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Correlation between selected characteristics of paddy growers with adoption of recommended plant protection measures

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Abstract

Paddy is an important cereal crop and a major component of the farming system in Gadchiroli district of Maharashtra. The present study was undertaken to assess the adoption of recommended plant protection measures among paddy growers and to determine the relationship between selected characteristics of farmers and their adoption. An exploratory research design was used. Gadchiroli, Desaijanj and Armori talukas were purposively selected, and four villages from each taluka were selected based on higher area under paddy cultivation. Ten paddy growers from each selected village were selected, constituting a sample of 120 respondents. Data were collected through personal interviews using a pre-tested structured interview schedule. The findings revealed that 48.33 per cent of respondents had a medium level of adoption, followed by 35.00 per cent with low and 16.67 per cent with high adoption. Complete adoption was highest for stem borer management (26.67%), followed by leaf folder (23.33%) and plant hopper management (20.00%). Among diseases, complete adoption was highest for blast and neck blast management (25.83%). Correlation analysis revealed that age, education, occupation, annual income, income from paddy, access to credit, source of information, labour availability, attitude and knowledge had significant positive relationships with adoption. Source of information, attitude and knowledge showed highly significant positive relationships. Land holding, area under paddy, farming experience and training received had non-significant relationships. The study emphasizes strengthening extension services through regular training, demonstrations and timely technical guidance to improve adoption of recommended plant protection measures among paddy growers.

Keywords: Adoption, paddy growers, plant protection measures, Gadchiroli, extension services

1. Introduction

Paddy (*Oryza sativa* L.) is one of the most important cereal crops and plays a significant role in food security and rural livelihoods (Manjunath *et al.*, 2011) [3]. In Maharashtra, paddy cultivation is particularly important in the eastern Vidarbha region, including Gadchiroli district. The district is characterized predominantly by rainfed agriculture, and paddy forms an important component of the farming system. However, paddy production is affected by several insect pests and diseases, which can adversely affect crop growth, yield and economic returns. Important insect pests include stem borer, leaf folder, plant hopper, gall midge and armyworm, while major diseases include blast, neck blast, sheath blight, false smut, rice bunt and sheath rot. Therefore, adoption of appropriate and recommended plant protection measures is essential for minimizing crop losses and improving productivity. The availability of recommended plant protection technologies does not necessarily ensure their adoption by farmers. Farmers may differ in the extent to which they adopt recommended practices due to differences in their socio-economic characteristics, access to

information, knowledge, attitude, resources and other personal and farm-related factors. (Manjunath *et al.*, 2011; Sharma, 2019) [3, 5]. Understanding the practice-wise level of adoption is therefore important for identifying the areas where adoption gaps exist. Similarly, examining the relationship between selected characteristics of farmers and their adoption behaviour can help in identifying the factors associated with better adoption of recommended plant protection measures.

Considering the importance of paddy cultivation and the need for effective plant protection in the region, the present study was undertaken to assess the practice-wise adoption of recommended plant protection measures by paddy growers and to study the relationship between selected characteristics of paddy growers and their adoption of recommended plant protection measures in Gadchiroli district of Maharashtra.

2. Objectives of the study

1. To study the practice wise adoption of plant protection measures by paddy growers.
2. To study the relationship between selected profile of

paddy growers and their adoption of recommended plant protection measures.

3. Methodology

An exploratory research design of social research was used for the present investigation. The study focused on the practice wise adoption of plant protection measures recommended for paddy cultivation. The study was conducted in Gadchiroli district of the Vidarbha region of Maharashtra. Gadchiroli, Desaijanj and Armori talukas were purposively selected. Four villages from each selected taluka were selected based on their higher area under paddy cultivation, resulting in 12 selected villages. Ten paddy

growers were selected from each selected village. Thus, 120 paddy growers constituted the final sample. Data were collected through personal interviews at respondents' homes, fields and workplaces using a pre-tested structured interview schedule.

4. Results and Discussion

4.1 To study the practice wise adoption of plant protection measures by paddy growers

The overall adoption of recommended plant protection measures was medium among nearly half of the respondents. About 48.33 per cent had medium adoption, 35.00 per cent had low adoption and only 16.67 per cent had high adoption.

Table 1: Practice wise adoption of plant protection measures by paddy growers

A. Pests: Adoption of control measures by paddy growers					
Sr. No.	Name of Pests	Control measures	CA	PA	NA
1	Stem borer	1) Cultivate resistant varieties e.g., Sakoli-8, Sindewahi-5. 2) Before transplanting, dip seedling roots in Chlorpyrifos 20% EC @ 10 ml per 10 liters water for 12 hours. 3) Release <i>Trichogramma japonicum</i> parasitoids @ 50,000/ha at 7-day intervals, 3–4 times. Avoid chemical sprays 3–4 days before and after release. 4) On noticing 5% infested tillers, spray Azadirachtin 0.15% @ 30–50 ml or Quinalphos 32 ml or Carbosulfan 25% @ 16 ml per 10 liters water; or apply Carbofuran 3% granules @ 25 kg/ha or Fipronil 0.3% granules @ 16.67 kg/ha in the field. 5) Harvest rice close to ground level. 6) After harvest, plough and destroy stubbles.	32 (26.67)	60 (50.00)	28 (23.33)
2	Leaf folder	1) For control of leaf folder, caseworm, cutworm, and horned caterpillar: apply Beauveria bassiana 1.15% @ 2.5 kg/ha or Azadirachtin 0.15% @ 30–50 ml or Quinalphos 20% EC @ 25 ml or Indoxacarb 15.8% EC @ 4 ml per 10 liters water.	28 (23.33)	57 (47.50)	35 (29.17)
3	Plant Hopper	1) Cultivate resistant varieties e.g., PKV Ganesh, Sindewahi 2001 2) Apply FYM @ 1.5 tons/ha during puddling to reduce hopper incidence. 3) Transplant seedlings at recommended spacing (20×15 cm or 20×20 cm). 4) Adopt strip planting (leave 30 cm gap after 10 rows or 2 meters). 5) Avoid dense planting, which favors hopper infestation. 6) Plant marigold/cowpea on bunds to conserve natural enemies. 7) Avoid excessive nitrogen fertilizer. 8) Use light traps for monitoring. 9) Drain water from field for 3–4 days if hopper incidence is high. 10) Apply <i>Metarhizium anisopliae</i> 1.15% powder @ 2.5 kg/ha in bunds. 11) Avoid unnecessary chemical sprays to conserve predators and parasitoids. 12) If economic threshold is crossed, spray Buprofezin 25% EC @ 16 ml or Imidacloprid 17.8 SL @ 3 ml or Fipronil SC @ 20 ml or Ethofenprox 10% EC @ 10 ml or Flonicamid 50% @ 3 g or Thiamethoxam 25 WG @ 2 g per 10 liters water.	24 (20.00)	55 (45.83)	38 (31.67)
4	Gall midge	1) Cultivate resistant varieties e.g., Sindewahi-2001, Sakoli-8, PKV Ganesh. 2) In endemic areas, transplant 15 days earlier than recommended (between 2–20 July). 3) Apply FYM @ 1.5 tons/ha during puddling to reduce gall midge and stem borer incidence. 4) Destroy alternate host plants (wild rice). 5) Remove and destroy infested seedlings. 6) In endemic areas, apply Carbofuran 3% granules @ 25 kg/ha or Quinalphos 5% granules @ 5 kg/ha at 10 and 30 days after transplanting, or when 5% silver shoots are observed, with 7–10 cm standing water. Retain water for 4 days.	22 (18.33)	45 (37.50)	53 (44.17)
5	Armyworm	1) Maintain water in nursery or field, clean bunds. 2) After harvest, deep plough and burn stubbles to destroy pupae. 3) Beat plants with sticks to dislodge larvae; conserve frogs as they feed on larvae.	10 (8.33)	38 (31.67)	72 (60.00)
B. Diseases: Adoption of control measures by paddy growers					
Sr. No.	Name of Disease	Control measures	CA	PA	NA
6	Blast and Neck Blast	1) Use resistant varieties e.g., RP 4-14, Ratna, Sakoli-6, IR-64. 2) On symptom appearance, spray Carbendazim 50% WP @ 10 g or Mancozeb 75% WP @ 30 g or Hexaconazole 5% EC @ 20 ml per 10 liters water.	31 (25.83)	57 (47.50)	32 (26.67)
7	Sheath	1) Spray Copper hydroxide 53.8% DF @ 30 g or Streptomycin sulfate 90% + Tetracycline	21	54	45

	blight	hydrochloride 10% SP @ 1.5 g per 10 liters water, 2–3 sprays at 10-day intervals after transplanting.	(17.50)	(45.00)	(37.50)
8	False smut	1)Treat seed with 3% salt solution, discard floaters. 2)Treat seed with Thiram 75% WP @ 3 g/kg seed. 3)Burn infected panicles. 4)Spray Copper hydroxide 77% WP @ 30 g per 10 liters water.	19 (15.83)	51 (42.50)	50 (41.67)
9	Rice bunt	1)Treat seed with 3% salt solution, discard floaters. 2)Treat seed with Thiram 75% WS @ 3 g/kg seed.	16 (13.33)	29 (24.17)	75 (62.50)
10	Sheath rot	1)Plant at proper spacing. 2)Burn infected stubbles. 3)Apply balanced nitrogen fertilizer.	13 (10.83)	35 (29.17)	72 (60.00)

(CA=Complete Adoption, PA= Partial Adoption, NA= No Adoption)

Table 2: Distribution of respondents according to their adoption of plant protection

Sr. No.	Adoption of plant protection measure	Respondents (n=120)	
		Frequency	Percentage
1	Low (upto 33.33)	42	35.00
2	Medium (33.34 to 66.66)	58	48.33
3	High (above 66.66)	20	16.67
	Total	120	100.00

The practice-wise findings showed that complete adoption was comparatively higher for stem-borer control measures (26.67%), followed by leaf-folder (23.33%) and plant-hopper management (20.00%). Partial adoption was highest for stem-borer management (50.00%), whereas no adoption was particularly high for armyworm management (60.00%). For diseases, complete adoption was highest for blast and neck-blast management (25.83%), while no adoption was highest for sheath-rot management. These findings indicate an adoption gap despite the relatively favourable attitude and moderate knowledge of farmers.

Table 3: The relationship between selected profile of paddy growers and their adoption of recommended plant protection measures

Sr. No.	Independent variable	Adoption (r value)
1	Age	0.2301*
2	Education	0.2161*
3	Land holding	0.1761 ^{NS}
4	Occupation	0.1822*
5	Annual income	0.2177*
6	Area under paddy crop	0.1761 ^{NS}
7	Experience	0.1600 ^{NS}
8	Income from paddy crop	0.2301*
9	Access to credit	0.1919*
10	Source of information	0.3579**
11	Training received	0.1659 ^{NS}
12	Labour availability	0.1968*
13	Attitude towards plant protection	0.3084**
14	Knowledge of plant protection	0.4604**

*Significant at 0.05 level of probability

**Significant at 0.01 level of probability

NS = Non-significant

The positive significant relationship indicates that respondents having higher levels of these characteristics tended to have higher adoption of recommended plant protection measures. Source of information ($r = 0.3579$) showed a positive and highly significant relationship with adoption. This indicates that respondents having greater access to agricultural information were more likely to adopt recommended plant protection measures.

Similarly, attitude towards plant protection ($r = 0.3084$) showed a positive and highly significant relationship with adoption. This suggests that respondents with a more favourable attitude towards plant protection were more likely to implement recommended measures. The strongest positive relationship was observed between knowledge of plant protection and adoption ($r = 0.4604$), which was highly significant. This indicates that better knowledge about pests, diseases, symptoms and their management was associated with greater adoption of recommended plant protection measures. On the other hand, land holding ($r = 0.1761$), area under paddy crop ($r = 0.1761$), and farming experience ($r = 0.1600$) showed a positive but non-significant influence on the adoption of plant protection measures among the respondents in the present study.

Thus, it can be concluded that knowledge, source of information and attitude towards plant protection were important factors associated with adoption, while several socio-economic characteristics also showed significant positive relationships. Strengthening farmers' knowledge through extension contact, training, demonstrations and timely information dissemination may therefore help improve adoption of plant protection measures among paddy growers in Gadchiroli district.

5. Conclusion

The study revealed that the adoption of recommended plant protection measures among paddy growers was predominantly at a medium level, with 48.33 per cent of respondents falling in the medium adoption category, followed by 35.00 per cent with low adoption and 16.67 per cent with high adoption. Practice-wise, adoption was comparatively better for stem borer, leaf folder and plant hopper management, whereas considerable gaps were observed in the adoption of several pest and disease management practices. The correlation analysis showed that age, education, occupation, annual income, income from paddy crop, access to credit, source of information, labour availability, attitude towards plant protection and knowledge of plant protection were positively and significantly associated with adoption. Among these variables, knowledge of plant protection showed the strongest positive relationship with adoption ($r = 0.4604$), followed by source of information ($r = 0.3579$) and attitude towards plant protection ($r = 0.3084$). Land holding, area under paddy crop and farming experience showed positive but non-significant relationships, while training received was also non-significant. Thus, improvement in farmers' knowledge, attitude and access to reliable agricultural information is important for increasing adoption. Regular training programmes, field

demonstrations, timely technical guidance and strengthened extension services should be promoted to reduce the adoption gap and encourage effective use of recommended plant protection measures among paddy growers in Gadchiroli district.

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