Indian Journal of Agriculture and Allied Sciences
A Refereed Research Journal

ISSN 2395-1109
Volume: 1, No.: 4, Year: 2015

Received: 28.10.2015, Accepted: 30.11.2015

ADOPTION OF NEWER IPM TECHNOLOGIES BY THE FARMERS AND PATTERN OF ADOPTION VIS-A-VIS PRESENT DAY INTENSIVE FARMING

Richa Kumari[1] and A. P. Nikoshe[2]

[1]Ph.D. Scholar, Department of Entomology and Agricultural Zoology, Banaras Hindu University, Varanasi-221 005, Email:richthakur61@gmail.com, [2]Ph. D Scholar, Division of Entomology, IARI, New Delhi, Corresponding Author: Richa Kumari

Abstract: *Importance of Integrated Pest Management (IPM) is evident fromstudies all over the world in so many ways as this is an ecologically much safer approach than the complete reliance on the chemical based methods. Specifically bio intensive IPM will not only reduce the pesticide load on crop and environment in general but also provide more sustainable alternative to the conventional chemical interventions by utilizing eco-friendly approach towards the pest problem by minimizing chemical use. Adoption of the IPM technology by the farmers around the world shows the immense potentialas it was the only reliable notion which could provide the both food security and environmental stability simultaneously without compromising the economic benefits that derived for the farmers. Indeed, despite five decades since the concept of integrated control and threshold theory was born, and four decades since implementation ofIPM programs in USA, Asia, Latin America, Australia, and India, the widespread use of complex IPM practices are not being adopted. This failure can be explained by IPM complexity, policy restrictions, and counteracting forces that pesticide industry applies. IPM practices with adoptability indices higher than 0.60 have been widely adopted by the farmers.The methodological framework developed to forecast the adoptability of agricultural innovations in general and IPM practices in particular offers plausible answers to the researchers to predict at what extent farmers will adopt a new technology. Following review was done to comprehend the current position of the adoption of IPM, role of extension programmes and potential in these technologies*

Keywords: *Adoption, Bio-intensive IPM, Eco-friendly, Integrated Pest Management (IPM).*

Introduction: IPM is usually referred as a "crop protection/pest management system" with allegation used for both of the methodologically and disciplinary combination in the socio economic framework of farming system. IPM is a sustainable agriculture approaches with a sound ecological foundations. It is usually targeted against the complete pest complex of an agro ecosystem [1]. IPM Pest allows the farmers in protection of their crops from different types of pests. IPM also gives protection to soil, water, wild life, beneficial insects and the community. Most of the scientific literatures showed that the practices of IMP improve the environmental performance and effective pest control [2].The Socio-economic characteristics of the farmers do not significantly influence their adoption of IPM [3,4]. Among the socio-economic factors, income, farming experience, gender, education, amount of land owned, age among others have been found to significantly influence the adoption of IPM technologies[4]. Importance of Integrated Pest Management (IPM) is evident from studies all over the world in so many ways as this is an ecologically much safer approach than the complete reliance on the chemical based methods. Effective linkages between research, extension and sugarcane growers should help in identifying the problems faced by farmers in adoption of IPM practices, ultimately arriving at the most appropriated solutions through on farm research and on farm trails. Researches carried in Sri Lanka declared IPM most promising pest control method because this method has flexibility strategy for insect control and its performance was followed environmental preservation objectives [5]. Keeping this in mind present review is done to understand the farmer adaptation pattern of IPM and the role of extension personals in dissemination of the technology.

Four Simple Steps Comprise the IPM Program

1. Set Action Threshold**-** Before choosing an action, determine if there really is a problem. For example, if there is only one tomato hornworm, pick it off the plant to avoid using chemicals.
2. Monitor and Identify Pests- Accurate identification of "pests" will determine the need for chemicals. Many beetles, bugs and weeds do not require chemical use because many do not cause problems.
3. Prevention-in an IPM program, implement other controls before chemicals. Changing the time of watering, planting vegetables in different spots each year and choosing appropriate plant varieties are examples of preventative actions. These do not require extensive changes or financial input.
4. Control- If action is required after steps 1-3, evaluate the various forms of control to determine the least risky. Using pheromones to interrupt the mating cycle, weeding or trapping, may be effective and have no bad effects. Specifically targeted chemicals affecting specific pests would be the next to the last resort. The goal is to avoid broadcast spraying of non-specific chemicals [6].

Adoption of the IPM technologies: Adoption of the IPM by the farmers is worked out as under [7], on cured Virginia tobacco in Middle East.

$$D = \frac{\sqrt{P(1-P) \times Y\, 1 + d(m-1)Y}}{n}$$

Where,

D = Confidence Level Value

K = 1.64 (Constant for 90% Confidence Level)

D = 0.2 (constant)

$$M = \frac{Total\ Number\ of\ Farmers}{Total\ Number\ of\ Villages}$$

N = Total Number of Farmers (Respondents)

$$P = \frac{No. of\ respondents\ for\ Specific\ Activities \times \frac{100}{100}}{Total\ surveyed\ farmers\ (Respondents)}$$

Upper and Lower confidence levels are worked out as below:

Upper Confidence level = (P + D) x 100

Lower Confidence level = (P – D) x 100

Adoption rate of farmers from Chakdarra and Shergarh ranged between 21.47-46.53%and 19.66-44.33% at 90% confidence level respectively for improved crop production practices. Most farmers found chemical applications of insecticides very useful and no one found itnon-useful, maximum farmers reported to provide the optimum irrigations.

Reported that majority of the sugarcane growers from Karnataka were relatively lesser in adoption of biological tool, practicing mulching, paired row planting, judicious use of nitrogen and irrigation, planting disease free sets compared to chemical tool, frequent irrigation, set treatment, in management of pest in sugarcane [8].

Highest technological gap (87.60%) in the adoption of biological control measures against the mulberry pests whereas the gap with cultural/mechanical practices was 33.30% and minimum 9.80% in the adoption of chemical measures for uzi fly management on silkworms in Tamil Nadu [9]. Reported awareness about various IPM practices among the farmers of the country with maximum emphasis on chemical control based on ETL in combination with little use of bio-agents and mechanical control [10].

Efficiency of Extension Programmes in Adoption of IPM Technologies: Extension services are one of most important cause about chemical pesticides using by farmers because extension services have focused on chemical pesticide diffusion in developing countries for long time [11]. Many researchers believe that participatory methods can be more effective in IPM technology adoption by farmers as success of farmer's field school (FFS) method is evident [12]. Since farmers are the final decision-makers for adoption of any technology, it is important for the technology developers/providers to identify how farmers react to the provided techniques and what about the adoption process of certain innovations [13].

Previous studies about role of extension services on farmers IPM adoption emphasized on four important notes [14]:

1. Agricultural extension services have effected on farmers IPM adoption by increasing IPM knowledge.
2. IPM/FFS is used as main educational method for farmers.
3. Although agricultural extension services can have improving function in IPM adoption by farmers but incomplete using of these services can reduce IPM adoption. Therefore, attention to other educational technology is necessary.

4. IPM technology is considered as a sustainable agricultural technology which can reduce using of pesticides by farmers.

In the findings farmers adopting the technology and extension contact was not encouraging in Nigeria [15]. Revealed that in the Western Hills of Nepal, the level of adoption of technologies was consistently and significantly affected by the level of extension input [16]. A study on crop-specific IPM training provided by the farmer field schools has been found extremely effective in wider adoption of IPM [13]. Showed that using variation tools in IPM education to farmers has increase farmers [17] IPM adoption and can make informal educational method effective on farmers IPM knowledge and active farmers observation skills used in FFS enhanced farmers tendency to adopt IPM [18].

Reported the five most important problems as reported by the farmers ranked in the following order: i) need for much more labour, ii) lack of proper training for farmers about IPM, iii) lack of farmers knowledge regarding IPM practices, iv) availability of insecticides and v) complexity of IPM practices. Similarly, the five most common suggestions were i) establishment of more IPM field school, ii) arrangement of farmers practical training, iii) introduction of IPM practices into the school/college academic course, iv) increase the farmers awareness on environment pollution and v) to ensure proper supervision of extension worker [19].

Potential of IPM Strategies: Full implementation of the IPM approach requires more effort than other types of control programmes, but once in place, it can be used to make more reliable pest management decisions. A successful pest manager understands (i) food facility structure and operations, (ii) the taxonomy, behaviour, ecology, and biology of pest species, and (iii) the effective use of monitoring and management tools. The ecology of stored-product insects, and thus, the insect pest management programme required are likely unique for each chain, for each location in the marketing system, and for each time those insect pests are managed [20]. The components of an IPM programme are many and are available for use, but our understanding of their optimal integration and target specific utilization of these tactics as part of an IPM is limited. Adoption of IPM is also hindered by spatial and temporal complexities of landscapes and poor understanding of the pest populations, the difficulty of evaluating pest populations, and finally by the limited information on field efficacy and how to optimally select and combine management tools. Many questions remain about the use of these tools; from the very practical issues such as how many traps are needed and which types work best, to fundamental issues concerning the relationship between trap captures and pest population density, distribution and level of infestation. Finally, there is a great need for conversion of IPM research into user friendly decision support tools that have been developed and validated in practical situations [21].Combining and integrating different management tools and careful selection and timing of different approaches, together with an understanding of pest behaviour and ecology can result in greater effectiveness. For example, heat combined with diatomaceous earth effectively reduced the temperatures necessary to kill stored-product insects [22]. Using single multiple pheromone trap will reduce the material land labour costs of maintaining a pest surveillance programme (Wakefield, 2006).

References

1. Bajwa, W.I. and Kogan, M. (2002). Compendium of IPM Definitions (CID) - What is IPM and how is it defined in the Worldwide Literature? *IPPC Publication No. Integrated Plant Protection Center* (IPPC), Oregon State University, Corvallis, OR 97331, USA, pp: 998.
2. Hamerschlag, K. (2007). Economic How “USDA Could Deliver Greater Environmental Benefits From Farm Bill Conservation Programs, *NRDC ISSUE PAPER.*
3. Ofuoku A.U., Egho E.O. and Enujek, E.C. (2009[a]).Integrated Pest Management (IPM) Adoption among Farmers in Central Agro-Ecological Zone of Delta State, Nigeria. *Advances in Biological Research*,3(1-2): 29-33.
4. Kirinya, J., Taylor, D. B., Kyamanywa, S., Karungi, J., Erbaugh, J. M. and Wabbi, J. B. (2013). Adoption of Integrated Pest Management (IPM) Technologies in Uganda: Review of Economic Studies. *International Journal of Advanced Research*, 1(6): 401-420.
5. Sanderson, J. T., Boerma, J., Lansbergen, G. W. and Van den Berg, M. (2002). Induction and inhibition of aromatase (CYP19) activity by various classes of pesticides in H295R humanadrenocortical carcinoma cells.*Toxicology and applied pharmacology*,182(1): 44-54.
6. Ahmad, I., Islam, Z., Fazli S., Muhammad I., Khan, M. and Hassan, S. (2014[a]). Adoption of Integrated Pest Management (IPM) Practices in Flue Cured Virginia Tobacco Crop. *Middle-East Journal of Scientific Research*,19(6): 760-768.

7. Ahmad, I., Islam, Z., Fazli S., Muhammad I., Khan, M., and Hassan, S. (2014[b]). Adoption of Integrated Pest Management (IPM) Practices in Flue Cured Virginia Tobacco Crop. *Middle-East Journal of Scientific Research,*19(6): 760-768.
8. Maraddi, G. N., Hirevenkanagoudar, L. V., AngadiJ. G.and Kunnal, L. B. (2007). Extent of adoption of integrated pest management practices by sugarcane growers, *KarnatakaJ. Agric. Sci*., 20(3):564-567.
9. Sakthivel, N., Kumaresan, P., Qadri, S. M. H., Ravikumar, J. and Balakrishna, R. (2012). Adoption of integrated pest management practices in sericulture-A case study in Tamil Nadu. *J. Biopest*, 5: 212-215.
10. Dixit and Rai (1999). Economics of Integrated Pest Management in Major Crops of Andhra Pradesh, *Integrated Pest Management in Indian Agriculture proceedings,* 11:175.
11. Orr, A. (2003). Integrated pest management for resource-poor African farmers: Is the emperor naked? *World Development*, 31:831-845.
12. Asiabaka, C.(2002). Promoting Sustainable Extension Approach: Farmer Field School (FFS) and its role in sustainable agriculture development in African.Department of agricultural economic and extension, Federal university of technology P.M.B, Owerri, Nigeria. from *http://www.codesria.org/*
13. Singh, A., Vasisht, A.K., Kumar, R. and Das, D.K. (2008). Adoption of Integrated Pest Management Practices in Paddy and Cotton: A Case Study in Haryana and Punjab. 21: 221-226.
14. Mohammadrezaei, M. and Hayati, D. (2015). The role of agricultural extension services in integrated pest management adoption by Iranian pistachio growers. *Int. J. Agr. Ext.*,3(01): 47-56.
15. Ofuoku A. U., Egho E. O. and Enujek, E.C. (2009[b]).Integrated Pest Management (IPM) Adoption among Farmers in Central Agro-Ecological Zone of Delta State, Nigeria. *Advances in Biological Research*,3(1-2): 29-33.
16. Floyd, C.N., Harding, A.H., Paddle, K.C., Rascal, D.P., Subedi, K.D. and Subbedi, P.P. (1999). The Adoption and Associated impact of Technologies in the Western Hills of Nepal. *Agricultural Research and Extension Network*, Paper No.90 London: Overseas Development Institute, p.3-7.
17. Braun, A. R., Thiele, G., Fernandez, M. (2000). Farmer Field School and Local Agricultural Research Committees: Complementary Platform for Integrated Decision-Making in Sustainable Agriculture. *Agricultural Research and Extension Network,* (AgREN). NO. 105.
18. Khisa, G., Sthaters, T., Namanda, S. (2005).An introduction to sweet potato farmer field schools. Manual for sweet potato integrated production and pest management farmer field school in Sub-Saharan Africa. *http://www.cipotato.org.*
19. Rahman, M. M. (2012). Problems and suggestions for farmers' adoption of IPM practices in rice (*Oryzasativa* L.) cultivation. *Bangladesh J. Agril. Res*.,37(1): 121-128.
20. Trematerra, P. (2013). Aspects related to decision support tools and Integrated Pest Management in food chains. *Food Control,* 34: 733-742.
21. Campbell, J. F. (2013). Influence of landscape pattern in flour residue amount and distribution on *Triboliumcastaneum* (Herbst) response to traps baited with pheromone and kairomone. *Journal of Stored Products Research,* 52:112-117.
22. Dowdy, A. K., & Fields, P. G. (2002). Heat combined with diatomaceous earth to control the confused flour beetle (Coleoptera: Tenebrionidae) in flour mill. *Journal of Stored Products Research*, 38: 11-22.
23. Wakefield, M. E. (2006). Storage arthropod pest detection-current status and future directions. *Proc. 9th int.working conf. stored-product prot.*, p. 371-384.