Research Paper Zoology

Analyzing the Barriers of Integrated Pest Management Involved in Agro Fields of Usilampatti Taluk, Tamil Nadu, India

Vanitha K	Ph.D. Research Scholar, Manonmaniam Sundaranar University, Tirunelveli – 627012, Tamil Nadu
Dr. B. Geetha	Asst. Professor, Department of Zoology, V.O. Chidambaram College, Tuticorin – 628003 Tamil Nadu
Dr. S. Dinakaran	Head, PG Department of Zoology, The Madura College, Madurai – 625011 Tamil Nadu

ABSTRACT

Among the sustainable agricultural strategies, integrated pest management play a vital role. IPM incorporates the entire suite procedures to govern or manage arthropods and pests in crops. It offers a system tactic to pest management and cut pesticide by means and it customs sustainable method. But, in South Indian context, particularly in Usilai Taluk, rice cultivation is at peak, but contrary to this, the awareness among farmers in the participation of IPM lacks behind the actual level, which further needs to improve. Hence, this research was done with aim to study the barriers involved in the implementation of integrated pest management through weeds and arthropods under the circumstances of Usilai Taluk. The common barriers are collected from the existing literatures; further the common barriers are modified as a questionnaire in order of scale, to collect data. In order to analyze the data, multi criteria decision making approach was used, namely analytical hierarchy process (AHP). By which the weightage of the each collected common barriers were identified based on the replies of the decision makers. The results concluded the most effective barrier of IPM implementation with the concern of arthropods and weeds. Furthermore, finally this study ends with some future insights which shed light on major issues of IPM.

KEYWORDS : Barriers, Integrated Pest Management, Arthropods, Weeds, AHP

Introduction

In the past three decades the concept of sustainable agriculture evolved as an answer to the negative impacts of conventional farming. There remains disagreement among farmers, the general public, and even agricultural professionals about what the concept means. Sustainable agriculture is a key element of sustainable development and essential to the future well-being of the planet. Sustainability aims to achieve adequate safe and healthy food production, improved livelihoods of food producers and the preservation of non-renewable resources. which this objective can be achieved is through integrated pest management (IPM), rather than sole reliance on pesticides.

Increasing agricultural production through heavy use of pesticides and inorganic fertilizers is now recognized as a threat to the natural resource base. Environmental concerns such as depletion of natural resources, pollution of soil, air water and chemical residues in foods have become important topics in agricultural production. Subsequently, the demand for Integrated Pest Management (IPM) has increased due to negative effects observed from use of pesticides. IPM is a strategy which encourages the reduction of pesticide use by employing a variety of pest control options in combination to contain or manage pests below their economic injury levels. Implementation and adoption of an Integrated Pest Management strategy can help to reduce environmental and human health risks and reduce pest management costs. IPM is a vital component of agro-ecological engineering for sustainable development of agriculture. IPM programs utilize all possible control strategies, including biological control, cultural control, environmentally sound chemical control and ecosystem health techniques, with the goal of reducing purchased inputs while maintaining the yield, quality and profit of crops. Indeed, Integrated Pest Management, or IPM, is a method used to control pests in an environmentally responsible manner. By reducing our dependence on pesticides, IPM protects the environment and our health. It also saves money. IPM can be applied wherever pests are found: on and in farms, schools, homes, hospitals, restaurants, golf courses and home gardens. IPM combines different techniques to prevent pest damage without harming the environment. Pests can include insects and mites, rodents and certain birds, plant diseases, and weeds. IPM practices include monitoring, modifying pest habitat, protecting natural enemies, and, when needed, the use of pesticides.

In summary, integrated pest management (IPM) helps growers use pesticides wisely in combination with other approaches to minimize economic, health and environmental risks. IPM provides a system for growers to use knowledge instead of just pesticides to control pest problems. To make good choices about control, growers need knowledge gained from training and observations in the field. This includes education about pest life cycles, scouting for pests and the impact of pesticides. IPM's systematic approach helps growers use information to make sound decisions about pest control that take into account cost, effectiveness, resistance management and potential environmental impacts. IPM emphasizes a range of options to prevent pest problems – including solutions based on mechanical (e.g., mowing or pruning) or cultural practices (e.g., planting cultivars that match site conditions or are disease resistant). With improved spray timing, IPM enables growers to use pesticides more efficiently, effectively and safely. Growers can reduce or eliminate practices such as application of broad-spectrum pesticides that disrupt natural processes for controlling pests.

Research concluded that attitude towards IPM, Knowledge of IPM and risk bearing ability are the important factors influencing adoption of IPM. Looking to this fact, a study was thought necessary to undertake with one important objective. That is detecting the barriers of adopting integrated pest management in Usilai Taluk, Madurai, India.

Materials and Methods

This section folds into two main categories, namely data collection and data analysis. The detailed descriptions of both sections are discussed below.

Data collection

For any kind of study data collection play a vital role, because most of studies face downfall owing to the lack of reliability of the data. Hence, the data which is to be analyzed must be solid in terms of the study's core. In this paper, the common barriers exhibit in implementation of weeds associated arthropods IPM was collected. Collected common barriers are shown in Table 1. It consists of six sub dimensions and each consists its relevant sub criteria for analysis.

Table 1: Common barriers collected from literature

Dimension	Criteria
Outreach barriers	OUT-1 Insufficient training and technical support to farmers
	OUT-2 Limited access to IPM inputs, like resistant cultivars and biopesticides
	OUT-3 Limited access to IPM extension publications and knowledge
	OUT-4 IPM too difficult to explain and understand
	OUT-5 Shortage of well-qualified IPM experts
	OUT-6 Shortage of IPM training programs in universities and other training institutions
	OUT-7 Lack of IPM guidelines for many pests and diseases, both old and emerging
	OUT-8 Shortage of IPM guidelines focused on crop health instead of specific pests
	OUT-9 Shortage of well-qualified extensionists
	OUT-10 Farmers unaware of IPM
	OUT-11 IPM extension publications are difficult to understand for farmers
	OUT-12 Poor understanding of mechanisms behind successful extension programs
Incentive barrier	INC-1 Lack of favorable government policies and support
	INC-2 Shortage of funding for IPM, especially long-term funding
	INC-3 Lack of market incentives for farmers to adopt IPM, consumers want high quality at lowest price
Farmers related barriers	FMR-1 Farmers have low levels of education and literacy
	FMR-2 Farmers uninterested in changing habitual management practices
	FMR-3 Farmers are too risk averse
	FMR-4 Farmers have limited understanding of unintended effects of pesticides
IPM related barriers	IPM-1 IPM too difficult to implement compared with conventional management with pesticides
	IPM-2 Costs of IPM are much more apparent than benefits
	IPM-3 IPM requires collective action within farming community
	IPM-4 IPM too expensive
	IPM-5 Shortage of practices and products as effective as chemical pesticides
	IPM-6 Conventional management with pesticides responds well to needs of farmers
	IPM-8 IPM too labor-intensive
	IPM-9 Benefits of pesticides are much more apparent than their negative effects
	IPM-10 Farmers become disillusioned with IPM because experts overestimate its benefits
	IPM-11 IPM combines many practices but farmers want just the single best
	IPM-12 Farmers cannot make IPM priority, have more important problems to address
Pesticide industry influence	PST-1 Powerful influence of pesticide industry
	PST-2 Pesticides promoted too heavily by salespeople
	PST-3 Access to pesticides too easy and unrestricted in rural areas
	PST-4 Weak regulation of pesticide industry
Research Barriers	RCH-1 Shortage of interinstitutional collaboration in IPM; e.g., between universities and private sector
	RCH-2 Insufficient IPM research
	RCH-3 IPM research poorly oriented to needs of farmers
	RCH-4 Shortage of interdisciplinary collaboration in IPM; e.g., between pathologists and rural sociologists
	RCH-5 Insufficient attention to participatory methods
	RCH-6 Experts underestimate legitimate role of pesticides in IPM
	RCH-7 Insufficient attention to biological control
	RCH-8 Insufficient attention to host plant resistance
	RCH-9 Many IPM recommendations are not evidence-based or research-based
	RCH-10 Insufficient attention to cultural practices, like crop rotations and intercropping
	RCH-11 Insufficient attention to decision-support tools
	RCH-12 Insufficient attention to gender issues
	RCH-13 Insufficient attention to traditional and local knowledge

Data Analysis

Data analysis was one with the assistance of analytical hierarchy process (AHP), based on the replies of the decision makers including farmers, landlords and agricultural officials in that locality. Though the procedures and steps are same for all analysis, hence in this study, only the analyses of dimensions through AHP were shown and along with the final results are detailed.

Table 2: Pairwise comparison among dimensions

	ORB	IB	FRB	IPMB	PIB	RB
ORB	1	1/2	4	1/3	3	2
IB	2	1	5	1/2	4	3
FRB	1/4	1/5	1	1/6	1/2	1/3
IPMB	3	2	6	1	5	4
PIB	1/3	1/4	2	1/5	1	1/2
RB	2	1/3	3	1/4	2	1

Table 3: Normalized comparison matrix among dimensions

	ORB	IB	FRB	IPMB	PIB	RB
ORB	0.116505	0.116732	0.190476	1/7	0.193548	0.184615
IB	0.23301	0.233463	0.238095	0.204082	0.258065	0.276923
FRB	0.029126	0.046693	0.047619	0.068027	0.032258	0.030769
IPMB	0.349515	0.466926	0.285714	0.408163	0.322581	0.369231
PIB	0.038835	0.058366	0.095238	0.081633	0.064516	0.046154
RB	0.23301	0.077821	0.142857	0.102041	0.129032	0.092308

Table 4: Eigen values and ranks among dimensions

S. No	Barriers	Eigen values	Ranks
1	ORB	0.156322	3
2	IB	0.240606	2
3	FRB	0.042415	6
4	IPMB	0.367022	1
5	PIB	0.064124	5
6	RB	0.129511	4

Likewise, the other rankings are as follows.

Table 5: Eigen values and ranks among outreach barriers

S No	Barriers	Eigen values	Ranks
1	OUT1	0.183709	2
2	OUT2	0.049822	7
3	OUT3	0.038061	8
4	OUT4	0.028712	9
5	OUT5	0.13602	3
6	OUT6	0.02168	10
7	OUT7	0.016285	11
8	OUT8	0.012244	12
9	OUT10	0.241175	1
10	OUT12	0.108	4
11	OUT13	0.064245	6
12	OUT14	0.083301	5

Table 6: Eigen values and ranks among Incentive barriers

S No	Barriers	Eigen values	Rank
1	INC1	0.163781	3
2	INC2	0.297258	2
3	INC3	0.538961	1

Table 7: Eigen values and ranks among Farmers related barriers

S No	Barriers	Eigen values	Rank
1	F1	0.465819	1
2	F2	0.09597	4
3	F3	0.27714	2
4	F4	0.16107	3

Table 8: Eigen values and ranks among IPM related barriers

S No	Barriers	Eigen values	Ranks
1	IP1	0.108336	4
2	IP2	0.188957	2
3	IP3	0.142729	3
4	IP4	0.035704	8
5	IP5	0.250785	1
6	IP6	0.062659	6
7	IP7	0.026675	9
8	IP8	0.019813	10
9	IP9	0.01108	12
10	IP10	0.082428	5
11	IP11	0.014715	11
12	IP13	0.047446	7

Table 9: Eigen values and ranks among Pesticide industry influence barriers

S No	Barriers	Eigen values	Rank
1	PIB 1	0.07597	4
2	PIB 2	0.385819	1
3	PIB 3	0.33714	2
4	PIB 4	0.20107	3

Table 10: Eigen values and ranks among research barriers

S No	Barriers	Eigen values	Rank
1	RB1	0.01108	12
2	RB2	0.188957	2
3	RB3	0.250785	1
4	RB4	0.014715	11
5	RB5	0.142729	3
6	RB6	0.008673	13
7	RB7	0.108336	4
8	RB8	0.082428	5
9	RB9	0.026675	9
10	RB10	0.019813	10
11	RB11	0.062659	6
12	RB12	0.035704	8
13	RB13	0.047446	7

Conclusion

From the study it can be clearly found that Integrated pest management related barriers are the major factors which hurdle the implementation of integrated pest management through weeds and arthropods. However, other sub barriers are also explored with the assistance of AHP methodology, in future it can extended with the focus of geographic difference, in order to explore whether the barriers are generalized from location to location. However, along with the useful implications this study provides advantageous insights for the effective implementation of integrated pest management through weeds and arthropods.