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Constraints as perceived by the vegetable growers regarding the adoption of IPM technologies in cauliflower cultivation: An empirical study

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Abstract

The present study revealed that among all the various types of constraints perceived by the respondents regarding the adoption of Integrated Pest Management (IPM) technologies in the cauliflower (*Brassica oleracea* L. var. *botrytis*) production, the lack of knowledge of the respondents about the Economic Threshold Limit (ETL) concept (under the category of knowledge and information constraints) had the first rank closely followed by the lack of knowledge of the respondents regarding the bio-pesticides (under the category of knowledge and information constraints). The lack of knowledge of the respondents about the IPM techniques (under the knowledge and information constraints category) enjoyed third position, closely followed by lack of training of the respondents on the proper use of pesticides (under category of administrative and managerial constraints). The result clearly indicate that among six different categories of perceived constraints, knowledge and information constraints with a rank score of 2769 enjoyed first rank position, distantly followed by administrative and managerial constraints (with a rank score of 1586) in the second position, technological and communication constraints with a rank score of 1249 in the third position, socio-economic constraint (rank score of 828) in the fourth position.

Key words: *Brassica oleracea* L. var. *botrytis,* constraints, adoption of IPM technologies, cauliflower cultivation, knowledge and information constraints, rank score.

Introduction

Integrated Pest Management (IPM) is a scientific paradigm (Perkins, 1982) which is now of global significance. Its basic concern is with designing and implementing pest management practices that meet the goals of farmers, consumers and governments in reducing pest losses while, at the same time, safeguarding against the longer term risk of environmental pollution, hazards to human health and reduced agricultural sustainability.

While the philosophy and ideas of IPM are now widely accepted in the political and scientific arena, the practical implementation of IPM has proved far more difficult to achieve. Over two decades, attempts to develop and disseminate IPM technologies in the developing countries have met with limited success (Kiss and Meerman,1991; Yudelman *et al.*, 1998).

IPM was first developed in response to the environmental concerns about the abuse or over use of the chemical pesticides associated with the input-intensive agricultural systems of the developed countries. The traditional approach regarding the IPM technology development was to develop pest and disease control alternatives to reduce or eliminate the use of chemical pesticides. Here, the role of the agricultural extension system was to transfer and disseminate these technologies and practices directly to the farmers (Morse and Buhler, 1997). More recently, alternative approaches have been evolved for the small-scale farming systems of the developing countries. These approaches seek to combine indigenous farmer knowledge with scientific knowledge of cropping systems and pests to develop site appropriate IPM systems. Variously labeled as ecological or sustainable IPM (Schwab, 1995; Mangan and Mangum, 1998), these approaches are often described as being knowledge-intensive (Morse and Buhler, 1997). This new approach regarding IPM technologies require enhanced knowledge and understanding of the small farmers regarding the biological factors and ecological interactions (Dent, 1995).

Therefore, it is of utmost necessity to find out and analyze the field level constraints (as perceived by the farmers) in the adoption of IPM technologies especially in the vegetable cultivation in the third world countries where excessive and indiscriminate use of the pesticides were reported by various researchers like Rashid *et al.* (2003), IPM DANIDA Project (2004), Kim and Park (2005), Baral *et al.* (2006). Keeping these in mind, the present study was undertaken with following set of objectives: (i) to study the field level constraints (as perceived by the respondents) in the adoption of IPM technologies on the selected vegetable and (ii) to analyze the field level constraints (as perceived by the respondents) in the adoption of IPM technologies on the selected vegetable category wise.

Materials and methods

Site of the study: The Katwa-I block of Bardhaman District was purposively selected for the present study, since this block is famous for vegetable cultivation. Only one vegetable *i.e.* cauliflower was selected. This vegetable is the major crop of the winter season and grown in relatively more area than other vegetables.

All the villages, eighteen (18) in numbers falling under the five (5) kilometers radius of Katwa Town were selected for the present study, as these villages have sizeable population, who grew cauliflower commercially in more than 0.33 acre of farm land. At present, 150 such farmers were there. So, all the 150 vegetable growers were selected as the sample population of the present study.

Measurement of the degree of the perceived constraints: To measure the degree of constraints as experienced by the respondents in relation to the adoption of IPM technologies in cauliflower cultivation, the respondents were asked to indicate on a four point continuum about the extent to which each constraint was perceived as crucial factor for the adoption of IPM technologies in the selected vegetable. The scoring procedure was as follows:

S No.	Category	Score
1	High	3
2	Medium	2
3	Low	1
4	Not at all	0

Results and discussion

Field level constraints experienced by the respondents regarding the adoption of the IPM technologies in the cauliflower cultivation: The ranking (both category-wise and overall ranking) of various field level constraints as perceived by the respondents regarding the adoption of the IPM technologies in cauliflower cultivation is given in Table 1.

From the Table, it became clear that among the socio-economic constraints as perceived by the respondents regarding the adoption of IPM technologies in the cauliflower cultivation, lack of contact of the respondents with outside world held the first rank position followed by lack of financial resources, lack of education, small size of land holding, age and gender of the respondents. This was apparently because of more the contact of the respondents with outside world, more they would have exposures to various sources of information which would encourage the respondents regarding the adoption of IPM technologies for the cauliflower production.

Among the infrastructural constraints, lack of preservation and cold-storage facilities for the selected vegetable scored the first position followed by the lack of communication and transport. Lack of irrigational facilities held the third rank followed by lack of the vegetable market. Among the infrastructural constraints, lack of preservation and cold-storage facilities enjoyed the first position might be because of the fact that without proper preservation facilities, the cauliflower growers were under pressure to sell the harvested cauliflower crops immediately which in turn encouraged the cauliflower growers to apply the pesticides more for increased level protection from the pests and vis-à-vis increased yield of the cauliflower crops and thus the farmers tended to dissociate themselves from the adoption of IPM technologies in the cauliflower cultivation.

Table clearly shows that among the situational constraints regarding the adoption of IPM technologies in the cauliflower production, average distance between the fragments of the cultivated land held the first position, closely followed by fragmentation of the cultivated land. Fragmentation of the cultivated land and lack of supply of the pesticides in the market at the right time enjoyed the third and fourth positions, respectively.

From the Table, it became clear that among technological and communication constraints as perceived by the respondents, the inadequate / complicated description regarding the precautions to be taken in the case of toxicity related accidents in the written materials kept in the containers of pesticides enjoyed the first rank position, followed by the lack of proper Integrated Pest Management (IPM) technologies for the cauliflower crops in the second position. The quality of the printing of the written materials kept in the containers of the pesticides was in the third position and the colour used in the written materials kept in the containers of pesticides enjoyed the fourth position. The fact that given description regarding the precautions to be taken in the case of toxicity related accidents in the written materials kept in the containers of pesticides enjoyed the first rank position might be due to the cause that unclear, complicated, written in highly technical way of writing and below quality descriptions would compel the respondents to use the pesticides without any precaution in the cauliflower cultivation.

Among the knowledge and information constraints as perceived by the respondents, regarding the adoption of IPM technologies, the lack of knowledge of the respondents (vegetable growers) about the Economic Threshold Limit (ETL) concept of the cauliflower crops held the first rank position, closely followed by the lack of knowledge of the cauliflower growers regarding the bio-pesticides in the second position which was closely followed by the lack of knowledge about the Integrated Pest Management (IPM) techniques for the cultivation of the cauliflower crops. The lack of proper information on the judicious use of pesticides was in the fourth position. The fact that the lack of knowledge of the respondents (vegetable growers) about the Economic Threshold Limit (ETL) concept of the cauliflower crops held the first rank position among the knowledge and information constraints might be due to the cause that without the knowledge about the Economic Threshold Limit (ETL) concept of the cauliflower crop, the respondents were prone to use the chemical pesticides more in numbers, frequency and quantity in the cauliflower cultivation than suggested by the IPM experts.

It was apparent from the Table that among the administrative and managerial constraints as perceived by respondents, lack of training on the IPM technologies was most important, closely followed by non-availability of extension personnel in time and distantly followed by cheating by the sales agents and dealers of pesticide companies. In the fourth position, lack of loan sanctioning mechanism for the vegetable growers for cultivation of cauliflower crops was ranked. Among the administrative and managerial constraints, lack of training of the vegetable growers on the IPM technologies in the cauliflower production had the first position because of the fact that without proper training of the respondents regarding the IPM technologies, the respondents would be prone to misuse of pesticides in the cauliflower production.

Table 1 revealed that among all the constraints perceived by the respondents regarding the adoption of IPM technologies in the cauliflower production, the lack of knowledge of the respondents

Table 1. Ranking of various constraints (as perceived by the respondents) regarding the proper use of pesticides in the cauliflower cultivation

Sl. No.	Types of constraints	Rank score	Rank within a category	Overall rank
	A. Socio-economic Constraints			
01.	Lack of contact of the vegetable growers with outside world	306	I	V
02.	Lack of financial resources of the vegetable growers	195	II	XVI
03.	Lack of education of the vegetable growers	158	III	XXII
04.	Small size of land holding of the vegetable growers	150	IV	XXV
05.	Age of the vegetable growers	14	V	XXXXV
06.	Gender of the vegetable growers	05	VI	XXXXVI
	Total of Category	828		IV
	B. Infrastructural Constraints			
07.	Lack of preservation and cold-storage facilities for the selected vegetables	270	I	VII
08.	Lack of communication and transport	97	II	XXXVIII
09.	Lack of irrigational facilities	60	III	XXXXI
10.	Lack of vegetable market	57	IV	XXXXII
11.	Lack of proper plant protection implements	52	V	XXXXIII
	Total of category	536		VI
	C. Situational Constraints			
12.	Average distance between the fragments of the cultivated land of the vegetable growers	173	I	XVII
13.	Lack of mutual co-operation among the vegetable growers	169	II	XVIII
14.	Fragmentation of the cultivated land of the vegetable growers	138	III	XXVIII
15.	Lack of supply of the pesticides in the market at the right time	109	IV	XXXV
16.	Topography of land	51	V	XXXXIV
	Total of category	640		V
	D. Technological and Communication Constraints			
17.	Inadequate / complicated description regarding the precautious to be taken in the case of toxicity related accidents in the written materials kept in the containers of pesticides	236	I	VIII
18.	Lack of proper Integrated Pest Management (IPM) technologies for the selected vegetables	212	II	XIV
19.	The quality of the printing of the written materials kept in the containers of the pesticides	167	III	XIX
20.	The colour used in the written materials kept in the containers of pesticides	161	IV	XXI
21.	The quality of the pictures of the pests used in the written materials kept in the containers of the pesticides	151	V	XXIV
22.	Size of the letters of the written materials kept in the pesticide containers	114	VI	XXXIII
23.	Language of the written materials kept in the containers of the pesticides	105	VII	XXXVI
24.	The quality of the various diagrammatic representations used in the written materials kept in the containers of the pesticides	103	VIII	XXXVII
	Total of category	1249		III
	E. Knowledge and Information Constraints			
25.	Lack of knowledge of the respondents (vegetable growers) about the Economic Threshold Limit (ETL) concept of the selected vegetables	330	I	I
26.	Lack of knowledge of the vegetable growers regarding the bio-pesticides	324	II	II
27.	Lack of knowledge of the respondents about the Integrated Pest Management (IPM) techniques for the cultivation of the selected vegetables	323	III	III
28.	Lack of proper information on the judicious use of pesticides	233	IV	X
29.	Lack of knowledge of the vegetable growers regarding the process of diagnosis of the attacking pests	228	V	XI
30.	Lack of information regarding the pesticide application on the selected vegetables	201	VI	XV
31.	Lack of knowledge of the respondents regarding the proper handling procedure of the pesticides	157	VII	XXIII
32.	Lack of knowledge of the vegetable growers regarding the proper pesticide application procedure on the selected vegetables	145	VIII	XXVI
33.	Lack of knowledge of the vegetable growers about the ideal dose of the applied pesticides in the cultivation of the selected vegetables	141	IX	XXVII
34.	Lack of knowledge of the vegetable growers regarding the proper pesticide storage procedure to be maintained by the vegetable growers	137	X	XXIX
35.	Lack of knowledge of the vegetable growers regarding the proper way of disposing off of the date expired, unused pesticide containers	136	XI	XXX
36.	Lack of Knowledge of the vegetable growers regarding the ideal time of the day when the pesticide should be applied	129	XII	XXXI
37.	Lack of knowledge of the vegetable growers regarding the precautions to be taken when the pesticide application was on	113	XIII	XXXIV
38.	Lack of knowledge of the vegetable growers regarding proper way of disposing off of the empty containers of the pesticides	87	XIV	XXXIX
39.	Lack of knowledge of the vegetable growers regarding the ideal crop stage for the pesticide application	85	XV	XXXX
	Total of category	2769		I

Table 1 continued

Sl. No.	Types of constraints	Rank score	Rank within a category	Overall rank
	F. Administrative and Managerial Constraints			
40.	Lack of training of the vegetable growers on the proper use of pesticides	319	I	IV
41.	Non-availability of extension personnel in time	296	II	VI
42.	Malpractices by the sales agents and dealers of pesticide companies	235	III	IX
43.	Lack of loan sanctioning mechanism for the vegetable growers for the cultivation of the selected vegetables	226	IV	XII
44.	Lack of the agricultural extension mechanisms for the selected vegetables	218	V	XIII
45.	Problems created by the middlemen in the wholesale or the retail vegetable market	164	VI	XX
46.	Adulteration of the pesticides by the dealers of pesticide companies	128	VII	XXXII
	Total of category	1586		II

(vegetable growers) about the Economic Threshold Limit (ETL) concept of the cauliflower crops (under the category of knowledge and information constraints) enjoyed the first rank position closely followed by the lack of knowledge regarding the bio-pesticides (under the category of knowledge and information constraints). The lack of knowledge of the respondents about the Integrated Pest Management (IPM) techniques for the cultivation of the cauliflower crops (under the knowledge and information constraints category) enjoyed third position, closely followed by lack of training of the vegetable growers on the proper use of pesticides in the cauliflower production (under category of administrative and managerial constraints). It proved that the lack of knowledge of the respondents about the Economic Threshold Limit (ETL) concept of the cauliflower crops, lack of knowledge regarding the bio-pesticides, the lack of knowledge about the Integrated Pest Management (IPM) techniques for the cultivation of the cauliflower crops and lack of training of the vegetable growers on the IPM technologies in the cauliflower production put the most formidable hurdle regarding the adoption of IPM technologies in the cauliflower production.

Analysis of category wise field level constraints experienced by the respondents regarding the adoption of the IPM technologies in the cauliflower cultivation: Table 1 and 2 clearly indicate that among six different categories of perceived constraints regarding the adoption of IPM technologies in cauliflower cultivation, knowledge and information constraints with a rank score of 2769 enjoyed first rank position, distantly followed by administrative and managerial constraints (with a rank score of 1586) in the second position, technological and communication constraints with a rank score of 1249 in the third position, socio-economic constraint (rank score of 828) in the fourth position and it was interesting to note that situational constraints enjoyed the last position with only 589 rank score. The fact that the knowledge and information constraints held the highest position among different categories of constraints might be because of the reason that the respondents had very poor level of knowledge regarding the adoption of IPM technologies in cauliflower cultivation as well as they had very poor access to the sources of the information regarding the adoption of IPM technologies which is already indicated in the earlier sections. The above results also show that various administrative and managerial lacunae (incompetent extension services, inadequate monitoring of the markets etc.) on the part of the central and state governments contributed to a great extent to the low level of adoption of IPM technologies in cauliflower cultivation among the respondents. The results also revealed that the respondents were technologically ill equipped as well as there were various problems in the communication with the cauliflower farmers to adopt the IPM technologies in their cauliflower cultivation.

It is interesting to note that poor extension services, poor vigilance of the central and state governments on the pesticide market, inadequate and poorly governed vegetable markets etc. led the administrative and managerial constraints to the second position. The results clearly depicted a picture that the third biggest constraint before the respondents was technological and communication constraint regarding the adoption of the IPM technologies in the cauliflower production. This mean that the respondents were technologically ill equipped for adoption of the IPM technologies for the cauliflower crops and the communication channel for making the respondents aware about the technical specifications and information regarding the IPM technologies was poorly developed and to some extent ineffective in nature.

The socio-economic constraints like lack of contact of the respondents with outside world, lack of financial resources, lack of education, small size of land holdings etc. considerably affected the proper use of the pesticides by the respondents in the vegetable cultivation. As a result, socio-economic constraints came at the fourth position among the various categories of constraints regarding the adoption of the IPM technologies.

Table 2. Distribution of various categories of constraints as perceived by the respondents regarding the proper use of pesticides in the cauliflower cultivation

Sl. No.	Categories of constraints	Total rank score	Percentage	Rank position
1.	Knowledge and Information constraints	2769	36.40	I
2.	Administrative and managerial constraints	1586	20.85	II
3.	Technological and Communication constraints	1249	16.42	III
4.	Socio-economic constraints	828	10.88	IV
5.	Situational constraints	640	08.40	V
6.	Infrastructural constraints	536	07.05	VI
	Total	7608	100.00	

It is interesting to note that the infrastructural constraints came at last position with only 07.05 %. This means that there were little grass-root level infrastructural constraints related to the farming operations in general and the cauliflower cultivation in particular like lack of preservation and cold-storage facilities for the harvested cauliflower crops, lack of communication and transport, lack of irrigational facilities, lack of cauliflower market, lack of proper plant protection implements etc. posed little constraints to the respondents in relation to the adoption of the IPM technologies. This is a silver-line of hope among the otherwise bleak scenario.

The present study clearly revealed that the lack of knowledge of the respondents about the Economic Threshold Limit (ETL) concept was the limiting factor in adoption of IPM techniques closely followed by othe factors like lack of knowledge regarding the bio-pesticides, the lack of knowledge about the IPM techniques, closely followed by lack of training of the respondents on the proper use of pesticides. The present study also indicated that awareness enhancing and motivational messages delivered via traditional and mass media in support of an expanded extension service farmer training programme in vegetable IPM could be expected to reduce the constraints as perceived by the vegetable growers regarding the adoption of IPM technologies in cauliflower cultivation and contribute to safer and more profitable vegetable pest control.

References

Baral, K., B.C. Roy, K.M.B. Rahim, H. Chatterjee, D. Mondal, D. Ghosh, and N.S. Talekar, 2006. *Socio-economic Parameters of Pesticide Use and Assessment of Impact of an IPM Strategy for the Control of Eggplant Fruit and Shoot Borer in West Bengal, India – Technical Bulletin No. 37,* AVRDC – The World Vegetable Center, Shanhua, pp. 2-3, 12-13, 16.

Dent, D. 1995. *Integrated Pest Management.* Chapman and Hall, London.

IPM DANIDA Project. 2004. *Pesticides-Health Survey*: *Data of 124 Farmers in Chaiprakarn Chiang Mai, Thailand May 2004,* IPM DANIDA 64, November, 2004, Thailand, pp. 3-10.

Kim, J. and H. Park, 2005. *Slow Suicide*: *How Korean Farmers are Poisoning Themselves with Pesticides,* PAN Asia and the Pacific, Penang, pp. 19, 23-28.

Kiss, A. and F. Meerman, 1991. *Integrated Pest Management in African Agriculture.* World Bank Technical Paper 142, World Bank, Washington DC.

Mangan, J. and M. Mangum, 1998. A comparison of two IPM training strategies in China: The importance of concepts of rice ecosystem for sustainable insect pest management. *Agriculture and Human Values,* 15: 209-221.

Morse, S. and W. Buhler, 1997. *Integrated Pest Management*: *Ideals and Realities in Developing Countries.* Boulder, Co. Lynne Rienner Publishers, Colorado. 200p.

Perkins, J.H. 1982. *Insects, Experts and the Insecticide Crisis*: *the Quest for New Pest Management Strategies,* Plenum Press, New York.

Rashid, M.A., S.N. Alam, F.M.A. Rouf and N.S. Talekar, 2003. *Socio-economic Parameters of Eggplant Pest Control in Jessore District of Bangladesh.* Technical Bulletin No. 29, AVRDC – The World Vegetable Center, Shanhua, pp. iii, 9, 13, 14, 23.

Schwab, A. 1995. Fear of harvest failure - the compelling force behind the worldwide use of pesticides. In: *Pesticides in Tropical Agriculture*: *Hazards and Alternatives,* A. Schwab, I. Jager, G. Stoll, R. Gorgen, S. Prexler-Schwab and R. Altenburger (eds.), Margraf Verlog, Weikersheim, Germany, pp. 130-132.

Yudelman, M., A. Ratta and D. Nygaard, 1998. *Pest Management and Food Production*: *Looking to the Future.* Food, Agriculture and the Environment Discussion Paper 25, International Food Policy Research Institute (IFPRI), Washinton, DC.