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INSECT PESTS STATUS AND INSECTICIDE USE IN MAIZE IN DROUGHT PRONE AREAS OF BANGLADESH

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ABSTRACT

The study was conducted in four districts viz., Rajshahi, Noagaon, Chapainawabganj and Natore through pre-tested questionnaire survey among the target farmers, i.e. 30 farmers per district to gather information on existing socio-economic aspects of maize cultivating farmers as well as their opinion on maize insects pests and insecticide application against those pests. Most of the farmers are middle to old aged with primary to secondary level of education, small to medium farm size, small to medium family size with good farming experiences and medium to high level of annual income. According to the farmer's opinion, cutworm was detected as severe, while fall armyworm, stem borer, pink stem borer and cob borer were the major, and aphid was found as minor insect pests of maize in the survey area. For combating those insect pests, farmers mainly use Chlorpyrifos (50%) + Cypermethrin (5%) against cutworm and fall armyworm as well as Thiamethoxam (20%) + Chlorantraniliprole (20%) against stem borer, pink stem borer and cob borer.

Keywords: Survey, monitoring, fall armyworm, maize stem borer, Barind tract

Introduction

Bangladesh is recognized worldwide as one of the most vulnerable countries to the impact of climate change because of its disadvantageous geographic location, flat and low-lying topography, and reliance of many livelihoods on climate sensitive sectors, particularly agriculture (Ahmed *et al*. 1999). The major climatic hazards are the occurrence of flood, salinity, drought, cyclone, hail-storm, storm surge, sea level rise, water logging, and so on, which are likely to become more frequent and severe in very recent years (Huq and Ayers 2007). Among these climatic hazards, drought is likely to be aggravated by climatic change particularly in Barind tact and Northern regions of the country.

Maize (*Zea mays* L.) is the third most important cereal crop in Bangladesh after rice and wheat. It is a high valued crop popularly grown in Northern regions of Bangladesh. Maize could be a good source of protein, carbohydrate and lipids for the malnourished population (Alam *et al.* 2019). Every year huge amount of maize is utilized in Bangladesh of which only 42% is produced by the country and the remaining portion is imported (BBS 2016). Despite the increasing in the area of cultivation under this crop, the productivity is still low due to several reasons, viz. environmental factors, low mechanization, pest and diseases etc. (Reddy and Trivedi 2008).

In Bangladesh, the major causes of maize production are drought and drought induced insect pests. The insect pests of maize inflict serious losses both directly as borers, sap suckers, stem and root feeders etc, and indirectly as vectors of some diseases. The socioeconomic condition of farmers directly influences on production technology and management strategy against insect pests (Mohiuddin *et al*. 2009). Adaptive measures to combat climate change effect on crop productivity must be taken considering the socioeconomic condition of farmers for ensuring the food security of the drought prone areas of Bangladesh. Therefore, this study was undertaken to evaluate the insect pests status and different insecticides used for controlling the insects in maize in the drought prone areas of Bangladesh.

Materials and Methods

Pre-designed and pre tested structural questionnaire were used for data collection. The study was conducted in four districts viz., Rajshahi, Noagaon, Chapainawabganj and Natore during November-December 2019 among the target farmers (120 farmers) with the help of Department of Agricultural Extension (DAE) to gather information on existing socio-economic aspects of maize cultivars as well as farmers opinion on maize insect pests and insecticide application against those insect pests. The insect pests were considered as severe (if reported >80% farmers), major (if reported >40 to 79% farmers) and minor (if reported >1 to 20% farmers) according to farmer's response. The common name of insecticide was collected from List of Registered Agricultural Pesticides, Bio Pesticides and Public Health Pesticides in Bangladesh by Plant Protection Wing of DAE. The collected data were coded, edited for processing through tabular method using average, percentage, ratio etc.

Results and Discussion

The socio-economic and demographic profile of the respondents are presented in Table 1. The mean age of total respondents was 42.20 years where the most of farmer was middle aged (44.17%) and old aged (38.33%) whereas 17.50 % farmer was found under young aged. Most of respondents were with primary to secondary level school going educational background but higher secondary (5.81%) and illiterate farmers (12.45%) were competitively less. The average family size (no. of family member) of the respondents was 5.50 with dominating medium family size (55.00%). The average farm size (Acre land area) of the respondents was 2.30 with dominating small farm (56.67%) and medium farm size (40.83%) but no farmer was landless. The average annual income (BDT) of the respondents was 81,100.00 with dominating medium to high income compared to low income generating farmer. The average farming experience (No. of year of farming) of the respondents was 15.88 years with dominating moderate (49.17%) to high level (30.00%) of farming experience compare to poor farming experience (20.83%).

The farmers of the survey area detected a total of 6 insect pests, names fall armyworm (*Spodoptera frugiperda*), cutworm (*Agrotis ipsilon*), pink stem borer (*Seamia inferens*), stem borer (*Chilo pertellus*), cob borer (*Helicoverpa zea*) under Noctuidae Family under Lepidoptera Order and aphid (*Rhopalosiphum maidis*) (Homoptera: Aphididae). Among them, cutworm was considered as severe pests as all the respondents reported about this pest (100.00%). Fall armyworm (70.83%), pink stem borer (42.50%), stem borer (75.00%), cob borer

Table 1. Socio-economic and demographic profile of the respondents of drought prone areas of Bangladesh

Character	Measuring unit	Categories	No. of respondents	Percent	Mean
Age	Actual year	Young aged (up to 35)	21	17.50	42.20
		Middle aged (36-50)	53	44.17	
		Old (>50)	46	38.33	
Education	Year of schooling	Illiterate (0)	15	12.45	5.66
		Primary (1-5)	57	47.31	
		Secondary (6-10)	41	34.03	
		Higher (>10)	7	5.81	
Family size	Number	Small (up to 4)	24	20.00	5.50
		Medium (5 to 6)	66	55.00	
		Large (7 and above)	30	25.00	
Farm size	Actual (Acre)	Marginal (<.02)	0	0.00	2.30
		Small (>.02 to 0.99)	68	56.67	
		Medium(1 to 2.99)	49	40.83	
		Large (3 and above)	03	2.50	
Annual income	Actual (taka)	Low (up to BDT 50000)	34	28.22	81,100.00
		Medium (BDT 50001 to 75000)	44	36.52	
		High (above BDT 75000)	42	34.86	
Farming experience	No. of years	Poor (up to 15)	25	20.83	15.88
		Moderate (16 to 20)	59	49.17	
		High (above 20)	36	30.00	

Table 2. Insect pests of maize and their status in study area (total respondent 120)

Name of insect pests	Scientific name	Family and Order	No. of respondents reported	Extent of damage in farmers field	Status
Fall armyworm	*Spodoptera frugiperda*	Noctuidae Lepidoptera	85	70.83%	Major
Cutworm	*Agrotis ipsilon*	Noctuidae Lepidoptera	120	100.00%	Severe
Pink stem borer	*Seamia inferens*	Noctuidae Lepidoptera	50	42.50%	Major
Stem borer	*Chilo pertellus*	Crambidae Lepidoptera	90	75.00%	Severe
Cob borer	*Helicoverpa zea*	Noctuidae Lepidoptera	80	66.66%	Severe
Aphid	*Rhopalosiphum maidis*	Aphididae Homoptera	4	3.33%	Minor

Table 3. Insecticides use against target insect pests of maize in study area (total respondent 120)

Brand name of insecticide	Common name of insecticide	Name of target insect pests	No. of respondent reported	Farmer used percentage
Nitro 505 EC	Chlorpyrifos (50%) + Cypermethrin (5%)	Cutworm, fall armyworm	63	52.29
AC Mix 55 EC	Chlorpyrifos (50%) + Cypermethrin (5%)	Cutworm, fall armyworm	28	23.24
Karate 2.5 EC	Lambda Cyhalothrin	Cutworm, fall armyworm	24	19.92
Furadan 5G	Carbofuran	Cutworm	5	4.15
Virtako 40 WG	Thiamethoxam (20%) + Chlorantraniliprole (20%)	Stem borer, pink stem borer, cob borer	80	66.4
Batir 95WP	Acetamiprid (3%) + Cartap (92%)	Stem borer, pink stem borer, cob borer	13	10.79
Cartaprid 95 SP	Acetamiprid (3%) + Cartap (92%)	Stem borer, pink stem borer, cob borer	2	1.66

(66.66%), were considered as major and aphid (3.33%) was reported as minor insect pests by the respondents (Table 2).

As many as 141 insect pests cause varying degree of damage to maize crop right from sowing to till harvest (Reddy and Trivedi 2008). Research results by BARI (2007) reported that 10 insects attacks in maize, among them 5 insects are considered as major pest. The studies showed that cutworm (*Agrotis ipsilon*), stem borer (*Seamia inferens*), shoot borer (*Chilo pertellus*), leaf aphid (*Rhopalosiphium maidis*), cob borer/corn earworm (*Helicoverpa zea*) are the major insect pests of maize in Bangladesh. Hossain *et al.* (2005) reported that cutworm is the most destructive insect pest of maize in the field. Ahad (2003) reported that a number of insect pests cause damage to maize; among them, important ones are Asian maize borer, maize stem borer, maize army worm, American bollworm, maize aphid, cutworm, stem fly, white grub, thrips, termite. The fall armyworm (FAW), *Spodoptera frugiperda* that has been destroyed maize and sorghum fields covering millions of square kilometres and devastated the livelihoods of farmers in Africa and India.

All farmers of the study area took management approach in both seedling as well as reproductive stage of maize during the crop growing season. Farmers of the study area were totally depended on chemical insecticide and no farmer was found to use any non-chemical approach against the insect pests of maize. The major chemical group was Chlorpyrifos (50%) + Cypermethrin (5%) and the brand name of the insecticide was Nitro 505 EC (52.29%) and AC Mix 55 EC (23.24%) against cutworm and fall armyworm at seedling stage. Lambda Cyhalothrin (Karate 2.5 EC) and Carbofuran (Furadan 5G) also were used by some of the farmers against cutworm (19.92% and 4.15%, respectively). In the reproductive stage of maize, the major chemical group was Thiamethoxam (20%) + Chlorantraniliprole (20%) and the brand name was Virtako 40 WG (66.4%) followed by Acetamiprid (3%) + Cartap (92%) as the brand name Batir 95WP (10.79%) and Cartaprid 95 SP (1.66%) against stem borer, pink stem borer and cob borer.

Virtako 40WG is an insecticide having formulations of Chlorantraniliprole 20% and thiamethoxam 20% have been introduced in maize to act as a controlling agent against corn borer in Bangladesh. Lanka *et al.* (2012) reported that Virtako 40WG was the most effective insecticide in suppressing the corn borer, *Helicoverpa zea* by 75.06%. Alam *et al.* (2019) stated that Thiamethoxam 20% + Chlorantraniliprole 20% (Virtako 40 WG) @ 0.4g/L was the better performance on corn borer of maize than others tested insecticides i.e. it can act as an effective chemical control agent for controlling corn borer of maize while yield and all yield attributes were also higher.

Although Carbofuran was the major insecticidal group used against cutworm in Bangladesh but recent scenario was different as found in the present survey.

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