



Studies on Awareness Programmes for Insect Pest Management through Organic Farming among Farmers

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Insect pests are a major problem in agricultural production and can significantly affect crop yield, quality, and farmers' income. Although chemical pesticides are widely used to control pests, their excessive application may cause environmental pollution, pesticide resistance, harm to beneficial insects, and risks to human health (Pimentel, 2005). Organic farming offers an environmentally friendly alternative by promoting pest-management practices based on ecological processes, biological control, cultural practices, mechanical methods, and plant-derived products (FAO, 2020). The successful implementation of these approaches largely depends on farmers' awareness, knowledge, technical skills, and access to reliable information. Awareness programmes can help farmers identify insect pests, monitor pest populations, conserve natural enemies, use biological control agents, prepare botanical products, and adopt preventive crop-management practices. Training programmes, field demonstrations, farmer field schools, extension meetings, and digital agricultural advisory services can strengthen farmers' capacity to use sustainable pest-management techniques. Research on integrated pest management has demonstrated that farmer participation and education can reduce reliance on pesticides while supporting sustainable agricultural production (Pretty & Bharucha, 2015). Therefore, strengthening awareness among farmers is essential for encouraging the adoption of organic insect pest-management practices and promoting environmentally sustainable agriculture.

Keywords: Farmer awareness, organic agriculture, insect pest management, biological control, botanical pesticides, agricultural extension, sustainable farming.

Introduction

Agricultural production is continuously affected by different insect pests that attack crops at various stages of growth. Pest infestation can damage leaves, stems, roots, flowers, fruits, and seeds, ultimately reducing crop productivity and quality. Effective insect pest management is therefore necessary for maintaining stable agricultural production. Chemical pesticides have traditionally been an important tool for managing agricultural pests because they generally provide rapid control. However, their repeated and inappropriate use can create serious environmental and economic problems. These include pesticide resistance, contamination of soil and water, destruction of beneficial organisms, and possible risks to human health (Pimentel, 2005). Organic farming provides an alternative approach that places greater emphasis on ecological balance, biodiversity, soil health, and natural resource conservation. The principles of organic agriculture promote the use of ecological processes and discourage unnecessary dependence on synthetic inputs (IFOAM, 2008). Consequently, pest management in organic farming focuses mainly on preventive and environmentally compatible methods, including cultural practices, biological control, mechanical control,

physical methods, and suitable natural products (FAO, 2020). However, farmers cannot effectively adopt these approaches without adequate knowledge and practical skills. They need to know how to identify pests, recognize beneficial organisms, monitor pest populations, determine appropriate intervention, and select suitable management practices. Awareness programmes are therefore important for connecting scientific research and extension knowledge with farmers' practical needs.

Farmers' Awareness of Organic Insect Pest Management

Farmers' awareness includes their knowledge of pest species, symptoms of infestation, pest biology, monitoring methods, preventive practices, and available management options. Proper identification of a pest is particularly important because different insect species require different management approaches. In organic farming, pest control depends more heavily on preventive and ecological practices than on routine chemical applications. FAO (2020) emphasizes that organic pest management should address the factors contributing to pest development and encourage preventive approaches before serious infestations occur.

Awareness programmes can enable farmers to:

- identify common insect pests and the damage they cause;
- distinguish harmful insects from beneficial organisms;
- understand pest life cycles and seasonal occurrence;
- regularly monitor crops for pest infestation;
- conserve predators and parasitoids;
- use biological control methods appropriately;
- apply botanical pest-management products correctly;
- adopt crop rotation and diversified cropping;
- maintain proper field sanitation; and
- reduce unnecessary pesticide applications.

Improved knowledge can help farmers make better decisions regarding when and how pest-management measures should be applied (Pretty & Bharucha, 2015).

Organic Approaches to Insect Pest Management

Organic farming involves a combination of pest-management practices rather than dependence on a single control method. The most appropriate method depends on the crop, pest species, environmental conditions, and resources available to farmers.

Cultural Pest Management

Cultural practices are primarily preventive measures used to make agricultural fields less favourable for pest development. Crop rotation, intercropping, timely planting, field sanitation, removal of damaged plant material, and proper crop management can reduce pest populations and interrupt pest life cycles (FAO, 2020). Diversified cropping systems may also support natural enemies and reduce the concentration of host plants available to particular pests. These practices can be effectively demonstrated through farmer training and field-based programmes.

Biological Control

Biological control refers to the use or conservation of living organisms that naturally suppress insect pests. Predatory insects, parasitoids, and beneficial microorganisms can contribute to maintaining pest populations at acceptable levels. Farmer awareness is essential for successful biological control because many farmers may not be able to distinguish beneficial insects from harmful species. Excessive use of pesticides can destroy natural enemies along with pests, thereby disturbing the ecological balance of the farm ecosystem (Pimentel, 2005). Awareness programmes should therefore emphasize the identification and conservation of beneficial insects and explain their contribution to natural pest regulation.

Botanical Pest Management

Botanical pesticides are derived from plants and can be used against certain insect pests. They can form part of an organic pest-management programme when appropriate products and application methods are used (FAO, 2020). Farmers can be trained in the selection of

suitable plant materials, preparation of botanical extracts, application methods, appropriate timing, and safe handling. Demonstrations are particularly useful for developing farmers' practical skills in this area.

Mechanical and Physical Methods

Mechanical and physical techniques include hand-picking insects, destroying egg masses, removing heavily infested plant parts, installing traps, and using physical barriers. These methods may be especially useful for small farms where frequent field observation is possible (FAO, 2020). Awareness programmes can demonstrate these techniques directly in farmers' fields and explain how they can be combined with other pest-management approaches.

Importance of Awareness Programmes

Awareness programmes provide farmers with information and practical skills that can improve their ability to manage insect pests sustainably. Such programmes may be conducted by agricultural universities, research organizations, government departments, extension agencies, farmer organizations, and development agencies. A comprehensive awareness programme should provide information about pest identification, pest monitoring, natural enemies, biological control, botanical pesticides, cultural methods, mechanical control, and the safe use of approved agricultural inputs. Practical demonstrations are particularly valuable because farmers can observe the application of a technology under actual field conditions. Farmer field schools and participatory learning activities can further improve understanding by encouraging farmers to observe, discuss, experiment, and make decisions based on field conditions (Pretty & Bharucha, 2015).

Role of Agricultural Extension

Agricultural extension services are important for transferring research-based knowledge to farming communities. Extension workers can conduct village meetings, training programmes, field demonstrations, exhibitions, farm visits, and farmer field schools. Training should be designed according to local crops and pest problems and should preferably be delivered in a language that farmers understand easily. Locally relevant examples can improve participation and make technical information easier to apply. Digital communication can provide additional opportunities for farmer education. Mobile phones, agricultural applications, social media platforms, videos, and online advisory systems can provide information about pest outbreaks and management practices. However, digital extension should be combined with direct field-level support because farmers differ in access to technology and digital skills.

Measuring the Effectiveness of Awareness Programmes

The effectiveness of farmer awareness programmes can be assessed by comparing knowledge before and after training. A structured questionnaire or interview schedule can be used to assess farmers' understanding of pest identification, pest monitoring, biological control, botanical pesticides, and cultural practices. A baseline or pre-training assessment can determine farmers' existing knowledge. A post-training assessment can then be used to identify improvements resulting from the programme. However, an increase in knowledge does not necessarily lead to adoption. Farmers may understand a recommended technology but avoid using it because of high labour requirements, limited availability of inputs, cost, lack of technical assistance, perceived uncertainty, or doubts regarding effectiveness. For this reason, studies should assess farmers' **knowledge, attitudes, practices, and adoption behaviour**, rather than focusing exclusively on knowledge scores.

Factors Affecting Adoption

The adoption of organic pest-management practices is influenced by a combination of economic, social, technical, and institutional factors. Farmers' education, farming experience, farm size, access to extension services, availability of organic inputs, labour availability, market opportunities, perceived profitability, and risk perception may affect their decisions. Continuous contact with extension personnel can improve farmers' confidence in unfamiliar practices. Similarly, seeing successful results in demonstration plots may encourage farmers

to experiment with organic pest-management methods. Pretty and Bharucha (2015) reported that successful integrated pest management programmes require more than technical recommendations; farmer learning, institutional support, and suitable implementation conditions are also important.

Challenges in Adopting Organic Pest Management

Although organic pest management offers several environmental benefits, farmers may face difficulties in its implementation. Some methods require frequent crop monitoring and timely intervention. Certain biological or botanical inputs may not be easily available, and farmers may lack the knowledge required for their proper use. Another challenge is the perception that organic methods act more slowly than synthetic pesticides. Farmers facing serious pest outbreaks may therefore prefer chemical pesticides because of their perceived immediate effectiveness. Inadequate extension support, limited availability of reliable organic inputs, additional labour requirements, and insufficient market incentives may further discourage adoption. Pimentel (2005) also highlighted the economic and environmental consequences associated with excessive pesticide dependence, demonstrating the need for more sustainable alternatives.

Participatory Approaches to Farmer Awareness

Participatory approaches can make awareness programmes more effective because farmers actively participate in the learning process. Rather than simply listening to lectures, farmers can observe pest populations, identify natural enemies, test management methods, and discuss field-level experiences. Farmer field schools provide an important example of this approach. They encourage farmers to learn directly from their fields and develop decision-making skills through observation and experimentation. Participatory learning has been identified as an important component of successful IPM initiatives (Pretty & Bharucha, 2015). Farmer-to-farmer extension can also be useful. Farmers who have successfully adopted organic pest-management techniques can demonstrate their experiences to neighbouring farmers. This can improve trust and encourage wider adoption.

Future Scope

Future awareness programmes should be developed according to the specific needs of farmers and the pest problems affecting local crops. Training programmes should combine scientific information with farmers' traditional knowledge and practical experience. Demonstration plots can be established to compare organic pest-management practices and conventional approaches in terms of pest suppression, yield, production cost, and environmental effects. Economic information is particularly important because farmers are more likely to adopt practices that they consider technically effective and economically viable. Digital agricultural extension also has considerable potential. Mobile-based pest alerts, instructional videos, online training programmes, and expert advisory services can provide timely information. Combining digital communication with field-based extension can improve the coverage and continuity of farmer education. Long-term follow-up studies should also be conducted to determine whether farmers continue to use the practices introduced through awareness programmes. Such studies can identify the factors responsible for sustained adoption.

Conclusion

Awareness programmes are an important means of promoting organic insect pest management among farmers. Organic agriculture emphasizes ecological balance, biodiversity, prevention, and responsible use of natural resources (IFOAM, 2008). Organic pest management can involve cultural, biological, botanical, mechanical, and physical methods, which can be combined according to local conditions (FAO, 2020). Improving farmers' knowledge can help them identify insect pests, monitor their populations, conserve beneficial organisms, and select appropriate management practices. Participatory training, field demonstrations, farmer field schools, and continuous extension support can further

improve farmers' confidence and adoption of sustainable pest-management technologies (Pretty & Bharucha, 2015). Thus, awareness programmes should be considered an essential component of sustainable agricultural development. Strengthening farmers' knowledge and practical skills can reduce unnecessary dependence on synthetic pesticides, protect beneficial organisms, reduce environmental impacts, and support the development of safer and more sustainable farming systems.

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