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Personal correlates of farmers' awareness about pollution caused by pesticides and fertilizers

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Abstract

The research was carried out in the Latur, Renapur, and Udgir tehsils of Latur district in the Marathwada region of Maharashtra. Four villages were randomly selected from each tehsil, resulting in a total of twelve villages for the study. From each village, ten farmers were chosen, giving a total sample size of 120 respondents. An ex-post facto research design was adopted for the investigation. The findings revealed that age had a positive and significant association with farmers' awareness of agricultural pollution caused by the use of pesticides and fertilizers. Furthermore, variables such as education, family size, annual income, landholding, extension contact, access to information sources, social participation, and scientific orientation showed a positive and highly significant relationship with awareness regarding agricultural pollution resulting from pesticide and fertilizer use.

Keywords: Farmers, pesticides, fertilizers, agricultural pollution, awareness

Introduction

Agriculture remains the primary source of livelihood for a large proportion of India's population, and agrochemicals such as pesticides and fertilizers have contributed significantly to agricultural development. Since the advent of the Green Revolution, however, the use of synthetic fertilizers and pesticides has increased substantially. Agriculture worldwide faces numerous challenges, including stagnating crop productivity, poor nutrient use efficiency, declining soil organic matter, multiple nutrient deficiencies, shrinking cultivable land, and limited water resources. The degradation and depletion of land and water resources pose serious risks to food security, livelihoods, and nutritional well-being, particularly for a rapidly growing population.

India is among the leading producers and consumers of agrochemicals globally. Nevertheless, the excessive and unscientific application of synthetic fertilizers and pesticides adversely affects environmental quality, agricultural land health, and the well-being of plants, animals, and humans. Therefore, reducing dependence on these chemicals and promoting sustainable alternatives is essential to minimize

their harmful effects on ecological systems.

Pesticides are chemical substances used to prevent, control, or eliminate pests. According to the United States Code of Federal Regulations (CFR), a pesticide includes any substance or mixture intended for use as a plant regulator, defoliant, or desiccant. These chemicals are employed to control weeds, insects, fungi, rodents, nematodes, and mollusks, and include herbicides, insecticides, fungicides, rodenticides, nematicides, molluscicides, and plant growth regulators.

Fertilizers provide essential nutrients required for optimal plant growth and productivity. Farmers generally apply fertilizers through methods such as surface broadcasting, subsurface placement, or mixing with irrigation water. However, a considerable portion of conventional fertilizers, particularly urea, is lost through leaching, runoff, or volatilization, leading to contamination of surrounding ecosystems and water bodies.

Given the limited scope for expanding cultivated land in India, future increases in food grain production will largely depend on improvements in agricultural productivity. Consequently, awareness of environmental pollution

associated with agricultural practices has become increasingly important. Farmers, as well as society at large, must understand the environmental consequences of excessive agrochemical use so that timely and effective measures can be taken to protect natural resources and ensure sustainable agricultural development.

Pesticides and fertilizers scenario of India and Maharashtra

Table 1: Pesticides and fertilizers scenario of India

Pesticides consumption (Metric Ton)				
2018-19	2019-20	2020-21	2021-22	2022-23
59669	61701	62193	58720	52466
Fertilizers consumption (Thousand Tonnes of nutrients)				
2018-19	2019-20	2020-21	2021-22	2022-23
27375	29370	32536	29796	29844

Table 2: Pesticides and fertilizers scenario of Maharashtra

Pesticides consumption (Metric Ton)				
2018-19	2019-20	2020-21	2021-22	2022-23
11746	12783	13243	13175	6814
Fertilizers consumption (Kg/ha)				
2018-19	2019-20	2020-21	2021-22	2022-23
145.71	115.84	129.26	119.35	149.5

Objectives

The primary objective of the study was to examine the relationship between the socio-economic and personal characteristics of farmers and their level of awareness regarding agricultural pollution caused by the use of pesticides and fertilizers.

Materials and Methods

The study was conducted in Latur district of the Marathwada region in Maharashtra State, which was selected randomly for the investigation. Latur district

comprises ten tehsils: Ahmadpur, Ausa, Chakur, Deoni, Jalkot, Latur, Nilanga, Renapur, Shirur Anantpal, and Udgir. Among these, three tehsils Latur, Renapur, and Udgir were randomly selected for the study. From each selected tehsil, four villages were chosen through random sampling, resulting in a total of twelve villages.

A sample of ten farmers was randomly selected from each village, giving a total of 120 respondents. The respondents were chosen using a simple random sampling technique. Primary data were collected through personal interviews using a pre-tested and structured interview schedule. The collected information was systematically organized, classified, tabulated, and analyzed using appropriate statistical techniques, including frequency distribution, percentages, mean, standard deviation, correlation coefficient (r), and multiple regression analysis.

Results and Discussion

The findings indicated that 60.83 percent of the respondents belonged to the middle-age category. Nearly half of the farmers (48.33%) had attained education up to the higher secondary level. A majority of the respondents (73.33%) belonged to medium-sized families, while 74.17 percent had a medium level of annual income. Regarding landholding, 46.66 percent of the farmers possessed small landholdings. The study further revealed that 66.67 percent of the respondents had a medium level of extension contact. Most farmers (70.00%) reported a medium level of access to information sources. Similarly, 67.50 percent exhibited a medium level of social participation, and 68.33 percent demonstrated a moderate level of scientific orientation. These findings suggest that the majority of farmers were characterized by moderate socio-economic and communication attributes, which may influence their awareness and understanding of agricultural pollution issues.

Table 3: Distribution of farmers according to their Profile

Sr. No.	Category	Farmers (N = 120)	
		Frequency	Percentage (%)
1.1 Age			
1.	Young (Up to 27)	30	25.00
2.	Middle (28 to 52)	73	60.83
3.	Older (53 and above)	17	14.17
1.2 Education			
1.	Illiterate	2	01.67
2.	Primary Education (1 st to 4 th)	6	05.00
3.	Secondary School (5 th to 10 th)	15	12.50
4.	High School (11 th to 12 th)	58	48.33
5.	Graduation	27	22.50
6.	Post-graduation	12	10.00
1.3 Family size			
1.	Small (Upto 3)	20	16.67
2.	Medium (4-7)	88	73.33
3.	Large (8 and above)	12	10.00
1.4 Annual income			
1.	Low (up to Rs. 59,713)	15	12.50
2.	Medium (Rs. 59,714 – Rs. 2,27,020)	89	74.17
3.	High (2,27,021 and above)	16	13.33
1.5 Land holding			
1.	Marginal (up to 1.00 ha)	30	25.00
2.	Small (1.01 to 2.00 ha)	56	46.66

3.	Semi medium (2.01 to 4.00 ha)	26	21.67
4.	Medium (4.01 to 10.00 ha)	8	06.67
5.	Large (10.01 and above ha)	0	00.00
1.6 Extension contact			
1.	Low (Up to 25)	17	14.17
2.	Medium (26 to 48)	80	66.67
3.	High (49 and above)	23	19.16
1.7 Sources of information			
1.	Low (Up to 42)	13	10.83
2.	Medium (43 to 65)	84	70.00
3.	High (66 and above)	23	19.17
1.8 Social participation			
1.	Low (Up to 18)	23	19.17
2.	Medium (19 to 38)	81	67.50
3.	High (39 and above)	16	13.33
1.9 Scientific orientation			
1.	Low (Up to 15)	24	20.00
2.	Medium (16 to 28)	82	68.33
3.	High (29 and above)	14	11.67

Table 4: Correlation coefficient between profile of farmers and awareness

Sl. No.	Independent Variable	Correlation coefficient ('r')
1	Age	0.254*
2	Education	0.389**
3	Family size	0.370**
4	Annual income	0.339**
5	Land holding	0.351**
6	Extension contact	0.510**
7	Sources of information	0.492**
8	Social participation	0.501**
9	Scientific orientation	0.487**

** Significant at 0.01 per cent level

* Significant at 0.05 per cent level

The findings presented in Table 4 indicate that the correlation analysis revealed a positive and significant relationship between farmers' age and their awareness of agricultural pollution resulting from the use of pesticides and fertilizers. In addition, variables such as education, family size, annual income, landholding, extension contact, access to information sources, social participation, and scientific orientation exhibited a positive and highly significant association with farmers' awareness of agricultural pollution caused by agrochemical use. These results suggest that improvements in these socio-economic and communication-related factors contribute to higher levels of environmental awareness among farmers.

Conclusion

The study revealed that the majority of respondents (60.83%) belonged to the middle-age group, while 48.33 percent had attained education up to the higher secondary level. Most farmers (73.33%) had medium-sized families, and 74.17 percent reported a medium level of annual income. Nearly half of the respondents (46.66%) possessed small landholdings. Furthermore, 66.67 percent of the farmers had a moderate level of extension contact, 70.00 percent had medium access to information sources, 67.50 percent demonstrated moderate social participation, and 68.33 percent exhibited a medium level of scientific orientation.

The study also found that a substantial majority of farmers

(71.67%) possessed a moderate level of awareness regarding agricultural pollution caused by pesticides and fertilizers. Correlation analysis further established that age, education, family size, annual income, landholding, extension contact, information sources, social participation, and scientific orientation significantly influenced farmers' awareness levels. Therefore, strengthening educational opportunities, extension services, information dissemination, and scientific outlook among farmers may play a crucial role in enhancing awareness and promoting environmentally sustainable agricultural practices.

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