sytem and redgram based cropping systems (ha);
e) Education (years)	(X_5) – Education of farmers (no. of years schooling)
f) Farming experience (years)	(X_6) – No. of years of experience in redgram sole cropping system and redgram based cropping systems farmers
g) Farming experience square	(X_7) – The experience square of redgram sole cropping system and
h) Cropping system dummy	(X_8) - dummy regressor, zero if the farmer practices sole cropping system and one otherwise.

Initial regression runs revealed heteroscedasticity with the residual variance increasing as income level, age and farming experience increased This violates the homoscedasticity variance assumption of ordinary least squares (OLS) method. To avoid this problem, WLS procedure was applied. To achieve approximate normality and homogeneity of error variance, the variables- age, family size, farm size, education, farming experience were transformed by taking logarithms (following Gujarati, 2003).

In order to reach the homogeneity assumption of regression analysis, age and farming experience variables were squared and added into the model. The white test was used to to detect the heteroscedasticity problem.

Constraints in redgram and redgram based cropping systems:

To study the factors which are affecting the intercropping among redgram farmers, Garette's ranking technique was used. The order of merit assigned by the respondents was converted into ranks by using the following formula.

Per cent position =100 (Rij – 0.5)Nj

Where,

Rij = Rank given for i th variable by the jth respondent.

Nj= Number of variables ranked.

The respondents were asked to rank the ten constraints identified for the purpose of this study as 1,2,3,4.....10 in order to know their constraints in redgram and redgram based cropping systems. The calculated percentage positions for the ranks 1,2,3,4.....10 and their corresponding Garrett's table values are given in Table 1.

Table 1. Percentage position and Garett's table values

Rank	Percentage Position		Garett's Table Value
1	100 (1-0.5)/10	=5	82
2	100 (2-0.5)/10	=15	70
3	100 (3-0.5)/10	=25	63
4	100 (4-0.5)/10	=35	58
5	100 (5-0.5)/10	=45	52
6	100 (6-0.5)/10	=55	48
7	100 (7-0.5)/10	=65	42
8	100 (8-0.5)/10	=75	36
9	100 (9-0.5)/10	=85	29
10	100 (10-0.5)/10	=95	18

RESULTS AND DISCUSSION

Socio-economic profile of the sample farmers

Table 2 shows the sample means of socio-economic variables of redgram, sole cropping system (CS-1), Redgram+bajra cropping system (CS-2), redgram+greengram cropping system (CS-3), redgram+castor cropping system (CS-4) and redgram+sorghum (fodder) cropping system (CS-5). Among the five cropping systems, the mean income from redgram+greengram cropping system (CS-3) was higher than all cropping systems followed by redgram+castor cropping system (CS-4). The mean family size of the household head found to be highest in redgram sole cropping system. Redgram+castor cropping system (CS-4) farmers group had higher average education levels than other cropping systems where as redgram sole cropping system (CS-1) farmers

Table 2. Mean levels of socio economic fators of Redgram and Redgram based cropping systems

S.No	Variable	CS 1	CS 2	CS 3	CS 4	CS5	Overall mean
		(n=60)	(n=30)	(n=10)	(n=10)	(n=10)	(n=120)
1	Farm income (Rs/ha)	57400	54800	62860	58058	52673	57158
2	Farm size (ha)	5.89	4.89	3.36	4.80	3.72	5.11
3	Age (years)	44.36	46.63	47.30	40.80	47.10	45.00
4	Family size (no)	5.10	4.46	5.00	4.60	3.80	4.50
5	Education(years)	3.23	4.48	5.20	5.40	3.40	3.00
6	Farming experience	18.56	22.20	40.80	16.90	21.90	19.80

Table 3. Farm asset position of the sample farmers (n=120)

S.No.	Particulars	Average value		% to total
1	Agricultural land	9,49,955	-115	58.56
2	Farm house	50,142	-7	3.09
3	Cattle shed	86,229	-24	5.31
4	Bullock cart	58,181	-11	3.58
5	Tractor	4,36,333	-15	26.9
6	Electric motor	4,583	-6	0.28
7	Irrigation pipelines	3,000	-1	0.18
8	Cultivators	16,032	-31	0.98
9	Sprayers	9,401	-32	0.57
10	Sickles and others	196	-18	0.01
11	Pump house	8,000	-3	0.49
	Total		16,22,056	100

Note: Figures in parentheses indicate no of farmers.

group had lower average education levels than other cropping systems. Redgram sole cropping systems farmers found to be higher farm size than any other cropping systems.

The redgram+greengram cropping system (CS-3) farmers have highest age and farm experience than other cropping systems farmers, so that this cropping systems group of farmers obtained maximum farm income than other cropping systems. This revealed that age and farming experience had influenced farm income of the farmers.

Farm Assets Position

The asset position (Table 3) of the sample farmers was also studied to understand their financial background. The farm productivity, economic efficiency and the risk bearing ability of the farmers largely depend upon the value of farm assets owned by the farmers.

Regression analysis

Table 4 reports the influence of socio economic factors on farm income of redgram and redgram based cropping systems farmers. Regreesion analysis results for all cropping systems with farm income in rupees per hectare as dependent variable and age, age square, family size, farm size, education, farming experience, farming experience square and cropping system dummy were independent variables. The coefficient of multiple determination (R^2) indicated that selected eight independent variables had jointly explained 34 per cent of variation in the farm income of redgram and redgram based cropping systems. The regression coefficient of age and farm size were positive and significant at 5 per cent and 1 per cent level of significance respectively. It can be interpreted that farm income could be increase by 1.315 and 0.108 per cent respectively due to increase by 1 per cent of the variable concerned, keeping all other variables at their geometric mean level. The

variables like age square and cropping system dummy were negative and significant at 1 per cent level of significance. The other variables like Family size (no), Education (years), Farming experience (years) and Farming experience square (years) were not significant and had not reached the level of influencing farm income.

Table 4. Regression co efficients of Redgram and Redgram based cropping systems

Variables	Estimated coefficient	t-value	p-value
Farm income Y (Rs./ha)			
Age (years) X_1	1.315*	2.36 (0.557)	0.020
Age square X_2	-0.0003**	-2.70 (0.001)	0.008
Family size (no) X_3	0.1090	1.41 (0.08)	-0.160
Farm size (ha) X_4	0.1086**	3.42 (0.0317)	0.001
Education(years) X_5	0.0332	0.51 (0.064)	0.609
Farming experience (years X_6	-0.0723	-0.61 (0.1180)	0.541
Farming experience square X_7	0.0001	0.99 (0.0001)	0.325
Cropping system dummy X_8	-0.3419**	-5.29 (0.064)	0.000
Constant	6.3148**	3.69 (1.7095)	0.000
R^2		0.34	
F(8,111)		7.18	
White test			
(Homoskedasticity)			
Chi^2 (42)		42.58	
Prob > chi^2		0.44	

Note: *significant at 5 % level and **significant at 1 % level.
figures in paranthesis indicates standard error.

From above analysis it can be concluded that only age and farm size were influencing the farm income of redgram and redgram based cropping systems farmers in study area. Sadeghi *et al.* (2001) regressed farm income on socio-economic characteristics of Iranian farmers, and found that area of crop land, fruit land and livestock holding significantly affects income. Phandanouvong (1998) found that the income of Lao Agro forestry farmers was positively related to farm size and farmer education level and age.

Constraints

It is presented in the table 5 that according to Garrett ranking (based on mean score), the constraints in redgram based cropping systems were ranked in the order of inadequate credit, lack of knowledge in intercropping technology, low price of produce, non-availability of quality seeds, high cost of chemical fertilizers, non-availability of farmyard manure, diseases and pests, scarcity of owned funds, price fluctuations and lack of storage facility.

Inadequate credit ranked first (65.23) among constraints faced by the sample farmers. In some of the sample villages, majority of the farmers reported that they did not get crop loans from local financial institutions. The lack of credit makes it difficult. This limits farmers' scale of operations and eventually reduces their income. Lack of knowledge in intercropping technology was the second (58.74) most important constraint in redgram-based cropping systems. Low price of produce ranked third (56.25) among constraints faced by the sample farmers. Non availability of quality and short duration seeds ranked fourth (55.77) by the sample farmers. (Sharma *et al* 2016). High cost of chemical fertilizers and pesticides was the fifth (51.39) most important constraint in redgram-based cropping systems. Some of the farmers did not use the required quantities of chemical fertilizer due to its high cost supplemented the little they could afford with organic manures. Non- availability of farmyard manure ranked sixth (46.49) most important constraint in redgram-based cropping systems.

Disease and pest attack was the seventh most important constraint (45.17), birds and pigs damage is identified particularly in bajra crop, resulting in more yield loss in redgram+bajra cropping system. It is estimated that, worldwide, up to 30 per cent of total agricultural production is lost due to animal pests, weeds and diseases each year (Kiss and Meerman, 1991). This may be connected with the use of local seed varieties that are susceptible to disease and pest attack and poor farm cultural practices by farmers. Scarcity of owned funds ranked eighth (43.57) among the constraints limiting in redgram and redgram based cropping systems. Fluctuations in market prices for crops were the ninth most important constraint (40.77) faced by the farmers. This happens during the season when there is a glut in the market. Poor storage facilities ranked tenth (37.57) among the constraints faced by the farmers. Lack of adequate and efficient storage facilities predisposes excess crop leading to deterioration and wastage (Ohiagu, 1986). The farmers are, therefore, forced to sell their produce immediately after harvest when prices are low.

Table 5. Constraints in the Redgram based cropping system in the study area

S. No.	Constraints	Rank										Total no. of respondents	Total score	Mean Score	Rank
		1	2	3	4	5	6	7	8	9	10				
1	Inadequate credit	50	9	10	16	18	2	3	8	2	2	120	7828	65.23	I
2	Lack of knowledge in intercropping technology	10	20	26	34	6	10	5	0	5	4	120	7049	58.74	II
3	Low price of produce	8	45	3	12	12	11	9	7	4	9	120	6751	56.25	III
4	Non-availability of quality seeds	12	6	37	9	3	30	11	9	0	3	120	6693	55.77	IV
5	High cost of chemical fertilizers	15	13	17	10	7	5	16	18	10	9	120	6167	51.39	V
6	Non- availability of farmyard manure	8	12	11	7	24	6	5	12	16	19	120	5579	46.49	VI
7	Diseases and pests	8	15	5	9	10	13	6	10	30	14	120	5421	45.17	VII
8	Scarcity of owned fund	10	13	12	1	8	11	6	17	11	31	120	5229	43.57	VIII
9	Price fluctuations	2	0	3	10	17	5	43	5	20	15	120	4893	40.77	IX
10	Lack of storage facility	2	5	0	10	6	9	19	27	23	13	120	4509	37.57	X

Note: For constraint analysis the total score is calculated by multiplying the number of respondents ranking that factor as 1,2,3,.. and 10 by their respective table values given in Table 5.18. Mean score is calculated by dividing the total score by the number of respondents.

CONCLUSION

From regression analysis, it can be concluded that only age and farm size were influencing the farm income of redgram and redgram based cropping systems farmers in the study area. The other variables like Family size (no), Education (years), Farming experience (years) and Farming experience square (years) were not significant and had not reached the level of influencing farm income. Hence, there is a need to increase their farm size for obtaining more farm income from these cropping systems. The Garrett ranking analysis revealed that inadequate credit, lack of knowledge of intercropping technology, low price of produce, non-availability of quality seeds, high cost of chemical fertilizers, non-availability of farmyard manure, diseases and pests, scarcity of owned funds, price fluctuations and lack of storage facilities were the major constraints faced by the farmers in study area. These constraints can be controlled by institutional support for provision of credit that help in timely procurement of farm inputs, provision of fertilizers at affordable prices at right time to the farmers, adoption of cultivars resistant to diseases and pests as well as tolerance to adverse environmental conditions, adequate and efficient storage facilities to save the excess produce from deterioration and wastage and ensure steady availability and stable market price.

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