

RELATIONSHIP BETWEEN PROFILE OF FARMERS WITH THEIR ATTITUDE TOWARDS MEXICAN BEETLE

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ABSTRACT

A study was conducted in the Marathwada region of Maharashtra, India, during 2022–23 to evaluate farmers' attitudes toward using the Mexican beetle (*Zygogrammabicolorata*) for biological control of parthenium (*Parthenium hysterophorus*). Most respondents were educated up to the secondary school level, belonged to medium-sized families, and had moderate farming experience. Key characteristics such as economic motivation, scientific orientation, knowledge level, landholding size, annual income, social participation, extension contact, mass media exposure, and risk orientation were predominantly categorized as medium. Farmers generally exhibited favorable attitudes toward the Mexican beetle, with 23.33% expressing highly favorable attitudes and 22.50% showing less favorable attitudes.

Correlation analysis revealed that family size, farming experience, economic motivation, knowledge level, landholding size, annual income, social participation, extension contact, mass media exposure, and risk orientation significantly influenced farmers' attitudes. Moreover, education and scientific orientation exhibited a highly significant positive relationship with their acceptance of the Mexican beetle as a biological control agent.

These findings underscore the critical role of socio-economic and psychological factors in shaping farmers' attitudes toward adopting sustainable agricultural practices. The study emphasizes the need for targeted extension and awareness programs to promote the use of biological control methods like the Mexican beetle, thereby fostering environmentally sustainable approaches in weed management.

KEYWORDS: Mexican beetle; farmers; agriculture; management; attitude

1. INTRODUCTION

Parthenium hysterophorus L., an invasive herbaceous plant of global significance, originates from Mexico, the Americas, Trinidad, and Argentina. This weed is notorious for its adaptability, prolific seed production, drought tolerance, and allelopathic effects through toxic chemical release. Widely distributed across Asia, Africa, Australia, and the Pacific, *P. hysterophorus* ranks among the world's seven worst weeds, being particularly devastating in Australia and India, where it is considered the "worst weed" in the region. Its rapid growth and high reproductive potential enable extensive colonization of new habitats.

In India, *P. hysterophorus* was inadvertently introduced with imported food grains and has since infested approximately 35 million hectares. Its dominance is attributed to factors such as high seed production (up to 300 million pollens per square meter), lack of seed dormancy, adaptability to diverse climates, and its tiny, lightweight seeds. This weed severely impacts agricultural productivity, plant biodiversity, and poses significant health risks to humans and livestock. For livestock, the plant's unpalatable nature, irritating odor, and trichomes contribute to clinical conditions such as dermatitis, alopecia, salivation, and diarrhea. It also reduces fodder availability, further aggravating economic losses.

Efforts to control *P. hysterophorus* include chemical, manual, cultural, and biological methods, though none have proven entirely effective. Chemical control, while effective, is cost-intensive and requires frequent application due to persistent seed viability in the soil. Manual and cultural methods are feasible only in specific contexts. A promising approach is the use of *Zygogrammabicolorata*, a biological control agent introduced in India in 1984. This beetle has shown efficacy in reducing parthenium infestations, with instances of complete plant defoliation reported, such as near Anand Agricultural University in 2003. Integrated biointensive weed management strategies are emerging as the most sustainable approach for addressing this ecological and agricultural threat.

2. Objectives

- To study the profile of farmers.
- To study the relationship between profile of farmers and attitude of farmers towards Mexican beetle for eradication of parthenium.

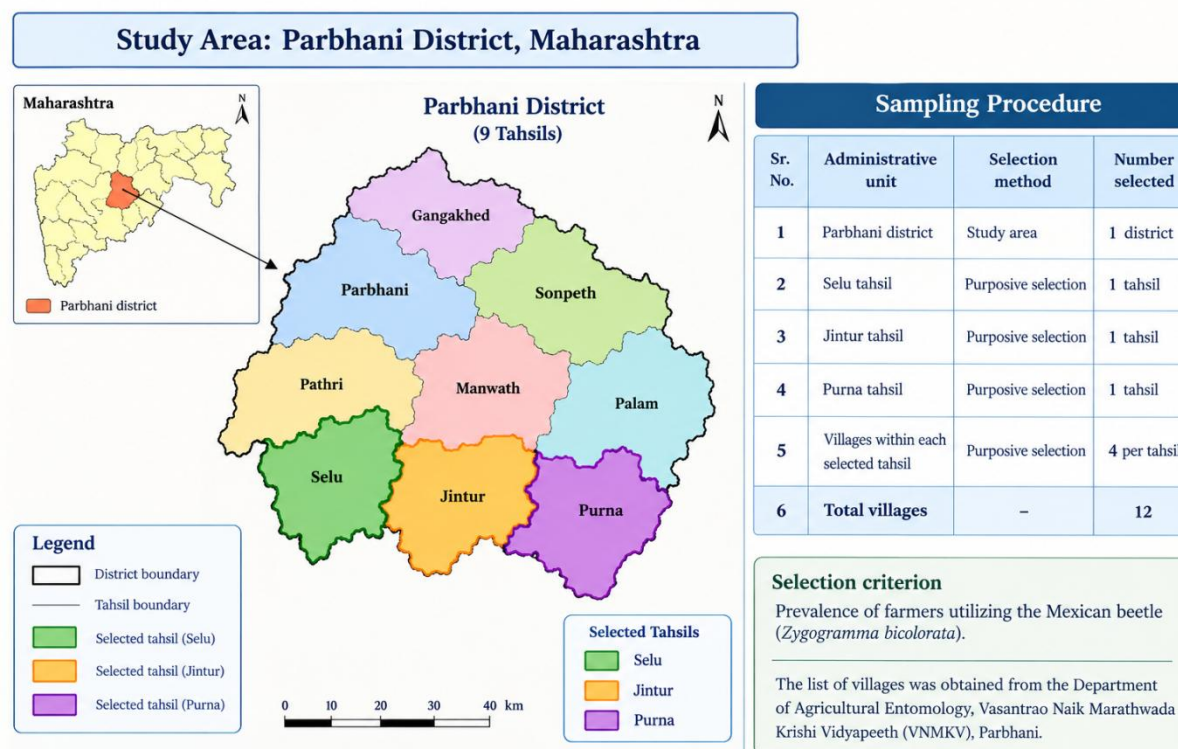
3.METHODOLOGY

The study was conducted in Parbhani district, Maharashtra, which comprises nine tahsils: Parbhani, Gangakhed, Sonpeth, Pathri, Manwath, Palam, Selu, Jintur, and Purna. Among these, three tahsils—Selu, Jintur, and Purna—were purposively selected based on the prevalence of farmers utilizing the Mexican beetle (*Zygogramma bicolorata*). From each selected tahsil, four villages were purposively chosen using similar criteria, with a list obtained from the Department of Agricultural Entomology, VNMKV, Parbhani. Consequently, a total of 12 villages were selected for this study.

An ex-post facto research design was employed. This design is suitable for analyzing the current situation as an effect of previously existing causal factors and involves tracing back over time to identify the underlying causes. The study aimed to understand the influence of various socio-economic and psychological factors on farmers' attitudes toward the use of the Mexican beetle for biological control of Parthenium hysterophorus.

Primary data were collected through personal interviews with respondents using a pretested structured interview schedule. The collected data were systematically tabulated and analyzed using statistical methods including mean, standard deviation, frequency, percentage, and coefficient of correlation. These methods facilitated an in-depth interpretation of the findings and provided insights into the factors influencing farmers' adoption of this biological control practice.

Fig 1.Study Area



4. RESULTS AND DISCUSSION

4.1 Personal and Socio-economic Characteristics of the Respondents

Results and Discussion

The study analyzed various profile characteristics of farmers in the study area, which were treated as independent variables to understand their socio-economic and psychological attributes. The results presented in Table 1 revealed the following:

- **Education:** The majority (27.50%) of respondents had attained education up to the secondary school level.
- **Family size:** Most respondents (63.33%) belonged to medium-sized families.
- **Farming experience:** A significant proportion (71.67%) had medium farming experience.
- **Economic motivation:** Over half (52.50%) of the respondents fell into the medium economic motivation category.
- **Scientific orientation:** Similarly, 52.50% of respondents exhibited medium scientific orientation.
- **Knowledge level:** The majority (60.83%) had a medium level of knowledge.

- **Landholding size:** A considerable proportion (40.83%) were small landholders.
 - **Annual income:** Most respondents (75.00%) belonged to the medium annual income category.
 - **Social participation:** The majority (57.50%) exhibited medium levels of social participation.
 - **Extension contact:** Most respondents (59.17%) reported medium levels of extension contact.
 - **Mass media exposure:** A significant portion (58.33%) had medium levels of mass media exposure.
 - **Risk orientation:** Half (50.00%) of the respondents demonstrated medium levels of risk orientation.
 - **Attitude toward the Mexican beetle:** The majority (54.17%) had a favorable attitude toward the Mexican beetle, while 23.33% exhibited a highly favorable attitude, and 22.50% had a less favorable attitude.
- These findings suggest that the majority of farmers exhibited moderate socio-economic and psychological traits, which likely influenced their adoption and perception of the Mexican beetle as a biological control agent. The predominance of medium-level attributes indicates the need for targeted interventions to enhance farmers' scientific orientation, knowledge, and attitude for better adoption of sustainable agricultural practices.

Table 1: Distribution of respondents according to their personal, socio-economic, psychological and communication characteristics.

Sr. No.	Characteristics	Farmers (n = 120)	
		Frequency	Percentage
1	Education		
	Can't read and write	4	3.33
	Can read and write	10	8.33
	Upto 4th	15	12.50
	5th to 10th	33	27.50
	11th and 12th	31	25.83
	Graduate	27	22.50
2	Family size		
	Small (upto 4)	23	19.17
	Medium (5 - 8)	76	63.33
	Large (9 & above)	21	17.50
3	Farming experience		
	Low (upto 6)	16	13.33
	Medium (7 - 20)	86	71.67
	High (21 & above)	18	15.00
4	Economic motivation		
	Low (upto 20)	33	27.50
	Medium (21 - 24)	63	52.50
	High (25 & above)	24	20.00
5	Scientific orientation		
	Low (upto 19)	28	23.33
	Medium (20-23)	63	52.50
	High (24 & above)	29	24.17
6	Knowledge level		
	Low (upto 4)	21	17.50
	Medium (5 - 7)	73	60.83
	High (8 & above)	26	21.67
7	Land holding		
	Marginal (upto 1.00 ha)	18	15.00
	Small (1.01 ha- 2.00 ha)	49	40.83
	Semi medium (2.01 ha- 4.00 ha)	45	37.50
	Medium (4.01 ha - 10.00 ha)	7	5.83
	Large (10.01 ha & above)	1	0.83
8	Annual income		
	Low (up to 72,931 Rs)	12	10
	Medium (72,932 Rs to 3,10,151 Rs)	90	75
	High (3,10,152 Rs & above)	18	15
9	Social participation		
	Low (upto 2)	28	23.33
	Medium (3 - 4)	69	57.50
	High 5 & above)	23	19.17
10	Extension contact		
	Low (upto 31)	29	24.17

	Medium (32- 43)	71	59.17
	High (44 & above)	20	16.67
11	Mass media exposure		
	Low (upto 5)	26	21.67
	Medium (6- 8)	70	58.33
	High (9 & above)	24	20.00
12	Risk Orientation		
	Low (upto 16)	28	23.33
	Medium (17 - 20)	60	50.00
	High (21 & above)	32	26.67

4.2 Relationship Between Farmers' Profiles and Their Attitudes Towards the Mexican Beetle

4.2.1 Education and Attitude

A positive and highly significant relationship was observed between education and farmers' attitudes toward the Mexican beetle for parthenium eradication. This indicates that as the education level increases, so does the favorability of farmers' attitudes. Higher education likely enhances understanding of the benefits of biological control methods.

These findings are consistent with those of Tripathi (2021).

4.2.2 Family Size and Attitude

Family size exhibited a positive but non-significant relationship with farmers' attitudes. This suggests that family size has minimal influence on shaping attitudes toward the Mexican beetle.

These findings align with Basak and Pandit (2011).

4.2.3 Farming Experience and Attitude

A positive but non-significant relationship was found between farming experience and farmers' attitudes. While experience may provide exposure to various weed management practices, it does not significantly affect attitudes toward biological control methods.

Similar results were reported by Nataraju et al. (2019).

4.2.4 Economic Motivation and Attitude

Economic motivation had a positive and significant relationship with attitudes toward the Mexican beetle. Farmers with greater economic motivation likely perceive biological control as a cost-effective method, leading to favorable attitudes.

This finding concurs with Boppana (2020).

4.2.5 Scientific Orientation and Attitude

Scientific orientation showed a positive and highly significant relationship with farmers' attitudes. Greater inclination toward scientific approaches enhances understanding and acceptance of biological control.

This finding aligns with Boppana et al. (2020) and Tripathi (2021).

4.2.6 Knowledge Level and Attitude

A positive and significant relationship was found between knowledge level and attitudes. Farmers with higher knowledge, often acquired through social participation and extension services, were more likely to favor the use of the Mexican beetle.

This is consistent with Ingale (2020).

4.2.7 Landholding and Attitude

Landholding size had a positive and significant relationship with attitudes. Larger landholdings likely enable farmers to experiment with and adopt innovative practices, including biological control.

These findings align with Deshmukh et al. (2020).

4.2.8 Annual Income and Attitude

Annual income showed a positive and significant relationship with farmers' attitudes. Higher income levels may enhance the ability and willingness to invest in sustainable practices.

These findings are supported by Deshmukh et al. (2020).

4.2.9 Social Participation and Attitude

Social participation exhibited a positive and significant relationship with attitudes. Membership in groups such as farmers' clubs facilitates knowledge sharing and fosters a favorable perception of the Mexican beetle.

These findings align with Deshmukh et al. (2020).

4.2.10 Extension Contact and Attitude

Extension contact demonstrated a positive and significant relationship with attitudes. Farmers with greater interaction with extension services gain more exposure to innovative practices, leading to favorable attitudes.

This finding is consistent with Ghosh and Shaikh (2013).

4.2.11 Mass Media Exposure and Attitude

Mass media exposure had a positive and significant relationship with attitudes. Access to information through local-language mass media sources like TV, newspapers, and the internet plays a critical role in shaping favorable attitudes.

These findings align with Ingale (2020).

4.2.12 Risk Orientation and Attitude

Risk orientation showed a positive and significant relationship with attitudes. Farmers with higher risk-taking tendencies were more likely to adopt biological control measures.

This finding is supported by Sadam (2014).

Table 2: Coefficient of correlation between profile of farmers and attitude of farmers towards Mexican beetle for eradication of parthenium.

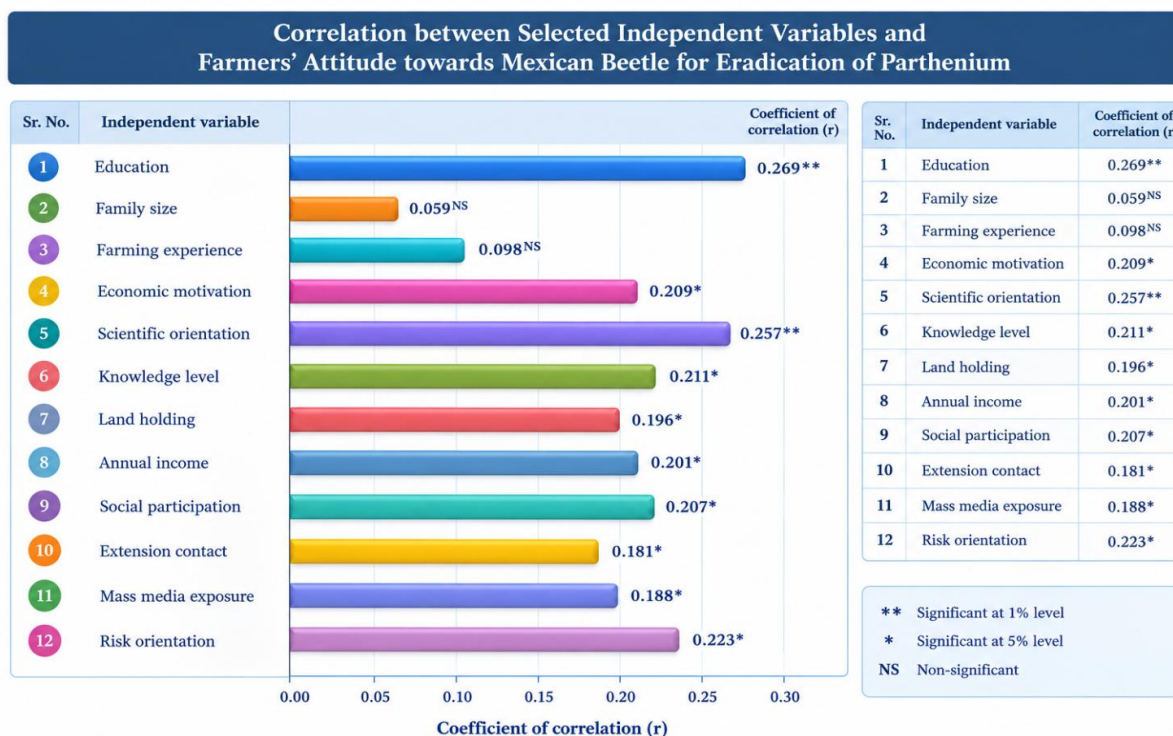
Sr. No.	Independent variable	Coefficient of correlation (r)
1	Education	0.269**
2	Family size	0.059NS
3	Farming experience	0.098NS
4	Economic motivation	0.209*
5	Scientific orientation	0.257**
6	Knowledge level	0.211*
7	Land holding	0.196*
8	Annual income	0.201*
9	Social participation	0.207*
10	Extension contact	0.181*
11	Mass media exposure	0.188*
12	Risk orientation	0.223*

* Significant at 0.05 level of significance

**Significant at 0.01 level of significance

NS - Non-significant

Fig 2: Coefficient of correlation between profile of farmers and attitude of farmers towards Mexican beetle for eradication of parthenium.



5.CONCLUSION-

It was observed that family size and farming experience shows positive and non significant relationship with attitude of farmers towards Mexican beetle. Economic motivation, knowledge level, land holding, annual income, social participation, extension contact, mass media exposure and risk orientation shows positive and significant relationship with attitude. Education and scientific orientation shows positive and highly significant relationship with attitude of farmers towards Mexican beetle for eradication of parthenium.

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