P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 7; July 2025; Page No. 410-413

Received: 29-04-2025
Accepted: 06-06-2025

Indexed Journal
Peer Reviewed Journal

Understanding Farmers' Perceptions Towards the Adoption of Bio-Pesticides in Durg District of Chhattisgarh

[1]Dhani Ram, [2]Dr. Sanjay Kumar Joshi and [3]Dr. Hulas Pathak

[1]MBA (ABM) Student College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

[2]Assistant Professor, Department of Agri-Business and Rural Management College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

[3]Professor & HOD, Department of Agri-Business and Rural Management College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

DOI: https://www.doi.org/10.33545/26180723.2025.v8.i7f.2158

Corresponding Author: Dhani Ram

Abstract

Biopesticides have emerged as sustainable alternatives to chemical pesticides due to their eco-friendly, target-specific and biodegradable nature. Despite their growing global acceptance, their adoption among Indian farmers remains limited. This study investigates the perceptions and awareness of farmers in Durg district of Chhattisgarh regarding the use of biopesticides. A multistage random sampling method was used to select 100 farmers across 20 villages in two blocks (Durg and Dhamdha). Data were collected using a structured interview schedule and analyzed using percentage analysis, arithmetic mean and Garrett's Ranking Technique. Results revealed that 76% of farmers still rely solely on chemical pesticides, while only 16% use biopesticides. Key barriers to adoption include limited availability (40%), perceived lower efficacy (21%) and the need for higher doses and management (18%). However, 12% of respondents recognized biopesticides as an emerging and beneficial technology. Among users, 33.33% reported improved yield and quality, while 24% acknowledged higher profitability. Still, 55% of farmers cited high product cost as a major concern. The findings emphasize the need for enhanced awareness, availability and affordability of biopesticides to encourage their wider adoption and support sustainable agriculture in the region.

Keywords: Farmers' perceptions, bio-pesticides, IPM, sustainable agriculture, Chhattisgarh

Introduction

Biopesticides, which are derived from naturally occurring organisms or substances, have emerged as sustainable alternatives to conventional chemical pesticides. They are known for being biodegradable, eco-friendly, target-specific and compatible with Integrated Pest Management (IPM) strategies (Tijjani *et al.*, 2017 and Shukla *et al.*, 2019) [5, 3]. Unlike synthetic pesticides, biopesticides pose minimal risk to human health and the environment and leave no harmful residues, making them suitable for safe and sustainable agriculture (Kumar and Singh, 2015) [2].

Globally, the use of biopesticides is growing at an annual rate of 10%, with microbial agents like *Bacillus thuringiensis* accounting for the majority share (Shukla *et al.*, 2019) [3]. In India, however, their adoption is still limited, representing around 9% of total pesticide usage, though this is expected to increase significantly in the coming decades (Keswani, 2020) [1].

In Chhattisgarh, a state where 70% of the population is engaged in agriculture efforts are being made to promote bio-based pest management (Singh and Mazumdar, 2022) [4]. However, findings from a field study in Durg district reveal that several factors influence farmers' adoption. Notably, 40% of farmers reported limited accessibility, 21% expressed concerns about lower efficacy and 18% indicated biopesticides require more careful handling and higher doses. Additionally, 12% viewed biopesticides as a promising new technology, while 9% were concerned about cost.

Understanding farmers' perceptions is key to increasing biopesticide adoption. This study focuses on Durg district, aiming to assess farmers' awareness, attitudes and factors influencing their use of biopesticides to support sustainable agriculture in the region.

Materials and Methods

Study Area

The study was conducted in Durg district, located in the Chhattisgarh plains region of central India. The district spans 8,537 square kilometers, with diverse topography including forested areas and agricultural plains. Durg has a strong agricultural base, with major crops including paddy, wheat, soybean, maize, and various vegetables such as tomato, brinjal, cabbage, cauliflower, and okra. The total vegetable production area in the district is approximately 41,809 hectares, producing 768.14 thousand metric tons.

Sampling Technique
A multistage random sampling method was employed:

- **District selection:** Durg was purposively selected due to its relatively higher usage and awareness of biopesticides.
- **Block selection:** Two blocks Durg and Dhamdha were selected out of the three in the district.
- **Village selection:** From each block, 10 villages were randomly chosen, resulting in a total of 20 villages.
- **Respondent selection:** A total of 100 respondents (5 farmers per village) were selected through random sampling.

Data Collection

- Primary data were collected using a pre-tested structured interview schedule. The questionnaire included items on demographic profile, landholding, cropping patterns, pest control practices, awareness and perceptions of biopesticides and factors influencing their adoption.
- Secondary data were sourced from journals, reports, articles, official records and websites including data from the National Agriculture Board and the Department of Horticulture, Government of Chhattisgarh.

Analytical Tools
To analyze the data, the following tools were used:

- Percentage and frequency analysis to summarize responses and perceptions.
- Arithmetic mean to compute average scores.
- Garrett's Ranking Technique was applied to rank constraints and influencing factors based on farmer responses. The formula used was:

Percentage Position=100 × (Rij-0.5)/Nj

Where,
Rij = Rank given for the constraint by the individual.
Nj = Number of constraints ranked by the individual.
The mean scores were computed and used to rank each factor in descending order.

Results and Discussion
Demographic Profile of Respondents
Among the 100 farmers surveyed, 83% were male and 17% female. A majority (35%) belonged to the 26-35 age group. Most farmers were from the OBC category (69%) and had either primary (31%) or middle-level (24%) education. Landholding patterns showed 41% were marginal and 31% small farmers, reflecting the predominance of smallholder agriculture in the region, represent in table 1.

Pest Management Practices
Table 2 of the thesis revealed that 76% of farmers used only chemical pesticides, 16% used only bio-pesticides, and 8% used both. This indicates that a majority are still reliant on conventional pesticides, though a growing minority is exploring sustainable alternatives.

Annual expenditure on pesticide purchase
Table 3 shows the total amount of money invested by the farmers for pesticides purchase and application. The highest amount of >₹100000 and more was spent by medium to large scale farmers while up to ₹20000 was spent by small marginal farmers. Average expenditure was up to ₹ 50000 by the group of farmers for pest control by applying pesticides.

Respondents' perceptions about bio-pesticides
Table 4 describes the perception of farmers adopting and non- adopting of the bio-pesticides, the main barrier to biopesticide adoption is their limited availability, reported by 40% of respondents. Additionally, 21% perceive them as less effective than synthetic pesticides. While 12% view biopesticides as an emerging technology embraced by early adopters, 18% note the need for higher doses and careful application. Lastly, 9% find biopesticides costly or unaffordable, affecting wider usage.

Perception of Farmers using Bio-Pesticides
From the table 5 farmers adopting bio pesticides for pest management, most of them have given reason of reasonable cost and reduced harmful effect of chemical on produce. About 24% of the farmers say the use of bio pesticides increased the yield and quality of the produce.

Availability of Bio-pesticides by respondents
From the table 6 availability of the bio pesticides in Durg district according to the respondents are that 26% of the farmers are not able to get the products easily, while up to 47% of the farmers get the products easily or they didn't face much problem in applying the bio pesticide products.

Price of Bio-pesticides by respondents
From the table 7 the responses given by the farmers about the cost of bio pesticides shown in table 7 it can be stated that most of the respondent farmers (up to 55%) have issue of high cost of the products and this is the why they are not interested in application of bio pesticides. On the other hand 40-45% farmers are satisfied with the price of the bio pesticide products.

Efficiency of bio-pesticides by respondents
From the table 8 it is clear that almost 36% farmer have given opinion that the efficiency of bio pesticides in controlling pests of crop resulted moderate as compare to chemical pesticides application.

Production and profit from bio-pesticides by respondents
From the table 9 production and profit by using bio pesticides was found same as got by using chemical pesticides in crop field response received from the respondent farmers. while almost 30% of farmers gave positive answers towards bio pesticides application by getting higher production. About 15% of the farmers found negative results from the application of biopesticides as less production and profit from cultivation.

Major bio-pesticides brands used by respondents

From the table 10 we found that 30% of respondents apply the bio pesticides of the company M N biotech pvt. ltd, while the least craze about the products of Ample crop care company among different producer companies available in that area.

Table 1: Demographic details of respondent farmers (N=100)

S. No.	Particulars		No. of respondents	Percentage (%)
1.	Age group (years)	18-25	10	10
		26-35	35	35
		36-45	29	29
		46-55	18	18
		> 55	8	8
2.	Social Group	OBC	69	69
		SC	13	13
		ST	11	11
		OC	7	7
3.	Education	Illiterate	21	21
		Primary	31	31
		Middle	24	24
		Higher	16	16
		Graduation	8	8
4.	Family type	Nuclear	61	61
		Joint	39	39
5.	Occupation	Agriculture	81	81
		Agriculture & Allied	19	19
6.	Land holding	< 1ha (Marginal)	41	41
		1-2 ha (Small)	31	31
		2-5ha (Medium)	19	19
		>5 ha (Large)	9	9

Table 2: Farmers adopting Bio-pesticides for plant protection (N=100)

S. No.	Plant protection measures	No. of respondents	Percentage
1.	Chemical Pesticides	76	76
2.	Bio-pesticides	16	16
3.	Both	8	8
Total		100	100

Table 3: Annual expenditure on pesticide purchase (N=100)

S. No.	Annual expenditure (₹ $year^{-1}$ $acre^{-1}$)	No. of respondents	Percentage
1.	Up to Rs.20,000	**36**	**36**
2.	Rs. 20,001 - 50,000	35	35
3.	Rs.50,001 -1,00,000	18	18
4.	More than Rs.1,00,000	11	11
TOTAL		100	100

Table 4: The respondents' perceptions about bio-pesticides (N=100)

S. No.	Factors	Average score	Percentage	Rank
1.	Limited accessibility or scarce supply	24	40	I
2.	Perceived lower efficacy compared to synthetic pesticides	39	21	II
3.	Higher dosage and careful management needed	50	18	III
4.	Emerging technology embraced by early adopters	60	12	IV
5.	Considered costly or unaffordable	75	9	V
	Total	100	100	

Table 5: Perception of Farmers using Bio-Pesticides (N=100)

S. No.	Factors	Average Score	Percentage (%)	Rank
1	Yield better and improved quality of produce	24	33.33	I
2	High efficiency and good quality	39	23.80	II
3	For better soil quality	50	19.04	III
4	Reasonable cost	60	14.28	IV
5	Not harmful and beneficial in crop production	75	14.28	IV
	Total	100	100	

Table 6: Availability of Bio-pesticides by respondents (N=100)

S. no.	Availability of bio-pesticides	Number of respondents	Percentage (%)
1.	Frequently available	47	47
2.	Sometime available	27	27
3.	Rare	26	26
	Total	100	100

Table 7: Price of Bio-pesticides by respondents (N=100)

S. no.	Availability of bio-pesticides	Number of respondents	Percentage (%)
1.	Very High	33	33
2.	High	23	23
3.	Average	26	26
4.	Low	14	14
5.	Very Low	04	4
	Total	100	100

Table 8: Efficiency of bio-pesticides by respondents (N=100)

S. no.	Availability of bio-pesticides	Number of respondents	Percentage (%)
1.	Very High	16	16
2.	High	22	22
3.	Moderate	36	36
4.	Low	14	14
5.	Very Low	12	12
	Total	100	100

Table 9: Production and profit from bio-pesticides by respondents (N=100)

S. no.	Availability of bio-pesticides	Number of respondents	Percentage (%)
1.	Very High	23	23
2.	High	30	30
3.	Same as conventional	19	19
4.	Low	13	13
5.	Very Low	15	15
	Total	100	100

Table 10: Major bio-pesticides brands used by respondents (N=100)

S. No.	Major brands of Bio-pesticides	No. of respondents	Percentage (%)
1.	M N Biotech Pvt. Ltd	30	30
2.	Ample crop care	12	12
3.	Kay Bee Bio Organics Pvt. Ltd.	19	19
4.	Multiplex Group	25	25
5.	Nova Agritech	14	14
	Total	100	100

Conclusion

The study reveals that while awareness of biopesticides is increasing in Durg district, their adoption remains limited due to issues like high cost, limited availability and perceived lower efficacy. However, some farmers recognize their benefits in improving yield quality and reducing chemical residues. To enhance adoption, efforts must focus on better accessibility, affordability and farmer education on the advantages of biopesticides.

References

1. Keswani C. Bioeconomy for sustainable development. Singapore: Springer-Nature; 2020. 388 p.
2. Kumar S, Singh A. Biopesticides: present status and the future prospects. J Fertil Pestic. 2015;6(2):1-2.
3. Shukla N, Singh EANA, Kabadwa BC, Sharma R, Kumar J. Present status and future prospects of bio-agents in agriculture. Int J Curr Microbiol Appl Sci. 2019;8(4):2138-53.
4. Singh P, Mazumdar P. Microbial pesticides: trends, scope and adoption for plant and soil improvement. Woodhead Publishing. 2022;2(2):37-71.
5. Tijjani A, Bashir KA, Mohammed I, Muhammad A, Gambo A, Musa H. Biopesticides for pests control: a review. J Biopestic Agric. 2017;3(1):6-13.