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Aastha R Vighe

PG Student, Agril. Econ. & Stat. Section, Shri Shivaji Agriculture College, Amravati Maharashtra, India

Dr. SM Sarap

Assistant professor, Agril Econ. & Stat. Section, Shri Shivaji Agriculture College, Amravati, Maharashtra, India

Dr. PD Peshattiwar

Assistant professor, Genetics and Plant Breeding Section, Shri Shivaji Agriculture College, Amravati Maharashtra, India

Shri Sarang A Kanse

Assistant professor, Animal Husbandry and Dairy Science Section, Shri Shivaji Agriculture College, Amravati Maharashtra, India

Extent of adoption of IPM technology in gram production in Amravati district of Maharashtra

Aastha R Vighe¹, SM Sarap², PD Peshattiwar³, Shri Sarang A Kanse⁴

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ABSTRACT

The present study was undertaken to assess the extent of adoption of Integrated Pest Management (IPM) technology in gram (*Cicer arietinum* L.) production in Amravati district of Maharashtra. The study was conducted during the agricultural year 2025–26. Three tehsils, namely Teosa, Bhatkuli and Morshi, were selected and three villages from each tehsil were included. Primary data were collected through personal interviews from 120 gram farmers. The extent of adoption was measured using the Technology Adoption Index (TAI), considering 15 recommended IPM technologies. Farmers were classified into low, medium and high adoption categories. Out of 120 farmers, 23 (19.17 per cent) were low adopters, 77 (64.17 per cent) were medium adopters and 20 (16.67 per cent) were high adopters. The overall TAI was 0.4708, while the indices for low, medium and high adopters were 0.3404, 0.4726 and 0.602, respectively. At the overall level, seed rate recorded the highest adoption index (0.96), followed by proper spacing (0.92), summer ploughing (0.87) and seed treatment (0.78). Very low adoption was observed for hand collection of larvae (0.00), removal and destruction of pest-infested plant parts (0.04), botanicals (0.15) and HaNPV (0.012). The findings indicate that adoption was concentrated more on readily practiced cultural measures, while several mechanical and biological components remained poorly adopted.

Keywords: Gram, *Cicer arietinum* L., Integrated Pest Management, Technology Adoption Index, IPM adoption

Introduction

Agriculture plays an important role in India's food security, employment generation and rural development. Pulses are particularly important because of their nutritional value and their contribution to soil fertility. Among pulse crops, gram (*Cicer arietinum* L.), also known as chickpea or Bengal gram, is an important Rabi-season crop.

Gram production is affected by several biotic and abiotic stresses. Among the biotic stresses, pod borer (*Helicoverpa armigera*) is an important pest. Integrated Pest Management (IPM) provides a broader approach by combining cultural, mechanical, biological and need-based chemical measures.

Insect pests and diseases can adversely affect gram production and profitability. Integrated Pest Management combines cultural, mechanical, biological and need-based chemical measures for pest management. The economic outcome of IPM adoption depends on the expenditure on inputs, labour and plant protection as well as the quantity and value of output obtained. Therefore, estimation of cost and returns at different levels of IPM adoption provides useful farm-level economic information.

Objective of the study

To assess the extent of adoption of IPM technology in gram production.

Materials and Methods

Study area and data collection

The study was conducted in Amravati district of Maharashtra during the agricultural year 2025–26. Three tehsils, namely Teosa, Bhatkuli and Morshi, were selected. Three villages from each tehsil were selected, resulting in nine villages. The selected villages were Bahadarpur, Shiwapur and Gopgavhan in Bhatkuli; Khanapur, Nimbhi and Ghodgavhan in Morshi; and Bharwadi, Mozari and Teosa in Teosa. Primary data were collected through personal interviews from 120 Gram farmers using a structured schedule.

Measurement of Technology Adoption Index (TAI)

The Technology Adoption Index was used to measure the extent of adoption of recommended IPM technologies. Fifteen recommended IPM technologies were considered. AX_k as actual use of the selected technology and RX_k as recommended use of the selected technology, with K representing the recommended number of technologies.

Corresponding Author:

Aastha R Vighe

PG Student, Agril. Econ. & Stat. Section, Shri Shivaji Agriculture College, Amravati Maharashtra, India

For the present study, $K = 15$ (recommended technology)

$$TAI = \frac{1}{k} \left[\frac{AX_1}{RX_1} + \frac{AX_2}{RX_2} + \dots + \frac{AX_K}{RX_K} \right] \times 100$$

Classification of farmers

Based on the Technology Adoption Index, farmers were classified into low, medium and high adoption categories. The classification ranges of farmer were 0–38.94 for low adopters, 38.95–55.72 for medium adopters and 55.73 and above for high adopters.

Results and Discussion

Distribution of farmers according to Technology Adoption Index

Table 1. Distribution of farmer according to Technology Adoption Index

Level of adoption	TAI range	No. of farmers	Percentage
Low	0.00 - 38.94	23	19.17
Medium	38.95 - 55.72	77	64.17
High	55.73 and above	20	16.67
Overall	—	120	100.00

Table 2. Actual use of IPM technology by different level of Adoption in percent.

Sr.	IPM technology	Low	Medium	High	Overall
1	Summer ploughing	67.95	92.85	92.00	87.08
2	Seed treatment	50.00	82.46	92.50	78.33
3	Crop rotation	13.04	45.45	77.80	44.58
4	Proper spacing	91.30	92.20	95.00	92.50
5	Resistant variety	28.26	79.22	90.00	71.84
6	Seed rate	89.13	98.05	100.00	96.66
7	FYM	15.19	33.11	45.00	31.66
8	NPK	40.58	39.00	50.20	41.17
9	Weeding	21.73	24.00	45.00	26.67
10	Pheromone trap and bird perches	41.30	40.00	62.00	44.00
11	Collection/destruction of larvae and eggs	0.00	0.00	0.00	0.00
12	Removal/destruction of infested plant parts	0.00	2.10	15.00	4.20
13	HaNPV	0.00	1.20	2.10	1.20
14	Botanicals	8.60	9.70	45.00	15.00
15	Chemical pesticide	47.82	73.37	90.00	71.00

Conclusion

The study concludes that the extent of IPM adoption among the selected gram farmers were predominantly at the medium level. Out of the 120 farmers, 64.17 per cent were medium adopters, 19.17 per cent were low adopters and 16.67 per cent were high adopters. The overall TAI was 0.47 Seed rate, proper spacing, summer ploughing and seed treatment were comparatively better adopted, while hand collection of larvae, removal and destruction of infested plant parts, botanicals and HaNPV showed very low adoption. Strengthening farmer awareness, practical training and timely access to biological and mechanical IPM inputs would therefore be important for wider adoption.

The majority of farmers belonged to the medium adoption category. Out of 120 farmers, 77 farmers (64.17 per cent) were medium adopters, followed by 23 farmers (19.17 per cent) in the low adoption category and 20 farmers (16.67 per cent) in the high adoption category.

Actual adoption of individual IPM technologies

At the overall level, seed rate recorded the highest adoption (96.66 per cent), followed by proper spacing (92.50 per cent), summer ploughing (87.08 per cent), seed treatment (78.33 per cent), resistant variety (71.84 per cent) and chemical pesticide application (71.00 per cent). Adoption was lower for crop rotation (44.58 per cent), pheromone traps and bird perches (44.00 per cent), FYM (31.66 per cent) and weeding (26.67 per cent). Very low adoption was recorded for botanicals (15.00 per cent), removal and destruction of infested plant parts (4.20 per cent), HaNPV (1.20 per cent), and collection and destruction of larvae and eggs (0.00 per cent).

The results show that adoption of IPM was not uniform across individual practices. Cultural practices such as seed rate, proper spacing and summer ploughing were comparatively better adopted, whereas mechanical and biological components such as larval collection, removal of infested plant parts, botanicals and HaNPV were poorly adopted. The concentration of farmers in the medium adoption category indicates scope for increasing adoption of the complete IPM package through appropriate extension support and practical demonstrations.

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