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Assessing the adoption of eco-friendly management practices and its association with socio-economic factors among vegetable growers in Madhya Pradesh

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Abstract

Vegetables have become an essential part of the daily diet due to their nutritional value. This study was conducted in the Satna district of Madhya Pradesh, covering three blocks and twelve villages. A total of 240 vegetable-growing farmers were selected for the study. Majority of respondents, 58.75%, had a medium level of adoption about vegetable cultivation, followed by 25.42% with a low level of adoption and 15.83% of the respondents had a high level of adoption towards vegetable cultivation. The adoption of various crop management practices was ranked based on their mean scores. Among these, cultural pest management practices received the highest mean score of 5.67, followed by weed management practices with a score of 4.46. Natural farming practices received a mean score of 1.13, indicating that they are either less emphasized or perceived as less effective. The variables such as education, size of land holding, annual family income, extension participation, mass media exposure, social participation, institutional participation, scientific orientation and risk orientation are significantly associated with the adoption level of eco-friendly management practices.

Keywords: Adoption, association, vegetable growers, management, eco-friendly practices

Introduction

Madhya Pradesh has a total population of 7.25 crore which constitutes about 6 per cent of total population of India, according to the latest 2011 census. It is definitely true that India had witnessed a tremendous growth in agricultural production in the era of green revolution. Food grain production, which stood at the time of India's independence, the country produced approximately 50 million tonnes of agricultural products. This figure had increased nearly sixfold, reaching 295.67 million tonnes by the end of the 2019-20 fiscal year (Press Information Bureau, GOI, 2020). This remarkable growth occurred across a cultivated area of 162.82 million hectares (Agriculture Census, 2020-21). The rapid spread of modern agricultural technologies and the green revolution have had a negative impact on the ecosystem. The uncontrolled application of pesticides and herbicides has had a detrimental impact on human health. The world is currently dealing with a severe cancer problem. Studies carried out in farming communities across the globe have revealed that individuals exposed to specific pesticides may be at an increased risk of developing cancer. Cotton had the highest rate of pesticide use, followed by vegetables. Because these are very succulent, short-lived crops, there is also a higher use of pesticides.

Vegetables are an important part of the human diet due to their nutritional value. Eco-friendly farming practices, such as crop rotation with legumes, soil improvement methods, and organic matter application, help maintain soil health.

However, research on eco-friendly practices among vegetable farmers, especially regarding environmental hazards and sustainable management, is limited. Vegetable farming is a key activity in India, which is the second-largest vegetable producer in the world, after China. India produces around 204.83 million tonnes annually from 11.34 million hectares, (Agricultural Statistics at a Glance 2022)^[13]. Uttar Pradesh, West Bengal, and Madhya Pradesh are the top vegetable-producing states. In the study area, 922.25 thousand hectares are used for vegetable cultivation, yielding 184.26 lakh tonnes, with a productivity rate of 19.98 tonnes per hectare. (Madhya Pradesh horticulture department statistics 2019)^[12].

Eco-friendly farming focuses on cultivating land in a way that keeps soil healthy, maintains ecological balance, and minimizes pollution to air, water, and soil. Unlike modern farming, which heavily relies on chemicals, eco-friendly practices use biological inputs and reduce chemical use. The goal is to maintain sustainable agricultural production. This can be achieved by combining organic manures and biofertilizers with chemical fertilizers to improve crop yield and soil health. Integrated Pest Management (IPM) is also used to control pests, not eliminate them, through practices like using resistant crop varieties, neem oil, light traps, and traditional methods. These techniques help control pests, protect biodiversity, and reduce environmental harm.

Few research studies have focused on exploring farmers' knowledge of eco-friendly management practices and the

extent to which these practices are adopted. To fill this gap, a study was conducted with the following objectives: 1. To assess the level of adoption of eco-friendly management practices among vegetable-growing farmers. 2. To examine the relationship between socio-economic factors and the adoption level of these practices.

Materials and Methods

The present study was conducted in the Maiher, Sohawal, and Amarpatan blocks of Satna district, Madhya Pradesh. Four villages were purposively selected from each of the chosen blocks, resulting in a total of twelve villages for the study. A list of farmers who had cultivated vegetable crops for three or more consecutive years was prepared with the assistance of the Rural Horticulture Extension officers and Agriculture Extension officers. Respondents were selected using a simple random sampling method, with 20 farmers chosen from each village, resulting in a total sample size of 240. A structured interview schedule was developed to collect data through personal interviews. Based on the initial responses and insights gained, necessary modifications were made to the final draft. Data was gathered using a personal interview technique from randomly selected farmers in the chosen districts. Respondents were approached at their homes, community spaces, or farms. To assess the extent of adoption of eco-friendly practices, a schedule with 35 practices in vegetable cultivation was prepared, based on an extensive literature review and consultations with vegetable experts. Adoption was measured on a three-point scale: full adoption (2), partial adoption (1), and no adoption (0). The total score for each respondent was calculated by summing the scores across all items, with possible scores ranging from 0 to 70. Based on these scores, farmers were categorized into low, medium, and high adoption groups using mean and standard deviation. Data analysis was conducted using percentage, mean, standard deviation, mean score, and Chi-square tests to draw conclusions.

Results and Discussion

A general overview of the respondents was provided based on their level of adoption of eco-friendly management practices. This refers to the information about the eco-friendly practices adopted by the farmers. The farmers were categorized according to the adoption scores they obtained.

Table 1: Frequency distribution of farmers based on their adoption of eco-friendly management practices.

Sl. No.	Category	Frequency	Percent
1.	Low (up to 12)	61	25.42
2.	Medium (13 to 22)	141	58.75
3.	High (above 22)	38	15.83
	Total	240	100.00
	Mean	16.96	
	Standard deviation	4.95	

Table-1 and Fig.1 indicated that the out of 240 respondent’s majority of respondents, 58.75%, had a medium level of adoption about vegetable cultivation, followed by 25.42% with a low level of adoption and 15.83% of the respondents had a high level of adoption towards vegetable cultivation. Thus, it may be concluded that the majority of (84.17%) vegetable growers lie at the medium to low adoption level. This result matches up with the results of Rai *et al.* (2020)^[2], Suji and Kumar (2020)^[10] and Singh *et al.* (2023)^[9].

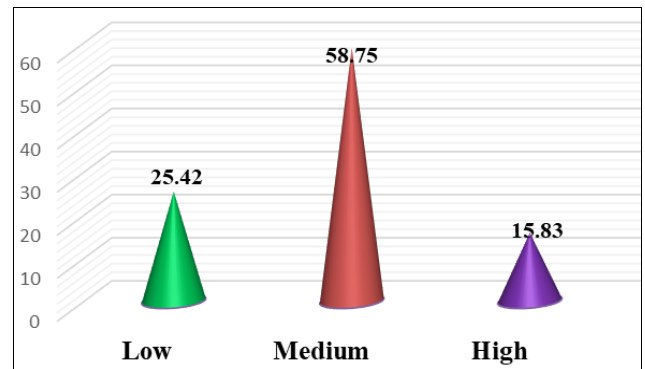


Fig 1: Distribution of respondents on the basis of their adoption level:

Adoption of co-friendly management practices followed by vegetable growing farmers

Table 2: Rank-wise distribution of vegetable growers based on their adoption level of Eco-friendly management practices in vegetable cultivation.

S. no.	Components	Mean score	Rank
1.	Cultural pest management practices	5.67	I
2.	Mechanical Pest Management Practices	1.23	VI
3.	Biological Pest Control	1.38	IV
4.	Weed Management Practices	4.46	II
5.	Application of organic manure	1.78	III
6.	Natural Farming	1.13	VII
7.	Use of bio-fertilizers/ Bio-agents	1.32	V
	Overall mean	2.42	

Table-2 and fig- 2 indicated that the ranked adoption of various crop management practices based on their mean scores. Cultural pest management practices obtained the highest score of 5.67 from growers, suggesting a strong preference or effectiveness. Weed Management Practices came in second with a score of 4.46, demonstrating its importance as well. Application of organic manure and Biological Pest Control were placed third and fourth, with scores of 1.78 and 1.38, respectively, indicating modest relevance. Lower-ranked practices such as Use of bio-fertilizers/bio-agents, Mechanical pest management practices, and Natural farming received mean scores of 1.32, 1.23, and 1.13, respectively, indicating that they are given less emphasis or are perceived as less effective than higher-ranked practices.

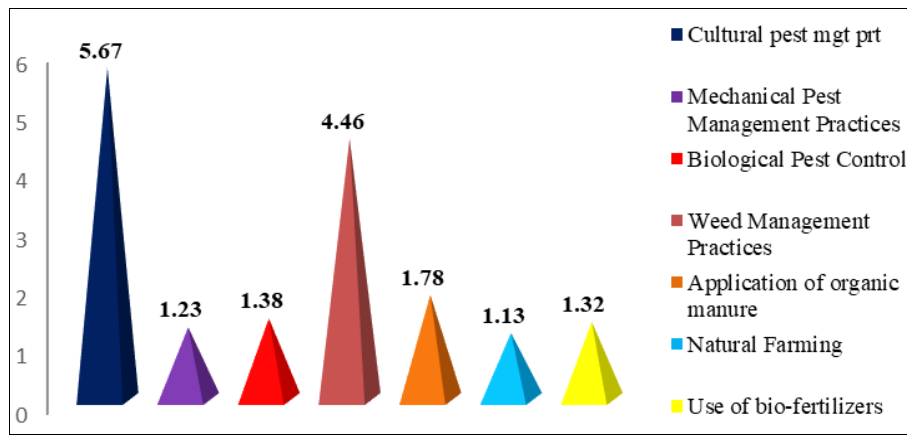


Fig 2: Rank-wise distribution of adoption levels among vegetable growers based on their mean scores.

Association between socio-economic variables and the adoption level of vegetable growers towards eco-friendly management practices

To explore the relationship between independent variables and adoption towards eco-friendly management practices among the respondent’s chi-square method was applied and the values of chi-square were estimated. The observed relationship is discussed with respect to age, education,

farming experiences, family size, type of family, occupation, size of land holding, annual family income, irrigation potential, farm power, extension participation, mass media exposure, social participation, institution participation, scientific orientation, achievement motivation, innovativeness, risk orientation and adoption of the vegetable growers.

Table 4: Association between socio-economic factors and adoption level of vegetable growers towards eco-friendly management practices

S. No.	Independent Variables	Pearson Chi-Square			
		Calculated Value	Degree of freedom	P-Value	Nature of association
1.	Age	6.116	4	0.190	Non-significant
2.	Education	20.82	6	0.001	Significant
3.	Farming experiences	5.590	4	0.231	Non-significant
4.	Family size	1.125	4	0.897	Non-Significant
5.	Type of family	1.018	2	0.601	Non-Significant
6.	Occupation	8.423	4	0.077	Non-Significant
7.	Size of Land holding	16.44	6	0.011	Significant
8.	Annual Family Income	10.534	4	0.032	Significant
9.	Irrigation potential	2.114	2	0.347	Non-Significant
10.	Farm power	5.408	4	0.247	Non-Significant
11.	Extension participation	9.847	4	0.043	Significant
12.	Mass media exposure	15.822	4	0.003	Significant
13.	Social participation	8.529	2	0.014	Significant
14.	Institutional participation	20.701	4	0.000	Significant
15.	Scientific orientation	14.55	4	0.005	Significant
16.	Achievement Motivation	4.04	4	0.401	Non-significant
17.	Innovativeness	3.042	4	0.550	Non-significant
18.	Risk orientation	16.540	4	0.002	Significant

(all result is significant at 0.05 level of significance)

Table-4 showed the relationship between the attributes of vegetable growers and their adoption level of eco-friendly management practices in vegetable cultivation. The results indicate that variables such as education, size of land holding, annual family income, extension participation, mass media exposure, social participation, institutional participation, scientific orientation and risk orientation are significantly associated with the knowledge level of eco-friendly management practices. These relationships were significant at 5 per cent level of significant. However, age, farming experiences, family size, type of family, occupation, irrigation potential, farm power, achievement motivation and Innovativeness do not show significant association with their adoption level. This result is consistent with the work done by Bhanu *et al.* (2019) [1],

Rajshree *et al.* (2019) [7], Upadhyay *et al.* (2019) [11], Suji and Kumar (2020) [10], Konsam and Sakthivel (2020) [4], Karthiga (2021) [3] and Singh *et al.* (2023).) [9],

Conclusion

Vegetables have become a crucial component of the daily human diet due to their high nutritional value. Eco-friendly agricultural practices typically include crop rotation with legumes, tillage methods to improve soil texture, and the application of organic matter to maintain soil health. The study explored the adoption of eco-friendly agricultural practices among vegetable farmers, revealing that most respondents (58.75%) had a moderate level of adoption. Cultural pest management practices ranked highest in adoption (5.67), while practices like deep ploughing in

summer and weed control showed varying degrees of adoption. For example, deep ploughing was fully adopted by 23.75%, and keeping field bunds free from weeds was fully adopted by 18.75%. However, some practices, such as uprooting alternate host plants and using biological controls like *Phosphobacter*, had very low adoption rates. The study found significant associations between adoption levels and factors like education, landholding size, income, and participation in extension activities.

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