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Socio-personal and socio-economic profile of farmers and their extent of awareness about agricultural pollution

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ABSTRACT

The present study was undertaken to assess the Socio-personal and socio-economic profile of farmers and their Extent awareness about agricultural pollution in Kolhapur district of Maharashtra. The study was conducted in three purposively selected tehsils, namely Karveer, Hatkanangale and Shirol. A total of 150 respondent farmers were selected through proportionate random sampling. The findings revealed that the majority of the respondent farmers belonged to the middle age group (66.00%), had secondary education (34.67%), possessed marginal land holdings (40.67%), followed farming as their sole occupation (41.33%), and belonged to the low annual income category (44.67%). A majority of the respondents had low farming experience (46.67%), year-round irrigation (44.67%), mono-cropping pattern (52.67%), medium social participation (58.67%), medium access to agricultural information (58.00%), medium mass media exposure (52.00%) and medium scientific orientation (65.33%). Regarding the extent of awareness about agricultural pollution, a majority of the farmers (58.00%) possessed a medium level of awareness, followed by 29.33 per cent with a high level and 12.67 per cent with a low level of awareness.

Keywords: Agricultural pollution, Extent of awareness, Sustainable farming, Pesticides and fertilizers, Soil health and human health

1. Introduction

Agricultural pollution refers to the contamination of soil, water, and air caused by agricultural activities and improper farming practices. Excessive and indiscriminate use of chemical fertilizers, pesticides, fungicides, insecticides, weedicides, and other agrochemicals adversely affects environmental quality and human health. Runoff from agricultural fields carrying harmful chemicals contaminates rivers, lakes, ponds, and groundwater resources. Similarly, continuous application of chemical inputs reduces soil fertility, destroys beneficial microorganisms, and disturbs ecological balance. In recent years, agricultural pollution has emerged as a major environmental challenge throughout the world.

Agriculture pollution is mainly emerged due to the different farming practices that farmers were following. Some forms of agriculture pollution would be excess fertilizer run off, polluted streams also polluting ground water etc. This pollution resulted in the contamination or degradation of the environment and surrounding ecosystems. The pollution may come from the different agricultural pollutants such as pesticides, fertilizers, livestock waste, waste from processing, harvest waste from orchards, which is richer in chemical nutrients and toxic substances. A pollutant is substance released into the environment due to natural or human activity which adversely affects the environment. The excessive use of these pollutants affects the water quality when it rains, the contaminated soils and water is washed into the adjacent waters or seep into be absorbed by the plants, which are then consumed by the animals and humans. It will terribly affect the animals (Shetty *et al.*, 2023) [1].

Farmers who regularly participated in agricultural training programmes and extension activities had better awareness regarding agricultural pollution and sustainable farming methods. The study concluded that awareness programmes conducted by agricultural universities and extension agencies play an important role in encouraging environmentally friendly agricultural practices (Patil *et al.*, 2021) [2].

Considering the seriousness of the problem, there is a need to assess the level of awareness among farmers regarding agricultural pollution and its harmful effects. A review of available literature indicates that very limited studies have been conducted in this area, especially in Kolhapur district of Maharashtra state. Therefore, to understand the awareness level of farmers and to generate useful information for future planning and extension activities, the present study entitled "Study of Farmer's Awareness Regarding Agricultural Pollution" was undertaken.

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2. Methodology

The present study was conducted in Kolhapur district of Maharashtra State. Karvir, Hatkanangale, and Shirol talukas were selected purposively for the study. Five villages were selected by adopting a simple random sampling technique. Thus, a total of 15 villages were selected for the study. From each of the selected villages, 10 farmers were selected through a simple random sampling technique. Thus, a total of 150 farmers were selected as respondents for the present study. The ex-post-facto research design was adopted for the present study since the phenomenon under investigation had already occurred and was continuing without any manipulation by the researcher. Ex-post-facto research is a systematic empirical inquiry in which the researcher has no direct control over the independent variables because their manifestations have already occurred or are inherently non-manipulable. Therefore, relationships among the selected variables were studied without direct intervention by the researcher.

Sr. No.	Category	Score (Years)	Frequency (N = 150)	Percentage (%)
1.	Young	Up to 35 years	27	18.00
2.	Middle	Between 36 to 55 years	99	66.00
3.	Old	56 years and above	24	16.00
Total			150	100.00
Max = 68 Min = 21				

2. Education

Educated farmers are generally more receptive to extension programmes, training, and modern communication channels, which can contribute to greater awareness regarding agricultural pollution and its control measures. Therefore, an attempt was made to study the educational status of the respondents.

The data presented in Table 2 revealed that the highest proportion (34.67 %) of the respondents had attained secondary education (8th–10th standard), followed by 32.67 per cent who had completed higher secondary education (11th–12th standard). Further, 16.00 per cent of the respondents were graduates, while 11.33 per cent had completed primary education. Only 2.67 per cent of the respondents were illiterate, and an equal proportion (02.66 per cent) had completed post-graduation.

Sr. No	Category	Standard of Education	Frequency (N = 150)	Percentage (%)
1	Illiterate	Can't read / write	04	02.67
2.	2. Primary Education	1 st to 7 th Std.	17	11.33
3.	3. Secondary Education	8 th to 10 th Std.	52	34.67
4.	Higher Secondary Education	11 th to 12 th Std.	49	32.67
5.	Graduation	UG degree	24	16.00
6.	Post-Graduation	PG degree	04	02.66
Total			150	100.00

Sr. No.	Category	No of respondents (N = 150)	
		Frequency	Percentage(%)
1.	Marginal (up to 01.00 ha)	61	40.67
2.	2. Small (01.01 to 02.00 ha)	58	38.67
3.	3. Semi Medium (02.01 to 04.00 ha)	25	16.66
4.	4. Medium (04.01 to 10.00 ha)	06	04.00
5.	5. Large (more than 10.00 ha)	00	00
Total		150	100.00
Max = 6.2 Min = 0.2			

3. Results and Discussion

(A) Socio-personal and socio-economic profile of farmers

3.1 Age

Age is one of the important socio-economic characteristics that influences an individual's knowledge, experience, decision-making ability, and adoption of improved agricultural practices.

The data presented in Table 1 revealed that the majority of the respondents (66.00%) belonged to the middle age group (36–55 years), followed by 18.00 per cent in the young age group (up to 35 years) and 16.00 per cent in the old age group (56 years and above). The findings indicate that the majority of the respondents were middle-aged farmers.

The findings indicate that the majority of the respondents were middle-aged farmers. This may be because farmers in this age group are actively engaged in agricultural operations and are primarily responsible for farm management and decision-making.

3. Land holding

Land holding is an important socio-economic characteristic that influences farmer's production capacity, resource utilization, and adoption of improved agricultural practices.

The data presented in Table 3 concluded that (40.67 %) of the respondents belonged to the marginal farmer category, followed by 38.67 per cent who were small farmers. Further, 16.66 per cent of the respondents were semi-medium farmers, while only 4.00 per cent belonged to the medium farmer category. None of the respondents possessed land holdings above 10.00 ha and therefore no respondent belonged to the large farmer category.

The findings indicate that the majority of the respondents were marginal and small farmers. This may be attributed to the fragmentation of agricultural land due to family partition, increasing population pressure, and limited availability of cultivable land.

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4. Occupation

Occupation is an important socio-economic characteristic that influences farmers' livelihood, income, and involvement in agricultural activities. The data presented in Table 4 concludes that majority (41.33 %) of the respondents were engaged in farming only, followed by

35.33 per cent engaged in farming along with animal husbandry. Further, 10.00 per cent of the respondents combined farming with labour work, 07.34 per cent combined farming with business, while 06.00 per cent were engaged in farming along with service. The findings indicate that farming was the principal occupation of the majority of the respondents.

Sr. No	Category	Frequency (N = 150)	Percentage (%)
1.	Farming only	62	41.33
2.	Farming + Animal Husbandry	53	35.33
3.	Farming + Labour work	15	10.00
4.	Farming + Business	11	07.34
5.	Farming + Services	09	06.00
Total		150	100.00

5. Annual income

Annual income is an important socio-economic characteristic that influences farmers' access to agricultural inputs, technologies, and information. The data presented in Table 5 revealed that (44.67 %) of the respondents belonged to the low annual income category, fol-

lowed by 38.67 per cent in the medium annual income category and 16.66 per cent in the high annual income category. The findings indicate that a majority of the respondents had a low annual income. This may be attributed to small and fragmented landholdings, dependence on agriculture as the primary source of livelihood

Sr. No.	Category	Income (₹)	Frequency (N = 150)	Percentage (%)
1.	Low	Up to ₹ 2,12,666	67	44.67
2.	Medium	₹ 2,12,667 to ₹ 3,81,333	58	38.67
3.	High	₹ 3,81,334 and above	25	16.66
Total			150	100.00
Range = ₹ 1,68,666 Max = ₹ 5,50,000 Min = ₹ 44,000				

6. Experience in farming

Greater farming experience enables farmers to better understand the environmental impacts of farming activities and enhances their awareness regarding agricultural pollution and its management. The data presented in Table 6 revealed that (46.67 %) of the respondents had low farming experience (up to 21 years), followed by 39.33

per cent with medium farming experience (22–36 years), while only 14.00 per cent had high farming experience (37 years and above). The farming experience of the respondents ranged from 7 to 50 years. The findings indicate that a majority of the respondents possessed low to medium farming experience. This may be attributed to the predominance of middle-aged farmers in the study area, who have been engaged in agriculture for a moderate period.

Sr. No.	Category	Score (Years)	Frequency (N = 150)	Percentage (%)
1.	Low	Up to 21	70	46.67
2.	Medium	Between 22 to 36	59	39.33
3.	High	37 and above	21	14.00
Total			150	100.00
Range = 14.33 Max = 50 Min = 07				

7. Irrigation status

Irrigation status refers to the extent to which a farmer has assured irrigation facilities for crop production throughout the agricultural year. The data presented in Table 7 revealed that (44.67 %) of the respondents had year-round irrigation, followed by 34.00 per cent with two-

season irrigation. Further, 16.00 per cent of the respondents had seasonal irrigation, while only 05.33 per cent practiced rainfed farming. The findings indicate that a majority of the respondents had access to year-round irrigation. This may be attributed to the availability of reliable irrigation sources such as bore wells and rivers, enabling farmers to cultivate crops throughout the year.

Sr. No.	Irrigation Status	Frequency (N = 150)	Percentage (%)
1.	Rainfed only	08	05.33
2.	Seasonal irrigation	24	16.00
3.	Two seasonal irrigation	51	34.00

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Sr. No.	Irrigation Status	Frequency (N = 150)	Percentage (%)
4.	Year round irrigation	67	44.67
Total		150	100.00

8. Cropping pattern

Different cropping patterns influence the use of fertilizers, pesticides, irrigation, and other farm inputs, thereby affecting agricultural pollution and the adoption of sustainable farming practices.

The data presented in Table 8 revealed that more than half of the respondents (52.67 %) followed mono-cropping, followed by 32.00 per

cent who practiced double cropping, while only 15.33 per cent adopted multiple cropping.

The findings indicate that mono-cropping was the predominant cropping pattern in the study area. This may be attributed to farmers' preference for cultivating a single major crop based on the availability of irrigation, market demand, input resources, and ease of crop management.

Sr. No.	Cropping Pattern	Frequency (N = 150)	Percentage (%)
1.	Mono-cropping	79	52.67
1.	Double cropping	48	32.00
3.	Multiple cropping	23	15.33
Total		150	100.00

9. Social participation

Social participation is an important socio-economic characteristic that enhances farmers' interaction with extension personnel, progressive farmers, and rural institutions.

The data presented in Table 9 revealed that a majority (58.67 %) of the respondents had a medium level of social participation, followed

by 28.67 per cent with a low level and 12.66 per cent with a high level of social participation.

The findings indicate that most respondents had a medium level of social participation, which may be attributed to their involvement in local organizations such as cooperative societies, self-help groups, and farmers' groups.

Sr. No.	Category	Score	Frequency (N = 150)	Percentage (%)
1.	Low	Up to 4	43	28.67
2.	Medium	Between 5 to 7	88	58.67
3.	High	8 and above	19	12.66
Total			150	100.00

Range = 02.33 Max = 09 Min = 02

10. Source of agricultural information

Access to reliable information helps farmers make informed decisions on the judicious use of agricultural inputs and adoption of pollution control measures.

The data presented in Table 10 revealed that a majority (58.00 %) of the respondents had a medium level of access to agricultural informa-

tion, followed by 30.00 per cent with a high level and 12.00 per cent with a low level of information sources.

The findings indicate that most respondents had a medium level of access to agricultural information, which may be attributed to their regular contact with extension personnel, progressive farmers, input dealers, and mass media.

Sr. No.	Category	Score	Frequency (N = 150)	Percentage (%)
1.	Low	Up to 11	18	12.00
2.	Medium	Between 12 to 14	87	58.00
3.	High	15 & above	45	30.00
Total			150	100.00

Range = 03 Min = 08 Max = 17

11. Mass media exposure

Information received through television, radio, newspapers, magazines, and digital media helps farmers understand the causes, effects, and control measures of agricultural pollution.

The data presented in Table 11 concluded that a majority (52.00 %) of the respondents had a medium level of mass media exposure, fol-

lowed by 29.33 per cent with a high level and 18.67 per cent with a low level of mass media exposure.

The findings indicate that most respondents had a medium level of mass media exposure, which may be due to regular access to television, newspapers, radio, and mobile-based agricultural information.

Sr. No.	Category	Score	Frequency (N = 150)	Percentage (%)
1.	Low	Up to 5	28	18.67

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Sr. No.	Category	Score	Frequency (N = 150)	Percentage (%)
2.	Medium	Between 6 to 9	78	52.00
3.	High	10 & above	44	29.33
Total			150	100.00

Range = 03.33 Min = 02 Max = 12

12. Scientific orientation

Farmers with a higher scientific orientation are more likely to understand the causes and consequences of agricultural pollution and adopt environmentally sustainable farming practices.

The data presented in Table 12 revealed that a majority (65.33 %) of the respondents had a medium level of scientific orientation, followed

by 18.00 per cent with a low level and 16.67 per cent with a high level of scientific orientation.

The findings indicate that most respondents possessed a medium level of scientific orientation, which may be attributed to their access to agricultural information, extension services, and practical farming experience.

Sr. No.	Category	Score	Frequency (N = 150)	Percentage (%)
1.	Low	Up to 16	27	18.00
2.	Medium	Between 17 to 23	98	65.33
3.	High	24 and Above	25	16.67
Total			150	100.00

Range = 06.33 Min = 10 Max = 29

(B) Extent awareness about agricultural pollution

Awareness regarding agricultural pollution is a key factor influencing farmers' understanding of the causes, consequences, and preventive measures associated with pollution arising from agricultural activities.

Higher awareness enables farmers to adopt environmentally sound farming practices and minimize the adverse effects of agriculture on soil, water, air, and human health.

Table 13. Distribution of the respondents according to level of awareness regarding different sources of agricultural pollution (n = 150)

Sr. No.	Source of Pollution	Level of Awareness					
		Low(0-2)		Medium (2-4)		High(4-6)	
		F	%	F	%	F	%
1.	Pesticides	19	12.66	88	58.67	43	28.67
2.	Fertilizers	14	14.00	81	54.00	48	32.00
3.	Sewage water	14	09.33	89	59.34	47	31.33
4.	Livestock waste	20	13.33	78	52.00	52	34.67
5.	Harvest waste	15	10.00	79	52.67	56	37.33
6.	Salt & silt drained by irrigation water	16	10.67	96	64.00	38	25.33
7.	Food processing waste	14	09.33	94	62.67	42	28.00

Table 13 indicates that the majority of respondents possessed a medium level of awareness regarding all major sources of agricultural pollution. Medium awareness was highest for salt and silt drained by irrigation water (64.00 %), followed by food processing waste (62.67 per cent), sewage water (59.34 per cent), pesticides (58.67 per cent), fertilizers (54.00 per cent), harvest waste (52.67 per cent), and livestock waste (52.00 per cent). A relatively higher proportion of respondents exhibited high awareness regarding harvest waste (37.33 per cent) and livestock waste (34.67 per cent), whereas low awareness was observed only among a small proportion of respondents across all pollution sources, ranging from 9.33 to 14.00 per cent.

The findings suggest that farmers had a moderate level of awareness about different sources of agricultural pollution, indicating that they were generally familiar with the environmental effects of common farming activities but lacked comprehensive knowledge in certain areas. Greater awareness of harvest waste and livestock waste may be attributed to their direct and frequent involvement in crop residue and animal waste management. Similarly, moderate awareness regarding pesticides and fertilizers reflects continuous exposure to extension advisories, input dealers, and mass media promoting the judicious use of agrochemicals.

Table 14. Distribution of respondent farmers according to their overall extent of Awareness regarding agricultural pollution:

Sr. No.	Category	Awareness level	Frequency (N = 150)	Percentage (%)
1.	Low awareness	Up to 26	19	12.67
2.	Medium awareness	Between 27 to 33	87	58.00
3.	High awareness	34 and above	44	29.33

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Sr. No.	Category	Awareness level	Frequency (N = 150)	Percentage (%)
	Total		150	100
Range = 6.33 Min = 20 Max = 39				

The data presented in Table 14 revealed that a majority (58.00 %) of the respondents had a medium level of awareness regarding agricultural pollution, followed by 29.33 per cent with a high level of awareness, while only 12.67 per cent of the respondents possessed a low level of awareness.

The findings indicate that most respondents had a medium level of awareness regarding agricultural pollution. This may be attributed to their moderate access to agricultural information, extension services, mass media, and practical farming experience. Although the respondents were aware of the harmful effects of agricultural pollution to some extent, there is still considerable scope for improving their knowledge through regular training programmes, demonstrations, awareness campaigns, and extension activities focusing on environmentally sustainable farming practices.

4. Conclusion

Study revealed that majority of respondent farmers belong to middle age group, have secondary educated, have marginal land holding, have only farming occupation, possessed a year round irrigation, have mono cropping pattern, had medium social participation, have medium source of agricultural information, had medium mass media exposure and possessed medium scientific orientation. The majority respondent farmers have medium awareness regarding pesticide pollution, fertilizer pollution, sewage water pollution, pollution from livestock waste, pollution from harvest waste, soil pollution by salt and silt drained by irrigation water and pollution from food processing waste.

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