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A critical comprehension of eco-friendly management practices of vegetables growing tribal farmers of Madhya Pradesh

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Abstract

The vegetables cultivation is very popular in farming community as well as tribal farmers for sustainable livelihood. Vegetables fulfill the requirement of essential nutrients in daily human diet. The current investigation was carried out in four tribal district of Madhya Pradesh. Total sixteen villages were selected for the study. There was proportional to total size of the respondents in selected villages fell under each of the four blocks. In all, 240 tribal farmers were selected to serve as the respondents for the study. Mainstream of the farmers were in medium category regarding knowledge about management of eco-friendly practices. The practices like deep summer season ploughing, observation of pest, application of farmyard manure/green manure/ vermicompost and method of application were well known to all the farmers. Whereas, mainstream of the farmers know about crop rotation with vegetable crop, seed treatment with chemicals, hand pecking of larvae, application of suggested dose of fertilizers and time of application. The practice of components which are technical skill orientated are less know to farmers namely pheromone traps, light traps, biological pest control measures, which consists of preservation/conservation and encouraging predators and parasitic wasps, use of NPV and its concentration and introduction of bio-control agents. Age and family size were found no significant association with knowledge about eco friendly management practices. High cost of improved varieties and new technologies and lack of awareness about eco-friendly management practices were reported major constraints.

Keywords: Eco-friendly, management, tribal farmers, parasitic wasps and bio-control agents

Introduction

The total number of persons in M.P is 7.25 crore which constitutes about 6% of total population of India. The total tribal population is 1.53 crore which comprises 21.1% of the total population. The tribal population is highest in Alirajpur (88.98%) district of M.P followed by Jhabua (86.8%), Barwani (67%) and in Dhar (55.94%). Their population in rural area is more than urban area (89.97%) and urban area (10.03%). The increment rate of the tribal population from the year 2001 to 2011 is 23.66% and 17.69% in tribal population and complete population respectively. The sex ratio for the population is 940 where as in Scheduled Tribes this ratio is 990 (Census 2011). The report states that nearly 75 per cent of the population of the state resides within the rural areas and their main profession is agriculture and allied. The quality of living, culture and customs of tribes mostly appear as the Hindu religion. The Western Zone of MP which includes Alirajpur, Jhabua, Dhar, Kargone and Barwani district, is the land of the Bhils who are the second most imperative tribe of the M.P. Bhilala is another tribal category which occupies highest place within the social hierarchy among the tribes in this zone.

The diversity in the tribes across the state comes from variations in heredity, lifestyle, cultural behavior, spiritual beliefs, societal structure, fiscal structure and language and speech. Due to the diverse linguistic, cultural and geographical environments, the different tribal world of Madhya Pradesh has been largely cut off from the conventional growth.

Eco-Friendly Practices (EFPs) can be meant as a set of farming practices aimed at mitigating critical environmental issues connected to intensive agriculture or at increasing the provision of agricultural ecosystem services. These practices can be directed towards different resources of the farming environment, like soil, water, landscape, habitat, and biodiversity. In recent decades, specific EFPs have been proposed as a tool for reducing diffuse soil and water pollution, contrasting landscape simplification and loss of habitats and improving ecological quality.

Now a day's vegetables cultivation is the most significant enterprise in all parts of India and it's grown since long time but presently it's become a very important enterprise at national and

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international level even at tribal belts. The vegetable now become a vital requirement of the daily human diet, attributable to its nutritional value.

The eco friendly practice in agriculture which is normally practiced are crop rotations with legumes, tillage practices to recover soil texture, application of organic matter to sustain and maintain soil health but very limited research was carried out in this aspect. There have been hardly any research studies, which have attempted to explore the knowledge of tribal farmers about the environmental hazards and eco-friendly management practices and the status of eco-friendly practices followed by farmers. with the following objectives- 1. To study the level of knowledge about eco friendly management practices of tribal farmers. 2. To explore the relationship between personal and socio-economic traits of the vegetable growing tribal farmers with their knowledge about eco friendly management practices. 3. To find out the hindrances within the proper adoption of eco-friendly management.

Material and Methods

The present study was carried out in four selected blocks of four districts i.e. Jhabua from Jhabua district, Manawar from Dhar district, Jobat from Alirajpur districts and Rajpur from Badwani districts of MP, respectively and four villages from each of the selected blocks were selected randomly. Thus, in total sixteen villages were selected for the study. A proportionate random sampling process was adopted for the selection of tribal farmers for cultivating vegetable crops. A list of tribal farmers, those who had cultivated vegetable crops for three or more than three years successively, was prepared. A special interview schedule was designed for collecting the data through interview schedule. The entire schedule was pre-tested in the field with 20 non-sampled respondents were classified to remove irrelevant items which were included in the interview schedule. Based on responses received and experience gained, the necessary modifications were incorporated in the final draft. The data were composed by personal interview technique from randomly selected tribal farmers of the selected districts. The respondents were contacted at their home, community places or their farms.

Results and Discussion

A general and concise sketch of respondents on the root of their level of knowledge about eco-friendly management practices.

It refers to information about eco friendly practices known to respondents. The farmers were categorized on the root of their obtained score of knowledge.

Table 1: Frequency allocation of farmers according to the knowledge about eco-friendly management practices

S. No.	Categories	Respondents (n=240)	
		Frequency	Percentage
1.	Low	62	25.83
2.	Medium	126	52.50
3.	High	52	21.67
Total		240	100.00
Mean		1.31	
SD		0.81	

The statistics in Table 1 and Fig. 1 show that out of the total 240 respondents, the higher percentage 52.50 percent respondents were in the medium knowledge about eco-friendly management practices followed by 25.83 percent

respondents had low knowledge about management of eco-friendly practices and only 21.67 percent were in high knowledge about eco-friendly management practices.

The sample means score of knowledge about management of eco-friendly practices of the respondents was found 1.31. Standard deviation 0.81 was calculated of the quantity of disparity or distribution of a set of ethics of vegetable growing tribal farmers. -

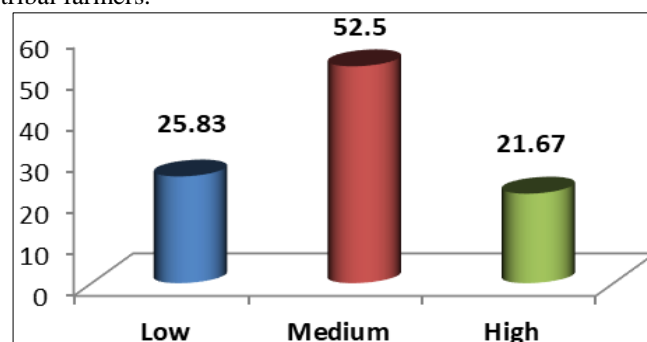


Fig 1: Show that out of the total 240 respondents, the higher percentage

Thus, it can be completed that mainstream of the farmers were in medium category regarding knowledge about management of eco-friendly practices. This result reveals in the line of work done by Badodiya, *et al.* (2010) [1]; Gour, *et al.* (2014) [2]; and Maratha & Badodiya (2018) [3].

Knowledge of eco-friendly management practices by vegetable growing tribal farmers

The examination of statistics offered in Table 4.19 indicates that hundred percent of the farmers had knowledge about summer season deep ploughing. A vast mainstream of the vegetable growing respondents possessed the knowledge of crop rotation with vegetable crops (82.50%) and seed treatments with chemicals as a control measure of pest (75.00%). About 69.17 and 64.17 percent of the farmers had knowledge about disease resistance varieties/ hybrids in vegetables and growing pigeon pea/ marigold/ sun hemp as traps and cover crop, respectively. Whereas, 39.17 percent of farmers had knowledge about growing inter crops in vegetables.

Regarding to management of mechanical control, hundred percent of the farmers knew about monitoring of pests and a huge mainstream of the tribal farmers (90.00%) did know about the hand picking of larvae from vegetables. Half of the respondents had knowledge about using of yellow sticky traps/cards followed by 46.67 percent of the respondents had known about uprooting alternate host plants. About 31.67 percent of respondents had knowledge about light traps, while only 10.00 percent of them had known about pheromone trap. In case of management of biological control, 34.17 percent of the vegetable growing respondents know about the utilization of NPV and concentration of spray. Less proportion of the farmers identified about introduction of bio-control agents (6.67%), preservation/conservation and encouraging of predators (8.33%) and conservation of parasitic wasps (5.83%).

More than fifty percent of the farmers possess the knowledge about neem seed kernel extract (59.17%) and frequency of spraying neem seed kernel extract (50.83%), whereas, 47.50 and 44.17 percent of the respondents recognized about concentration of neem seed kernel extract and preparation of neem seed kernel extract, respectively.

The entire cent percent of the farmers had known about application of organic manure like farmyard manure/ green manure/ vermicompost to their field. Further, 48.33 percent farmers know about press mud/seed cake application to vegetables.

With regards to management in use inorganic fertilizers; cent percent of the respondents know about method of application of fertilizers. Whereas, majority of the vegetable growing respondents know that the time of application and recommended dose of fertilizers in vegetables cultivation.

A close assessment of the Table-2 reveals that deep summer season ploughing, observation of pest, application of

farmyard manure/ green manure/ vermicompost and method of application were well known to all the farmers. Whereas, mainstream of the farmers know about crop rotation with vegetable crop, seed treatment with chemicals, hand pecking of larvae, application of suggested dose of fertilizers and time of application. The practice of components which are technical skill orientated are less known to farmers namely pheromone traps, light traps, biological pest control measures, which consists of preservation/conservation and encouraging predators and parasitic wasps, use of NPV and its concentration and introduction of bio-control agents.

Table 2: Knowledge about management of eco-friendly practices by vegetable growing respondents

S.N.	Practices	Knowledge level	
		Freq.	Per cent
1	Management of cultural control		
i	Deep ploughing in summer season	240	100
ii	Cultivation of trap and cover crop	154	64.17
iii	Crop rotation with vegetable crops	198	82.50
iv	Intercropping in vegetables	94	39.17
v	Seed treatment	180	75.00
vi	Disease resistant varieties	166	69.17
2	Management of mechanical control		
i	Hand pecking of larvae	216	90.00
ii	Observation of pest	240	100
iii	Uprooting alternate host plants	112	46.67
iv	Use of pheromone traps	24	10.00
v	Use of light traps	76	31.67
vi	Use of yellow sticky traps/cards	120	50.00
3	Management of biological pest control		
i	Conservation and encouraging of predator	20	8.33
ii	Conservation of parasitic wasps	14	5.83
iii	Use of NPV and concentration of spray	82	34.17
iv	Introduction of bio-control agents	16	6.67
4	Management in use of bio-pesticides		
i	Knowledge about neem oil	34	59.17
ii	Preparation of neem oil	106	44.17
iii	Concentration of neem oil	114	47.50
iv	Rate of recurrence of spraying neem oil	122	50.83
5	Application of organic manures		
i	Farmyard manure/ green manure/ vermicompost	240	100
ii	Press mud/ seed cake	116	48.33
6	Management in use of inorganic fertilizers		
i	Application of recommended dose	204	85.00
ii	Time of application	224	93.33
iii	Method of application	240	100.00

It is rational to derive from the above discussion those practices, which are complex and difficult to remember, are least known to farmers, on the other side of the practices which are simple and are being practices by forefathers are known to most of the farmers. The findings support with the work of Maratha *et al.* (2018) [3] Maratha & Badodiya (2018) [3] and Rajasree *et al.* (2019).

Association between knowledge about management of eco-friendly practices of tribal farmers with their profile

The outcomes of our qualitative meta-analysis aiming at explaining the similar results in terms of geographical context and temporal trends are summarized in Table-3 while the specific references to the reviewed literature are accounted.

Table 3: Association between knowledge about management of eco-friendly practices of tribal farmers with their profile

SN	Characteristics	χ^2	Degree of freedom
1	Age	05.339 ^{NS}	4 DF
2	Education	34.927**	8DF
3	Family size	01.853 ^{NS}	4 DF
4	Social participation	39.108**	4DF
5	Size of land holding	28.076**	6DF
6	Annual income	35.144**	4 DF
7	Economic Motivation	25.936**	4 DF
8	Irrigation availability	34.839**	4 DF
9	Material Possession	26.157**	4 DF

10	Source of information	22.486**	4 DF
11	Extension Contact	21.812**	4 DF
12	Innovativeness	23.294**	4 DF
13	Cosmopolitaness	25.695**	4 DF
14	Scientific orientation	35.364**	4 DF
15	Market Orientation	28.807**	4 DF
16	Attitude towards vegetable cultivation	20.465**	4 DF

The trends we found are common to all the EFPs analyzed, with very few exceptions. The adopted methodological framework disregards a set of value-chain-related factors which may affect farmers' choices on adoption of some EFPs when consumers are willing to pay a price premium for agri-food products produced by farmers adopting, for example, organic or low-input farming practices.

Age and family size were found no significant association with knowledge about eco friendly management practices. Education, social participation, size of land holding, annual income, economic motivation, irrigation availability, material possession, source of information, extension contact, innovativeness, cosmopolitaness, scientific orientation, market orientation and attitude towards vegetable cultivation were found significant association with knowledge about eco friendly management practices. The findings support with the work of Shashidhara and Manjunath (2008); Maratha *et al.* (2018); Gour, *et al.* (2014) ^[2]; Maratha & Badodiya (2018) ^[3] and Rajasree *et al.* (2019) ^[4].

Hindrances in the proper adoption of eco-friendly management practices

The results in Table-4 explain that the vegetable growing

respondents faced several constraints, limitations and restrictions in adopting the eco friendly management practices. High cost of improved varieties and new technologies, thus the respondents were unable to acquire those was major constraints reported by 82.50 percent of the respondents & it's got ranked I. Inadequate marketing tendencies and strategies prevented them from adopting the practices and it's got ranked III (70.83% of respondents). Moreover lack of awareness about eco-friendly management practices got ranked II (79.16% of respondents) along with less financial support and industrial/technical support by the government was experienced by the 64.16 percent of vegetable growing respondents & got ranked IV. Almost half of the respondents (49.50%) reported lack of knowledge about the atmosphere and climate regarding issues with stands on ranked V, less participation of the farmers in to the extension programmes was also a critical constraints reported by the respondents and got ranked VI (42.50% of respondents) and derisory environmental education at the school level at ranked VII (32.91% of respondents) also hindered the adoption of eco friendly management practices by the vegetable growing respondents.

Table 4: Hindrances in the proper adoption and management of eco-friendly practices

S. N.	Constraints faced by vegetable growing respondents	Freq.	%	Rank
1.	High cost of improved varieties and new technologies	198	82.50	I
2.	Inadequate marketing tendencies and strategies	170	70.83	III
3.	Lack of awareness about eco-friendly management practices	190	79.16	II
4.	No subsidy and industrial/technical support provided by the government	154	64.16	IV
5.	Lack of knowledge about the atmosphere and climate regarding issues	119	49.50	V
6.	Less participation of the farmers to the extension programmes	102	42.50	VI
7.	Derisory environmental education at the school level	79	32.91	VII

Conclusion

Fresh vegetables contain many vitamins and minerals that are good for our health therefore its cultivation is popular among farming community. Majority of the farmers were in medium category regarding knowledge about management of eco-friendly practices. The practices like deep summer season ploughing, observation of pest, application of farmyard manure/ green manure/ vermicompost and method of application were well known to all the tribal farmers. Whereas, mainstream of the farmers know about crop rotation with vegetable crop, seed treatment with chemicals, hand pecking of larvae, application of suggested dose of fertilizers and time of application. The practice of components which are technical skill orientated are less know to farmers namely pheromone traps, light traps, biological pest control measures, which consists of preservation/conservation and encouraging predators and parasitic wasps, use of NPV and its concentration and introduction of bio-control agents. High cost of improved varieties and new technologies, thus the respondents were unable to acquire those was major constraints reported by 82.50 percent of the respondents. Moreover, 79.16% of respondents' reported lack of awareness about eco-friendly management practices was also a major constraint.

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