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Correlation and regression analysis in IPM practices of rice-based cropping system

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Abstract
Rice-based cropping system can be described as mix of farming practices that comprises of rice as the major crop followed by subsequent cultivation of other crops. Intercropping of rice and other compatible crops is also widely practiced in many regions. The study was conducted during the year 2017-19 in two irrigated districts namely Janjgir-Champa and Dhamtari and two rainfed districts namely Korba and Mahasamund in Chhattisgarh Plains. Form the each of the selected districts two representative blocks namely Kurud and Dhamtari from Dhamtari district and Janjgir and Champa form Janjgir-Champa district were selected purposively. Similarly, two blocks Pali and Katghora from Korba district and Mahasamund and Bagbhra from Mahasamund district were selected. From each selected block two representative villages were selected randomly. Therefore 8 irrigated and 8 rainfed villages were considered for the study. Total 16 villages were selected. From each selected village 20 representative farmers were selected randomly. In this way a total of 160 (20X8) farmers from irrigated and 160 (20X8) farmers from rainfed area were selected. Thus total 320 farmers were considered as respondents for the present study. As regards to correlation analysis of non-irrigated respondents, revealed that out of the fourteen variables under the study only, four variables namely credit availability, economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive relationship with adoption of insect-pest management practices of respondents at 0.01 percent level of significance. Regarding multiple regression analysis, the data revealed that out of the fourteen variables, only three variables namely economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive contribution towards adoption of Insect-pest management practices at 0.01 percent level of significance.

Keywords: Correlation, regression, rice, insect-pest, economic motivation

1. Introduction
Rice-based cropping system can be described as mix of farming practices that comprises of rice as the major crop followed by subsequent cultivation of other crops. Intercropping of rice and other compatible crops is also widely practiced in many regions. Rice-based cropping system is a major cropping system practiced in India, which include the rotation of crops involving cereals, pulses, oilseeds, cotton, sugarcane, green manures, vegetable, etc. Depending upon the system of farming, food habits and climatic conditions, crops under rice based cropping system is differ and are grown in the region. In Chhattisgarh, rice is grown in a range of agro ecological zones like uplands, hilly areas, wet lands and plains. Various rice based cropping patterns can be seen in different agro ecological zones in the state. The major rice-based farming systems observed in these areas are: Rice-rice, Rice-pulses, Rice-millets, and Rice-oilseeds etc. Rice is grown on all the continents of the world, except Antarctica. As a global food, it has a large influence on human nutrition and food security all over the world. It is the staple food for over half of the world's population. In Asia alone, more than 2 billion people obtain 60 to 70 percent of their caloric intake from rice and its derived products. Rice is the most rapidly growing food source in Africa. Rice is grown in the tropic, sub-tropic, temperate, and sub-temperate zones in India, and on plains, basins, hilly regions, and plateaus.

2. Methodology
The study was conducted during the year 2017-19 in two irrigated districts namely Janjgir-Champa and Dhamtari and two rainfed districts namely Korba and Mahasamund in Chhattisgarh Plains. Form the each of the selected districts two representative blocks namely Kurud and Dhamtari from Dhamtari district and Janjgir and Champa form Janjgir-Champa

district were selected purposively. Similarly, two blocks Pali and Katghora from Korba district and Mahasamund and Bagbhra from Mahasamund district were selected. From each selected block two representative villages were selected randomly. Therefore 8 irrigated and 8 rainfed villages were considered for the study. Total 16 villages were selected. From each selected village 20 representative farmers were selected randomly. In this way a total of 160 (20X8) farmers from irrigated and 160 (20X8) farmers from rainfed area were selected. Thus total 320 farmers were considered as respondents for the present study. The data were collected by a personal interview with the help of a pre-tested structured interview schedule.

3. Results and Discussion

Correlation analysis

Table 1: Correlation analysis of independent variables with the adoption of Insect-pest management practices by the respondents

Sl. No.	Independent variables	Coefficient of correlation "r" value	
		Irrigated	Non-irrigated
01.	Education	0.253**	0.182*
02.	Size of Family	0.032	0.141
03.	Caste	-0.115	-0.106
04.	Social participation	0.156*	0.143
05.	Occupation	0.084	0.084
06.	Annual income	0.042	0.192*
07.	Land Holding	0.281**	0.172*
08.	Credit availability	0.158*	0.218**
09.	Sources of information	0.159*	0.166*
10.	Exposure to mass media	0.172*	0.185*
11.	Scientific orientation	0.271**	0.213*
12.	Economic motivation	0.495**	0.389**
13.	Attitude towards insect-pest management practices in major Crops	0.312**	0.410**
14.	Knowledge about insect-pest management practices in major crops	0.251**	0.287**

** Significant at 0.01 level of probability, * Significant at 0.05 level of probability

The Table 1 expressed correlation analysis of independent variables with adoption of insect-pest management practices of the sampled respondents that revealed that out of the fourteen variables under the study, only six variables namely education, land holding, scientific orientation, economic motivation, attitude towards insect-pest management practices and knowledge about insect-pest management practices in major crops had highly significant and positive relationship with adoption behavior of respondents at 0.01 percent level of significance. Four variables namely social participation, credit availability, source of information and exposure to mass media had significant and positive relationship with respondents‟ behavior of at 0.05 percent level of significance. The remaining 4 variables *viz.* size of family caste, occupation and annual income had non-significant relationship with adoption of insect-pest management practices of the respondents.

Similarly in case of rainfed interviewed respondents, the correlation analysis of independent variables with adoption of insect-pest management practices of respondents revealed that out of the fourteen variables under the study only, four variables namely credit availability, economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive relationship with adoption of insect-pest management practices of respondents at 0.01 percent level of significance.

Six variables namely education, annual income, land holding, sources of information, exposure to mass media and scientific orientation had significant and positive related with adoption of insect-pest management practices of respondents at 0.05 percent level of significance. The remaining 4 variables *viz.* size of family, caste, social participation and occupation had non-significant relationship with adoption of insect-pest management practices of respondents.

The positively significant relationship shows that when the level of variables *i.e.* education, social participation, annual income land holding, credit availability, sources of information, exposure to mass media, scientific orientation, economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops increases, the adoption of insect-pest management practices of respondents will also increase.

Multiple regression analysis

Multiple regression analysis was carried out for determining the contribution of independent variables towards adoption of Insect-pest management practices by the respondents and the data, thus obtained, have been furnished in the Table 2. It reveals that out of the fourteen variables under the study, only four variables namely land holding, economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive contribution towards adoption of Insect-pest management practices of the respondents at 0.01percent level of significance. six variables namely education, social participation, credit availability, sources of information, exposure to mass media, and scientific orientation had significant and positive contribution towards adoption of Insect-pest management practices of the respondents at 0.05 percent level of significance.

Table 2: Multiple regression analysis of independent variables with the adoption of Insect-pest management practices by the respondents

Sl. No.	Independent variables	Regression Coefficient "b" value	
		Irrigated	Non-irrigated
01.	Education	0.065*	0.102
02.	Size of Family	0.057	0.124
03.	Caste	0.095	0.205
04.	Social participation	0.131*	0.911
05.	Occupation	2.489	0.126
06.	Annual income	0.078	0.188
07.	Land Holding	0.547**	0.055
08.	Credit availability	0.346*	0.211*
09.	Sources of information	0.042*	0.192*
10.	Exposure to mass media	0.021*	0.089*
11.	Scientific orientation	0.600*	0.336*
12.	Economic motivation	0.218**	0.439**
13.	Attitude towards insect-pest management practices in major crops	0.439**	0.147**
14.	Knowledge about insect-pest management practices in major crops	0.226**	0.341**
		$R^2 = 0.631$	$R^2 = 0.619$

** Significant at 0.01 level of probability, * Significant at 0.05 level of probability

The remaining four variables *viz.* size of family, caste, occupation and annual income had non-significant contribution towards adoption of Insect-pest management practices of the respondents As evident from the significant „t" value of the variables, we can infer that if there is one unit increase in education, social participation, land holding, credit availability, sources of information, exposure to mass media, scientific orientation, economic motivation, attitude towards insect- pest management practices in major crops and knowledge about insect-pest management practices in major crops there would be 0.065, 0.131, 0.547, 0.346, 0.042, 0.021, 0.600, 0.218, 0.439 and 0.226 unit increase, respectively in adoption of Insect-pest management practices of the respondents. The R^2value of 0.631 indicates that all the fourteen independent variables jointly contributed towards adoption of Insect-pest management practices of the respondents to the extent of 63.10 percent.

Regarding non-irrigated respondents, the data reveal that out of the fourteen variables under the study, only three variables namely economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive contribution towards adoption of Insect-pest management practices of the respondents at 0.01 percent level of significance. Four variables namely credit availability, sources of information, exposure to mass media, and scientific orientation had significant and positive contribution towards adoption of Insect- pest management practices of the respondents at 0.05 percent level of significance.

The remaining seven variables *viz.* education, size of family, caste, social participation, occupation, annual income and land holding had non-significant contribution towards adoption of Insect-pest management practices of the respondents.

As evident from the significant "t" value of the variables, we can infer that if there is one unit increase in credit availability, sources of information, exposure to mass media, scientific orientation, economic motivation, attitude towards insect- pest management practices in major crops and knowledge about insect-pest management practices in major crops there would be 0.211, 0.192, 0.089, 0.336, 0.439, 0.147 and 0.331 unit increase, respectively in adoption of Insect-pest management practices of the respondents. The R^2 value of 0.619 indicates that all the fourteen independent variables jointly contributed towards adoption of Insect- pest management practices of the respondents to the extent of 61.90 percent.

4. Conclusion

As regards to correlation analysis of non-irrigated respondents, revealed that out of the fourteen variables under the study only, four variables namely credit availability, economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive relationship with adoption of insect-pest management practices of respondents at 0.01 percent level of significance. six variables namely education, annual income, land holding, sources of information, exposure to mass media and scientific orientation had significant and positive relation with adoption of insect-pest management practices of at 0.05 Percent level of significance.

Regarding multiple regression analysis, the data revealed that out of the fourteen variables, only three variables namely economic motivation, attitude towards insect-pest management practices in major crops and knowledge about insect-pest management practices in major crops had highly significant and positive contribution towards adoption of Insect-pest management practices at 0.01 percent level of significance. Four variables namely credit availability, sources of information, exposure to mass media, and scientific orientation had significant and positive contribution towards adoption of Insect-pest management practices at 0.05 Percent level of significance.

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