SURVEY AND IDENTIFICATION OF MAJOR INSECT PEST AND PEST MANAGEMENT PRACTICES OF BRINJAL DURING WINTER AT CHITTAGONG DISTRICT

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ABSTRACT

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A survey was conducted at Hathazari, Satkania and Fatikchari upazila in Chittagong district to identify major insect pest and pest management practices used by the brinjal growers. A total of seventy five brinjal growers were selected for interview during November 2006 to February 2007. Twenty five growers were selected from each area and pretested structured questionnaires were used in this survey. Brinjal Shoot and Fruit Borer (BSFB) was identified as the major insect pest in the study area. Ninety-nine percent of growers relied solely on pesticide use to control brinjal pest. The growers use a variety of pesticides belongs to various chemical groups with various formulations. Brinjal growers applied insecticides more than 23 times in a season. Six days interval gaps between insecticide application and fruit harvest. Pesticide dealers were the major source of information to farmers on the selection of chemicals and application methods. Very few growers used protective clothing or other safety measures during pesticide application; 45% of the respondent did not take any safety measures. Where as 29% of the growers covered their face and body. 17% covered their body and 17% covered their face at the time of spraying. On an average 61% of the farmers believed that pesticide application are harmful to farm labour, 27% farmers expressed their views that pesticide application pollute the water and air. This study reflects the irrational use of pesticide use in brinjal cultivation that has serious consequences to human health and the environment.

Key Words: Brinjal grower, insect identification, pest Management

INTRODUCTION

Brinjal (*Solamun melongena*) is the most important vegetable in Bangladesh. It is cultivated on small and marginal farmer's where daily sale of the produce serves as cash income. Nationwide, production area for brinjal has increased from 29,132 ha in 1994-95 to 37514 ha in 2004-05 and production has gone up from 187,705 tons to 240095 tons during this period (BBS, 2004). This represents an increase of 1.29 times in area under cultivation and 1.28 times increase in production volume nationwide. Among the many pest species, the brinjal shoot and fruit borer (BSFB), *leucinodes orbonalis* Guenee, is the most destructive. The pest larvae bore inside tender shoots and plant growth. More severe economical damage caused by the larvae to feeding inside the fruits, which make damaged the fruit and unfit for human consumption. The yield loss varies different environment conditions but can exceed 65% in Bangladesh (BARI, 1999). Despite the importance of brinjal and severity of BSFB problem, the management practices to combat BSFB are still limited to frequent sprays to toxic chemical pesticides (Kabir et al., 1996). Both over use and misuse of insecticides may lead to the loss of effective insecticides due to the development of resistance (Forrester, 1990) and could cause human health hazard and environmental pollution (Maclntyre *et al*., 1989).

Inappropriate selection of insecticides and doses, improper spray scheduling and inadequate spray coverage (Phillips *et al*., 1990) may causes of failure in controlling insect pests. For vegetables in general, Sabur and Mollah (2000) observed an increase in use of pesticide by farmers in combating pests throughout Bangladesh. According to Pesticide Association of Bangladesh (1999), pesticide use for growing brinjal was 1.41 kg/ha, whereas for all vegetables it was 1.12 kg, while it was only 0.20 kg in rice. Meanwhile, in appropriate pesticides, incorrect time of application and improper doses all have result in high pesticide cost with little or no reduction in target pest populations. For the last few years production of Brinjal is seriously hampered by the severe attack of different insect pests. The yield loss caused by these pests has been estimated up to 86% in Bangladesh. In the present study, an attempt was made to document the pest problems and pest management practices undertaken by the farmers. The results of this study are reported here in.

MATERIALS AND METHODS

A survey was conducted at Hathazari, Satkania and Fatikchari upazila in Chittagong district. A total of seventy five brinjal growers were interviewed during November 2006 to February 2007 of which twenty five brinjal growers were selected from each area. To determine the recent insecticide use pattern, farmers who did not grow Brinjal over the last one year were not selected. Objectives oriented structured questionnaire was used to identify major insect pest problems and pest management practices with Brinjal cultivation. The collected data were coded, edited for processing and analysis. Descriptive statistical methods were used to analyze the survey data.

RESULTS AND DISCUSSION

Land utilization pattern

Farm size is one of the socio-economic indicators for the farmer to adopt a new technology. The average farm size per household was 2.13 acre in Chittagong district. In Hathazari was much larger (2.26 acre) than Satkania (2.18 acre) and Fatikchori (1.94 acre). A total of 36.25% of the cultivated land was allocated to vegetable cultivation and 33.07% of land under brinjal cultivation over total vegetable cultivated land in surveyed area (Table 1).

Table 1. Location wise farm size and vegetables cultivation area of the study area

Location	Total cultivated land (acre/farm)	Total vegetables area (%)	Percent of brinjal area over total vegetables area
Hathazari	2.26	31.62	30.01
Satkania	2.18	44.56	27.31
Fatikchori	1.94	32.58	41.90
Average	2.13	36.25	33.07

Insect pests and their management

All the farmers under studied area considered BSFB as the most common pest insect (Table 2).The study found 30.67%, 18.67% and 14.67% growers reported that thrips (*Thrips palmi karny*), red mites (*Tetranychus* sp.) and epilachna beetle (*Epilachna* spp.) were other notable pests in the study area respectively. Study also revealed that 56% growers at Hathazari found red mite attacking in their brinjal fields but none in Satkania and Fatikchari.

Table 2. Percentage of the respondents to the insect infestation in brinjal cultivation

Pest	% respondent			
	Hathazari	Satkania	Fatikchori	Average
Brinjal shoot and fruit borer	100	100	100	100
Epilachna beetle	16	16	12	14.67
Thrips	48	24	20	30.67
Red mite	56	-	-	18.87

The percentage of respondents ranged from 20(Fatikchori) to 40 (Hathazari) of different locations perceived that BSFB was controllable. In contrast, 60 (Hathazari) to 80% (Fatikchori) respondents reported that it is difficult to control. The growers considered other insect pests are also problematic in brinjal cultivation as to BSFB. The percentage of farmers ranged from 43 (Fatikchori) to 52% (Satkania) of different locations perceived that Epilachna beetle was controllable. In contrast, 48 (Satkania) to 57% (Fatikchori) farmers reported that it was difficult to control. The percentage of farmers ranged from 46 (Hathazari) to 49 (Satkania) of different locations perceived that Jassids was controllable. In contrast, 51 (Satkania) to 54% (Hathazari) farmers reported that it was difficult to control. The percentage of farmers ranged from 42(Satkania) to 50 (Hathazari) of different locations perceived that Red mite was controllable. In contrast, 50 (Hathazari) to 58% (Satkania) farmers reported that it was difficult to control.

Table 3. Farmers knowledge about control of major insect pests of Brinjal

Particulars	Percent of brinjal growers					
	Difficult to control			Controllable		
	Hathazari	Satkania	Fatikchori	Hathazari	Satkania	Fatikchori
Brinjal shoot and fruit borer	60	75	80	40	25	20
Epilachna beetle	51	48	57	49	52	43
Thrips	54	51	52	46	49	48
Red mite	50	58	52	50	42	48

The majority of the brinjal farmers sprayed their brinjal crop from initial indication of pest infestation and their after on a routine basis (Figure 1). Study revealed that 16%, 16% and 4% of brinjal growers spray insecticides in their

field without observing insect pest in Hathazari, Satkania and Fatikchari respectively. Study also found that only 28% farmers of Satkania spray after detection of insect pest followed by Hathazari and Fatikchari respectively.

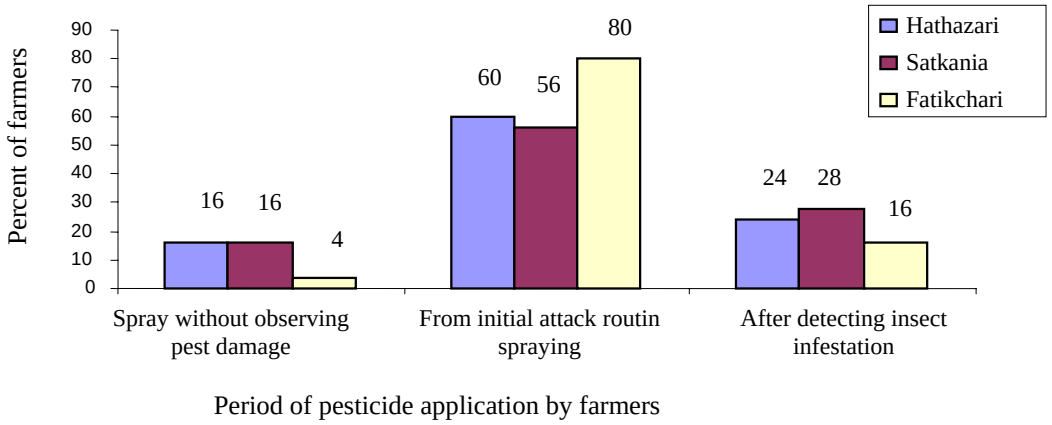

Figure 1. Farmers practice of application of pesticide for the control of brinjal pests in Chittagong District

Ninety nine percent farmers relied solely on spraying of pesticides for the control of brinjal insect pests; the remaining 1% used a combination of sanitation, which consists of prompt removal of damaged shoot, coupled with pesticide sprays (IPM techniques) (Table 4). Study also found that not a single farmer used cultural methods in cultivation of brinjal.

Table 4. Different control measures taken by the farmers for controlling brinjal insect pests

Method of insect control	% Farmers' respondent			
	Hathazari	Satkania	Fatikchori	Average
IPM	4	-	-	1.33
Only insecticide	96	100	100	98.67
Cultural method	-	-	-	-
Others	-	-	-	-

Chittagong farmers use a variety of pesticides belonging to different chemical groups with different formulations, such as emulsifiable concentrate (EC), soluble powder (SP), granular (G), and water-soluble concentrate (WSC).Carbosulfan (Marshall) 20 EC and carbofuran (Furadan) 5G were the most popular chemicals, being used by 36%, and 25%, of the brinjal growers, respectively (Table 5). Other insecticides were used in lesser quantities as: Malathion (Fyfanon) 57EC, cypermethrin (ostad) 10EC, dimethoate (perfecthion) 40Ec, cartap (cartuf) etc. Fungicide such as Theovit, Neon poeder, Dithane M-45, Polyrum powder, Cosavit, Sunvit, Bevistin, Ridomil Gold were used for the control of brinjal pest and plant growth regulators such as orbit, macrosul also used by the farmers.

Table 5. Type of insecticides used by growers to control brinjal pest at surveyed area

Chemical	Trade name	percent of farmers'			
		Hathazari	Satkania	Fatikchori	All
Carbamate					
Carbosulfan	Sunsulfan 20EC	-	4	4	2.67
	Marshal 20EC	48	48	12	36
Carbofuran	Furadan 5G	56	8	12	25..33
Cartap	Cartuf	32			10.67
	Suntuf 50SP	-	4	-	1.33
	Emituf 50SP	-	8	-	2.67
Carbaryl	Sevin 85SP	8	-	-	2.67
Malathion	Malathion 57EC	8	-	-	2.67
	Sumithion	12	-	-	4
	Fyfanon 57EC	-	-	20	6.67
	Syfanon 57EC	-	-	4	1.33
Dimethoate	Perfecthion 40EC	-	-	20	6.67
	Dimethion 40EC	-	-	24	8
	Tafgor 40EC	-	-	4	1.33
Monocrotophos	Azodrin 40WSC	-	-	4	1.33
Quinalphos	Kinolux 25EC	-	4	4	2.67
	Corolux	24	-	-	8
Diazinon	Diazinon 60Ec	12	4	-	5.33
	Rison 60EC	4	4	4	4
Pyrethroid					
Cypermethrin	Relothrin 10EC	-	-	4	1.33
	Basuthrin 10EC	8	32	-	13..33
	Superthrin 10EC	-	12	-	4
	Ostad 10EC	-	-	64	21..33
	Cypermethrin 10EC	-	4	-	1.33
	Ripcord 10EC	12	12	-	8
	Cymbush 10EC	4	-	-	1.33
Chloropyriphos	Pyriphos	4	-	-	1.33
Cyhalothrin	Karate 25EC	16	4	12	10.67
Thiomethroxum	Actara 25WG	12	4	16	10.67
Admire	Admire	-	4	-	1.33
Miticide	Omite	12	-	-	4
	Sobicron	28	20	4	17..33
	Basudin	8	8	8	8
	Polyrum	9.09			
Fungicide	Neon poeder	-	-	4	1.33
	Theovit	16	8	16	13..33
	Dithane M-45	-	8	8	5.33
	Polyrum powder	-	12	8	6.67
	Cosavit	-	4	8	4
	Sunvit	-	-	4	1.33
	Bevistin	-	4	8	4
	Ridomil Gold	12	-	-	4
	Ocozim	4	-	-	1.33
Plant Growth Regulator	Orbit	-	4	-	1.33
	Macsulfur	-	4	-	1.33

The interval between insecticide applications mostly depended upon the season. During winter, brinjal growers applied insecticides more than 23 times a season (Table 6). Six days gaps between insecticide application and the harvest of the fruits. About 84% growers spray insecticides by machine out of that 44% by own machine and 56% rental one.

Table 6. Insecticide spraying pattern on brinjal cultivation

Location	Spraying interval (day)	Total spray (no.)	% of Sprayer		% of machine owner	% of machine renter
			Spray machine	Piskari		
Hathazari	7	20	96	4	44	56
Satkania	5	30	96	4	48	52
Fatikchori	6.8	21	60	40	40	60
All	6.27	23.07	84	16	44	56

Most of the farmers (65%) reported that they received advice for the selection of chemical and its doses from pesticide dealers (Table 7). This indicates that the retailers of pesticides are an important factor for pesticide recommendation in the study area. On the other hand, the widespread miss use of pesticides also indicates that pesticide dealers do not have the expertise to guide farmers on effectively controlling brinjal pest. Even if they have the necessary expertise, but obviously motivated by profits from their own business of pesticide sale. Results of this survey also imply that either the extension workers in the area do not have proper technical expertise or their communication with farmers is not convincing enough.

Table 7. Source of information about pest control of brinjal

Source	% of respondent			
	Hathazari	Satkania	Fatikchori	All
Pesticide dealers	28	88	80	65.33
Neighbors	32	4	4	13.33
TV/radio	-	-	-	-
Relatives	-	-	-	-
Extension workers	4	8	12	8
Show level	36	-	-	12
Research workers	12	-	-	4
Company Agents	-	-	4	1.33

Health Hazards

Very few farmers used protective clothing or other safety measures during pesticide application; 45% did not taken any safety measures. 29%covered their face and body. 17%covered their body and 17%covered their face (Table 8) at the time of spraying.

Table 8. Protection measures taken by the farmers during pesticide application in brinjal

Protection measures	% of respondent			
	Hathazari	Satkania	Fatikchori	Average
Cover face	8	4	12	8
Cover body	24	36	28	29.33
Cover face and body	28	20	4	17.33
No protection measure	40	40	56	45.33

Farmer's Awareness on pesticide use Issues

Most of the farmers believed that spraying pesticides is the single most dangerous practice in their farming operations. On an average 61% farmers believed that pesticide applications are harmful to human health, 27% farmers expressed the view that pesticide applications pollute the water and air. In contrast, only 8% of farmers believed that pesticide applications polluter cause harm to natural enemies of pests.

On an average16% farmers believed that insecticide is not harmful (Table 9). This is due to the farmer's lack of training in recognizing harmful all useful insects and other arthropods. This lack of knowledge leads to destruction of these useful fauna by indiscriminate pesticide use.

Table 9. Farmers' awareness about the detrimental effect of insecticides use in brinjal

Particulars	% of respondent			
	Hathazari	Satkania	Fatikchori	Average
Water pollution	28	52	-	26.67
Air pollution	28	52	-	26.67
Harmful to natural enemies	24	-	-	8
Health hamper	64	64	56	61.33
Not harmful	4	-	44	16

CONCLUSIONS AND RECOMMENDATIONS

The present investigation demonstrates, BSFB is the most common pest insect in brinjal and the indiscriminate and irrational use of pesticide to protect brinjal from insect pest in the study area. The existing pattern of pesticide usage, if continued, will result in future loss of efficacy due to development of resistance by brinjal insect pest to pesticides. Other undesirable effects include resource degradation, resurgence of pest populations, environment pollution and threat to human health. Very few farmers use simple sanitation methods, such as cutting off of pest damaged shoots that have potential in reducing pest damage. Although farmers are interested in planting pest- resistant brinjal varieties, such varieties are not likely to develop in the immediate future. The IPM strategy that has been developed to reduce farmer's pesticide use drastically.

Farmers need to be trained by means of field days or demonstrations. The trained farmers should be motivated to adopt all methods, including sanitation, conservation of natural enemies by withholding pesticide use for as long as possible. In the meantime, intensified research is needed to develop component technologies such as BSFB resistant brinjal cultivars, introduction of effective biological pesticides and introduction of additional exotic parasitoids. Rural development authorities need to hire well-trained staff that is willing to assist farmers. The farmers should be encouraged to consult such trained extension workers instead of pesticide dealers and chemical company representatives to get proper information about pest management. Research-extension ties need to be improved for the quick dissemination of the improved IPM approach. Information dissemination through mass media should be undertaken on the use of IPM as well as the detrimental effect of pesticide use in vegetable cultivation.

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