



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2026): 5.20
www.agronomyjournals.com
2026; SP-9(6): 135-138
Received: 19-04-2026
Accepted: 23-05-2026

S Malathi
Professor (Entomology),
Agricultural College, Warangal,
Professor Jayashankar Telangana
Agricultural University,
Telangana, India

N Kishore Kumar
Assistant Professor (AEXT),
Agricultural College, Warangal,
Professor Jayashankar Telangana
Agricultural University,
Telangana, India

A Ramulamma
SMS (Crop Protection), Krishi
Vigyan Kendra, Kampasagar,
Professor Jayashankar Telangana
Agricultural University,
Telangana, India

B Kranthi Kumar
SMS (Crop Production), Krishi
Vigyan Kendra, Malyal,
Mahabubabad, Professor
Jayashankar Telangana
Agricultural University,
Telangana, India

E Rambabu
Assistant Professor (Horticulture),
Agricultural College, Warangal,
Professor Jayashankar Telangana
Agricultural University,
Telangana, India

A Sarala Kumari
Programme Coordinator (Retd.),
Krishi Vigyan Kendra, Malyal,
Mahabubabad, Professor
Jayashankar Telangana
Agricultural University,
Telangana, India

Corresponding Author:

S Malathi
Professor (Entomology),
Agricultural College, Warangal,
Professor Jayashankar Telangana
Agricultural University,
Telangana, India

Farmer-level knowledge and adoption of integrated pest management in chilli: A study from Mahabubabad district of Telangana, India

S Malathi, N Kishore Kumar, A Ramulamma, B Kranthi Kumar, E Rambabu and A Sarala Kumari

DOI: <https://www.doi.org/10.33545/2618060X.2026.v9.i6Sb.5734>

Abstract

A study was conducted during 2019–20 in Mahabubabad district of Telangana, India to assess the knowledge and adoption of Integrated Pest Management (IPM) practices among chilli growers. Using an ex-post facto research design, data were collected from 120 farmers selected from six villages across three mandals. The results revealed that 56.66% of the respondents possessed high knowledge of IPM practices, while 34.16% and 9.16% had medium and low knowledge levels, respectively. Knowledge was highest for insecticide application (91.66%), deep summer ploughing (88.33%), and crop rotation (85.00%), whereas awareness of resistant cultivars was comparatively low (55.00%). The mean adoption level of IPM components was 67.29 per cent, indicating a moderate to high level of adoption among chilli growers. Among different IPM components, insecticide sprays showed the highest adoption (91.00%), followed by pheromone traps (81.00%), border crops (75.00%), and mechanical control measures (74.00%). Adoption of bioagents (46.00%) and bird perches (38.00%) was relatively low. The study indicates that although farmers possess good knowledge of IPM and have adopted several components, pest management remains largely dependent on chemical pesticides. Strengthening extension efforts to promote eco-friendly IPM practices is essential for achieving sustainable chilli production.

Keywords: Adoption, bioagents, border crop, chilli, knowledge level, IPM, pheromone traps, trap crops

1. Introduction

Chilli (*Capsicum annuum* L.) is an important spice and vegetable crop cultivated throughout India. It is valued for its nutritional richness, containing vitamins, carotenoids, oleoresins, phenolic compounds and capsaicin, which possess antioxidant and medicinal properties (Subbalaxmi and Naik, 2002) ^[10]. Due to its flavour, pungency and colour, chilli is widely used as a condiment worldwide and is an integral part of Asian cuisine (Jitbunjerdkul and Kijroongrojana, 2007; Toontom *et al.*, 2010) ^[2, 11].

India is the world's largest producer of chilli, and Telangana is one of the major chilli-growing states, with the erstwhile Warangal district serving as an important production and export hub. Despite its economic significance, chilli productivity is constrained by several insect pests, including aphids, thrips, mites, whiteflies, fruit borers and jassids, which can cause yield losses ranging from 50 to 90 per cent under severe infestation (Gundannavar *et al.*, 2007; Poornima *et al.*, 2024; Sivakumar *et al.*, 2025) ^[1, 7, 9]. Management of these pests has largely depended on chemical pesticides, leading to problems such as pesticide residues, pest resurgence, insecticide resistance, environmental contamination and loss of natural enemies (Joia *et al.*, 2001; Mallikarjuna Rao and Ahmed, 1986) ^[3, 5]. Growing concerns regarding food safety and export quality standards have increased the need for sustainable pest management strategies.

Integrated Pest Management (IPM) has emerged as an effective and eco-friendly approach that integrates cultural, mechanical, biological and need-based chemical control measures to keep pest populations below economic threshold levels. IPM reduces pesticide use, improves environmental safety, enhances produce quality and increases profitability. However, adoption of IPM practices among chilli growers varies due to differences in knowledge, socioeconomic

conditions, access to extension services and input availability. Therefore, assessing the adoption status of IPM practices and identifying factors influencing their adoption is essential for promoting sustainable chilli production. In this context, the present study was undertaken in Mahabubabad district of Telangana during 2020 to assess the knowledge level and adoption status of IPM practices among chilli growers.

2. Research method

The study was carried out by the Krishi Vigyan Kendra (KVK), Malyal, Mahabubabad - an extension unit of Professor Jayashankar Telangana Agricultural University (PJTUAU), Telangana, India. Three mandals viz., Mahabubabad, Nellikuduru and Kuravi mandals of Mahabubabad district were selected and from each mandal, two villages were selected randomly based on chilli crop coverage. From each of the selected villages, 20 farmers were chosen, making a total sample of 120 farmers for the study. An ex-post facto research design, combined with an exploratory approach, was adopted since the phenomena under study had already occurred and were beyond the control. Familiarity with the local language enabled to establish quick rapport with the respondents and facilitated an in-depth investigation. Primary data were collected using an open-ended interview schedule designed to capture farmers' IPM Practices in chilli. The responses were systematically categorized and interpreted using frequency and percentage distributions.

3. Results and Discussion

3.1 Knowledge level of farmers on IPM in chilli: The respondents were categorized into low, medium, and high knowledge groups based on their level of knowledge regarding IPM practices in chilli (Table 1).

Table 1: Categorization of farmers based on Knowledge level of IPM in chilli

S. No.	Items	Category of Knowledge level		
		Low (up to 33.33)	Medium (33.33 to 66.66)	High (above 66.66)
1.	Frequency	11	41	68
2.	Percentage	9.16	34.16	56.66

The results revealed that more than half of the respondents (56.66%) belonged to the high knowledge category, followed by the medium (34.16%) and low (9.16%) knowledge categories. High level of knowledge about IPM practices in chilli cultivation among majority of the respondents may be attributed to their higher levels of participation in extension programmes and farming experience. Furthermore, a large proportion of the respondents are generally more active, receptive and interested in acquiring new agricultural innovations and technologies. Forty per cent of the farmers possessed high level of knowledge about integrated pest management practices in chilli in a similar study conducted by Mahalakshmi and Tulasiram, 2018^[4] in Raichur district of Karnataka, India by. Similar findings were reported in cotton by Patel and Sanwal, 2015^[6].

3.2 Extent of knowledge level of individual IPM practices in chilli crop: The knowledge level of chilli farmers regarding individual IPM practices varied across different components of crop production and protection (Table 2).

1. Deep ploughing in summer: Deep ploughing in summer exposes soil-inhabiting/resting stages of insects, pathogens, and nematodes and hence helps in decreasing pest incidence

during the crop season. This is a low-cost, widely acceptable practice and fits well in routine land preparation. A majority of the respondents (88.33%) were aware of these benefits and knew deep ploughing in summer as an important preventive IPM practice, which ranked second among the different components. This high level of knowledge may be due to the widespread recommendation of deep ploughing by extension scientists and agencies and its visible effectiveness in reducing pest and disease incidence.

- Adoption of crop rotation:** Farmers are familiar with the concept of crop rotation because of its role in improving soil health and breaking the life cycles of pests and diseases. About 85.00% of the respondents had knowledge of crop rotation as an IPM strategy, ranking third.
- Use of tolerant/resistant cultivars:** Host plant resistance is a cost-effective, sustainable backbone for IPM. However, only 55.00% of the respondents were aware of the use of tolerant or resistant cultivars, making it the least known practice (ranking ninth) among all the recommended IPM measures. The lower knowledge level may be attributed to lack of locally adapted resistant cultivars, insufficient seed availability, yield/market traits trade-offs, or inadequate dissemination by research/extension.
- Early sowing:** Early sowing is a tactical cultural measure to escape peak pest pressure or synchronize crop stages with lower pest abundance. Knowledge regarding early sowing as a pest management strategy secured fourth rank and was reported by 83.33% of the respondents. Farmers recognize that timely sowing helps the crop to escape severe pest infestation and adverse environmental conditions. Availability of seed and water in time is the major constraint expressed for taking up early sowing.
- Inter-cultivation and hand weeding:** A substantial proportion of respondents (82.50%, rank 5) possessed knowledge about inter-cultivation and hand weeding practices. This may be because these recommended practices are widely accepted and routinely followed by farmers and are recognized for reducing weed competition and pest harbourage.
- Growing trap crops and border crops:** Marigold is an important trap crop in chilli to attract fruit borer adults for egg laying so that control measures can be restricted to marigold plants or pest in the field can be reduced by harvesting marigold flowers, securing an additional income. Similarly, jowar and maize are recommended as border crops to reduce initial pest infestation especially sucking pests. 73.33% of the respondents possessed knowledge about the use of these trap and border crops. Although farmers are increasingly becoming aware of these ecological engineering practices, their understanding remain comparatively lower than conventional cultural practices.
- Use of yellow and blue sticky traps for pest monitoring:** About 68.33% (seventh rank) of the respondents were aware of using yellow and blue sticky traps for pest monitoring. Moderate level of knowledge may be due to increased promotion of these devices through extension programmes and demonstrations.
- Use of neem products:** Knowledge regarding the use of neem-based products ranked eighth and was reported by 61.66% of the respondents. Despite the growing emphasis on eco-friendly pest management, limited awareness on neem products was reported which could be due to farmers' preference for quick-acting chemical pesticides.

9. Insecticide sprays: The highest level of knowledge was observed for insecticide application, with 91.66% of respondents reporting awareness. Easy accessibility to agrochemicals, high availability, established supply chains, frequent interactions of farmers with input dealers and

extension personnel and immediate observable effects drive this dominance. However, overdependence on chemicals raises concerns about resistance development, pesticide residues, non-target impacts (natural enemies), and safety.

Table 2: Knowledge level of chilli farmers on IPM practices in Mahabubabad, Telangana

S. No.	Recommended IPM practice	Knowledge level		Rank
		Frequency	Percentage	
Pre sowing				
1	Deep ploughing in summer to expose soil inhabiting/resting stages of insects, pathogens and nematodes.	106	88.33	2
2	Adoption of crop rotation	102	85.00	3
Seed sowing				
3	Cultural practice - Tolerant/resistant cultivars	66	55.00	9
4	Early sowing	100	83.33	4
Vegetative growth stage				
5	Inter cultivation and hand weeding	99	82.50	5
6	Growing trap crops like marigold; border crops like jowar, maize	88	73.33	6
Pest and disease management				
7	Use of yellow and blue sticky traps for monitoring	82	68.33	7
8	Use of neem products	74	61.66	8
9	Insecticide sprays (like triazophos/acephate/acetamprid)	110	91.66	1

3.3 Adoption level of different IPM components

The adoption of different IPM components among chilli growers varied considerably. Among all the components, insecticide sprays recorded the highest adoption (91.00%), indicating that farmers predominantly relied on chemical methods for pest management. Pesticides are perceived as reliable and quick solutions for pest outbreaks. This was followed by the use of pheromone traps (81.00%), suggesting a good level of awareness and acceptance of pest monitoring and mass-trapping techniques. This may be due to increased promotion of pheromone traps through extension programmes and demonstrations conducted by the KVK and department of agriculture. The adoption of border crops (75.00%) and mechanical control measures (74.00%) was also relatively high, reflecting farmers' recognition of these practices in reducing pest incidence. Farmers prefer these practices because they are relatively simple, economical and can be integrated easily into existing crop management operations. Trap crops were adopted by 66.00 per cent of the respondents, indicating moderate acceptance. In contrast, the adoption of bio-agents was comparatively low (46.00%), while bird perches recorded the lowest adoption (38.00%). The lower adoption of bio-agents may be due to limited awareness regarding their mode of action, inconsistent availability, and the perception that biological control agents act more slowly than chemical pesticides. Lowest adoption of bird perches could be because of less awareness of their role in reducing pest populations, or because they perceive them as less effective compared to conventional control measures. Overall, the findings indicate that although several IPM components have been adopted by farmers, chemical control continues to dominate pest management practices in chilli cultivation. The mean adoption level of IPM components was 67.29 per cent, indicating a moderate to high level of adoption among chilli growers. However, the wide variation observed among different components suggests that farmers preferentially adopt practices that provide immediate and visible benefits, while ecological and biological approaches require further promotion through extension interventions. Similar study conducted by Ramulamma *et al.*, 2017^[8] in the same Mahabubabad district during 2016-17 reported 100% adoption of insecticidal sprays and lower adoption of pheromone traps

(16.0%), bird perches (4.0%), border crop (42.6%), trap crops (48.0%) and bioagents (20.0%) than the present study. This shows that extension efforts by the KVK and Department of Agriculture in the district improved the adoption of IPM practices.

Table 3: Status of adoption of different IPM components

S. No.	IPM Components	% Adoption
1	Installation of pheromone traps	81.00
2	Erection of bird perches	38.00
3	Growing border crop	75.00
4	Growing trap crops	66.00
5	Use of bioagents	46.00
6	Mechanical control	74.00
7	Insecticide sprays	91.00

4. Conclusion

The findings indicate that chilli farmers possessed relatively higher knowledge of conventional IPM practices such as insecticide application, deep ploughing, and crop rotation, while knowledge of eco-friendly IPM components such as growing resistant cultivars, use of neem products, sticky traps and trap crops was comparatively lower. Although several IPM components have gained considerable acceptance among farmers, adoption is skewed towards chemical and easily observable control measures, while ecologically based practices such as bioagents and bird perches remain underutilized. Greater emphasis is needed on promoting biological control agents to achieve a more balanced and sustainable IPM approach in chilli cultivation. Also, the continued high dependence on chemical pesticides highlights the need for further extension efforts to promote comprehensive IPM adoption among farmers.

References

- Gundannavar KP, Giraddi RS, Kulkarni KA, Awaknavar JS. Development of integrated pest management modules for chilli pests. *Karnataka Journal of Agricultural Sciences*. 2007;20(4):757-760.
- Jitbunjerdkul S, Kijroongrojana K. Formulation of Thai herbal nam prik. *Songklanakarin Journal of Science and Technology*. 2007;29:837-846.

3. Joia BS, Kaur J, Udean AS. Persistence of ethion residues on chilli. In: National Symposium on Integrated Pest Management in Horticultural Crops; 2001 Oct 17-19; Bangalore, India.
4. Mahalakshmi SM, Tulasiram J. Knowledge of integrated pest management (IPM) practices among chilli farmers in Raichur district of Karnataka, India. International Journal of Current Microbiology and Applied Sciences. 2018;7(3):2196-2202.
5. Mallikarjuna Rao D, Ahmed K. Effect of synthetic pyrethroids and other insecticides on the resurgence of chilli yellow mite, *Polyphagotarsonemus latus* (Banks). In: Proceedings of the National Symposium on Resurgence of Sucking Pests. Coimbatore, India: Tamil Nadu Agricultural University; 1986. p. 73-77.
6. Patel RM, Sanwal S. Knowledge of IPM practices among cotton growers of Sabarkantha district, Gujarat, India. International Journal on Recent and Innovation Trends in Computing and Communication. 2015;3(2):444-446.
7. Poornima G, Pramesh D, Ratnamma P, Saraswati M, Bheemanna M, Prabhuraj A. Efficacy of some insecticides against thrips and yellow mites in chilli. Indian Journal of Entomology. 2024;86(2):575-578.
8. Ramulamma A, Rakesh G, Chaitanya T, Sunil Kumar M, SaralaKumari A. Study on adoption of integrated pest management practices in chilli (*Capsicum annuum* L). Trends in Biosciences. 2017;10(31):6469-6473.
9. Sivakumar S, Angappan S, Thiyagarajan E, Sankaran SP, Perumal R, Veeranan VA, *et al.* Study of dissipation dynamics and persistent toxicity of selected insecticides in chilli using LC-MS/MS. Scientific Reports. 2025;15(1):3585.
10. Subbalaxmi G, Naik M. Nutritive value and technology of spices: current status and future prospects. Journal of Food Science and Technology. 2002;39(4):319-344.
11. Toontom N, Meenune M, Posri W. Consumer preference on flavour profiles and antioxidant information of a Thai chili paste. British Food Journal. 2010;112(11):1252-1265.