

Survey of Major Insect Pests, Uses of Management Practices and Other Related Information of Sugarcane (*Saccharum officinarum* L.) Growers of the Northern Region of Bangladesh

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Abstract: Kantajir sugarcane Farm is the largest farm that situated a Kharol thana, Dinajpur, Bangladesh. There are 140.08 hectares (346 acres) of land. Farmers of the adjacent locality received leased of that land and cultivate sugarcane. Data collected from those farmers (50 farmers) during 01.01.12 to 31.03.12 from Sunderbon union of that Thana. Farmers informed that stem borer (*Chilo tumidicostalis*), early shoot borer (*Chilo infuscatellus*), top shoot borer (*Scirpophaga incertulus*), root borer (*Emmalocera depressella*), termite (*Odontotermes obsesus*), mealy bug (*Saccharicoccus sacchari*) and scale insect (*Melanapis glomerata*) were major pest, respectively; even after application of insecticides (Furadan 5G). Moreover, 77.27% farmers informed that they used only Furadan 5G for the control of all type of stem borers; 54.54% farmers informed that they used losburn for control of termite. But removal of stem borer infested plant parts and killing of early shoot borer larvae by removal of soil was followed 21% farmers. In addition, the highest 77.27% farmers were acknowledged that those received information from the 'Sugarcane development assistance' followed by 'Center in charge (13.63%)'. Additionally, 814.82% farmers said that they cultivated Isd 37 sugarcane variety followed by Isd-21 (40.91% farmers), and Isd 26 (27.27% farmers). Furthermore, 63.63% farmers informed that those cultivated chili *Capsicum annuum* as relay crops followed by potato *Solanum tuberosum* 54.54% (farmers), tomato *Solanum lycopersicum* 18.18% (farmers) and cucumber *Cucumis sativus* 13.63% (farmers). Moreover, farmers obtained every inputs such as sugarcane set (seeds), fertilizer and insecticide as loan and those loans were paid during the selling of sugarcane to the mill of Shetabgonj (Dinajpur, Bangladesh). In addition, those farmers claimed that they suffered various problems for sugarcane cultivation such as lack of marketing facilities (late purchase of sugarcane by the sugarcane mill, when it reduced its weight due to dry) and stem borer insect infestation.

Keywords: Insect Pest, Insecticides, Mechanical Control, Sugarcane Variety, Relay Crops, Problems

1. Introduction

Sugarcane (*Saccharum officinarum* L.) is one of the most important cash-cum-industrial crops in Bangladesh [1, 2, and 3]. It is the second sugar producing crop of the world but in Bangladesh it rank is first [4]. The average yield of sugarcane in Bangladesh is very low compared to other sugarcane growing countries [5]. For example, it is 42.0

t/ha in Bangladesh [6]. Whereas, in India 56.0 t/ha [7]. Additionally, insect pests alone cause damage ranging from 20-60% [8]. Among various factors of yield reducing; insect pests inflicts considerable losses, which are estimated to be around 20% in cane yield and 15% in sugar recovery [5]. However, so far about 70 species of the insect pests have been identified to feed on sugarcane in Bangladesh [9, 10]. It is also reported that the most important pests of

sugarcane are: i) early shoot borer, ii) top shoot borer, iii) stem borer, iv) rootstock borer v) mealy bug, and vi) scale insect and vii) white grubs. The yield losses due to those insect pests were estimated to be 22-33% by early shoot borer [11]; 21-48% by top shoot borer [12]; 8.2-12.6% by stem borer [13]; and 8.55 - 10% by root stock borer [14]; 1.43% by scale insect [13], 24.1% by mealy bug and 23.07-38.17% by white grubs [15]. Various techniques such as cultural, mechanical, biological and chemical methods have been recommended to control those pests [16].

An understanding of insect pest attack and the associated factors would be helpful to planners and extension workers to devise strategies and courses of actions for effective control of the insect pests [17] (Ahad and Haque, 1993).

However, there are two sugar mills in this area: one is Thakurgaon sugar mill and another is Shetabgonj at Dinajpur. The raw materials of sugar (sugarcane) are supplied from those two mills. So, sugarcane is very important crop of this area.

But literatures reveal that information about major insect pests and other problems related to sugarcane (*Saccharum officinarum* L.) Cultivation is about scanty, especially in Bangladesh. However, Ahad and Haque [17] conducted a research on the insect pests faced by the farmers in sugarcane cultivation in Bangladesh. But it does not fulfill the overall need. Consequently, a research program was under taken whose objectives are: i) to know different insect pests of sugarcane, ii) different problems faced by sugarcane growers, iii) pest management practice they use, iv) the different varieties of sugarcane they cultivate, v) different sources they use to take advice for management of insect pests and other purposes, vi) their sources of loan, and finally vii) to know the relay crops they cultivate.

The research would be helpful to the researchers such as to agriculturists, entomologists, agriculture extortionists, sociologists, psychologists and also those who are interested to conduct a research based on interview schedule.

2. Materials and Methods

The methodology was followed according to Ahad and Haque [17] and Ahad et. al. [18]. Based on the literature, it was first surveyed how many insect pests attacked in the sugarcane crop in Bangladesh and India. Based on those data, an interview schedules was set for the collection of required data that mention in the objectives. A colour photograph (laminated) also prepared about the nature of damage and the insect pests of sugarcane. Then, it showed to the farmers and explains clearly and then asked those farmers, whether those insect pests are major, minor or absent. Besides, other questions (those mentioned in the objectives) were also asked. Finally, the obtained data were converted into percentages and compiled in various tables for illustration in the result and discussions.

3. Results and Discussions

3.1. Major Insect Pests of Sugarcane

Seven insect species were noted to attack sugarcane. However, 90.50% farmers claimed that sugarcane stem borer (*Chailo tumidicostalis*) was a serious insect pest. Whereas 40.98, 40.98, 50.48, 17.80, 20.50, 7.30 and 25.20% farmers (Table-1) claimed that sugarcane early borer (*C. infuscatellus*), termite (*Odontotermies obsesus*), mealybug (*Saccharicoccus sacchari*), scale insect (*Melanapis glomerata*) were damaged sugarcane crop, respectively. Consequently, those were major pest, respectively. It was seen that major% of farmers claimed that sugarcane stem borer was the major pests. So, stem borer was the serious pest even after application of insecticides. But insecticides reduced the damaged of sugarcane early borer (*C. infuscatellus*), termite (*Odontotermies obsesus*) scale insect and mealy bug. Patil and Hapase [21], Ahad et al. [2], Ahad [3] reported that the most important pests of sugarcane were early shoot borer, top shoot borer, stem borer, rootstock borer, mealy bug, scale insect and white grubs, which more or less supports the result of the present study.

Table 1. Comments of sugarcane farmers (%) about major insect pests.

Insect pests	Family	Comments of farmers (%) about infestation of major/minor insect pests		
		Major	Minor	Not found
i) Sugarcane Stem borer (<i>Chailo tumidicostalis</i>) *	Pyalidae	90.50	9.50	0.0
ii) Sugarcane top shoot borer (<i>Scirpophaga incertulus</i>)	Pyalidae	40.98	54.57	4.45
iii) Sugarcane early borer (<i>C. infuscatellus</i>)	Pyalidae	50.48	47.02	2.50
iv) Sugercane root borer (<i>Emmalocera depressela</i>)	Pyalidae	17.80	18.08	36.36
v) Termite (<i>Odontotermies obsesus</i>)	Termitidae	20.50	45.45	47.02
vi) Scale insect (<i>Melanapis glomerata</i>)	Coccidae	7.30	42.24	50.46
vii) Mealy bug mealybug (<i>Saccharicoccus sacchari</i>)	Pseudococcidae	25.20	52.46	27.26

*Serious pest.

3.2. Use of Insecticides and Other Management Practices Used by the Sugarcane Farmers

Farmers used seven types of insecticide but total 77.27% (highest%) farmers used Furadan 5G insecticide followed by Loss burn (54.54%), Ad furan (13.63%), and Briefer (9.09%), Karate (9.09%), lime (9.09%), respectively (able 2). Ahad et al. [4] showed that sugarcane farmers mainly use Furadan 5G for the control about all insect pest and Heptachlor for the control of termite. Here farmers use Loss burn instead of Heptachlor, as it is banned by the government of Bangladesh. This result supports the result of the present research. In addition, total 72.72% farmers remove the infested sugarcane shoot borer, stems and thrown into the water; killing of early shoot borer larvae by removal of soil is

also done by some farmers i. e. they use mechanical method of pest control (Table-2).

Table 2. Use of insecticides and other management practices used by the sugarcane farmers.

Insecticides	% Farmers use
Furadan 5G (Carbofuran)	77.27
Lorsban (Chlorpyrephos group)	54.54
Agrofuran (Carbofuran group)	13.63
Breffer (Carbofuran group)	9.09
Karata (Carbofuran group)	4.44
Azodrin (organophosphorus)	4.44
Lime	4.44
Avastan (Fungicide)	40.05
Others management practices	
Removal of insect infested sugarcane by stem borer and it was thrown into the water	72.72
Killing of early shoot borer larvae by removal of soil	31%

3.3. Use of Source Advice for the Insect Pest Control

It was observed that farmers took advice for management of sugarcane pest mainly from the cane development assistance (77.27%) followed by Center in charge (13.63%), own experience (9.09%), friends (9.09%), Assistant manager (9.09%), SCI (9.09%) and relatives (04.45%), respectively (Table - 3).

Table 3. Percentages of sources of information for advice for the control of sugarcane pests.

Sources of advice (information)	Farmer (%)
Cane development assistance (CDA)	77.27
CIC (Center in charge)	13.63
Self (use own experience)	9.09
Relatives and friends	4.45
SACDO (Sub-assistance cane development officer)	9.09
AM (Assistant manager)	9.09
Insecticides dealers	4.45

3.4. Sugarcane Variety Cultivated in Dinajpur

Farmers were cultivated mainly five varieties of sugarcane such as Isd 37, Isd 21 Isd 26 Isd 33, Isd 39. But most farmers cultivate Isd 37 (81.82% farmers) followed by Isd 21

(40.91% farmers), Isd 26 (27.27% farmers), Isd 33 (13.36% farmers) and Isd 39 (13.36% farmers). As a result, those were popular varieties, respectively. Moreover, Isd 12, Isd 22, Isd 29, Isd 34 Isd 35 Isd 36 and Isd 38 varieties were also cultivated very negligible% of farmers (Table-4).

Table 4. Percentage of Farmers cultivating different varieties of sugarcane.

Variety	Farmers (%) cultivating sugarcane
Isd 37	81.82
Isd 21	40.91
Isd 26	27.27
Isd 33	13.36
Isd 39	13.36
Others varieties (Isd 12, Isd 22, Isd 29, Isd 34 Isd 35 Isd 36 and Isd 38)	Cultivated by negligible% of farmers

3.5. Percentages of Sugarcane Farmers Cultivate Relay Crop

It was seen that 100% farmers cultivate relay crops after harvesting of sugarcane and when sugarcane were very young. However, highest 63.63% farmers cultivate chili (63.63%) as relay crop followed by potato (54.54%), tomato (18.18%) and cucumber (13.63%). Moreover, very minor% farmers (4.45% farmers) were also cultivated onion, tobacco, mustard, coriander, and mung bean (Table - 5) as relay crop.

Table 5. Percentages of sugarcane farmers cultivate relay crop.

Name of relay crop	Farmer (%)
Chili (Capsicum annum)	63.63
Potato (Solanum tuberosum)	54.54
Tomato (Solanum lycopersicum)	18.18
Cucumber (Cucumis sativus)	13.63
Onion (Allium cepa)	4.45
Tobacco (Nicotiana tabacum)	4.45
Mustard (Brassica juncea)	4.45
Coriander (Coriandrum sativum)	4.45
Mung bean (Vigna radiata)	4.45

Table 6. Categories of farmers, loan and benefit information of sugarcane farmers.

Categories of Farmers	Those took loan maximum amount of loan	Those took maximum amount of land	Farmers benefited amount of taka	Farmers benefited amount of taka
Big Farmers	Tk.1,95,000/- (average) per farmer	23 acre land (average) per farmer	Tk.3 lac per farmer	-
Medium farmers	Tk.10, 200/- (average)	3.2 acre land (average)	-	-
Small farmers	Tk. 4,000/-	1 acre acre land (average)	16 thousands per farmer	-

3.6. Amount of Land and Loan Information

There is 140.08 hectare (346 acre) of land in Kantagir farm. Farmer leased the entire lands of the adjacent area and cultivates sugarcane. 100% farmers received loan as seed, fertilizer and insecticides from the sugar mills. Those loans have to pay during the sugarcane by giving all sugarcane to the mills. After paid, if there is extra money, then they returned it from the mills. However, all farmers are benefited

as they all are laborious and have no investment without own labour during cultivation and harvesting. So, no need of own land and money except labour for cultivation and harvesting of sugarcane. Farmers could be classified three categories on basis of loan (Table-6) and land such as i) Big Farmers: those took loan maximum Tk.1, 95,000/- (average) loan for cultivation of maximum 23 acre land (average) ii). Medium farmers: those took loan Tk.10, 200/- (average) loan for cultivation of 3.2 acre land (average) iii) Small farmers: those

took loan Tk. 4,000/- (average) loan for cultivation of 1 acre land (average). However, farmers benefited Tk.3 lac per farmer and minimum 16 thousands per farmer.

3.7. Problems of Sugarcane Farmers

Correct identification of any problem makes it easy to solve. Sugarcane farmers were mostly illiterate. So, not all farmers were able to express their problem correctly but those who (a few) somewhat literate expressed their problem very effectively, but their percent was less. Consequently, the problems are summarized as rank (according to the highest% of farmers claim) wise in table-7.

Table 7. Problems of sugarcane farmers.

Problems	Rank (on the basis of descending %)
Lack of marketing facilities, late purchase of sugarcane by the sugarcane mill, when it losses its weight due do dry	I
Stem borer insect infestation	II
Newly adopted tender process taking of land for sugarcane cultivation instead of leach method	III
Have to take loan from the sugarcane mill though no need of loan	IV
Lack of irrigation facilities	V
Lack of organic manure	VI
No problem	VII

4. Conclusion

Sugarcane stem borer is the serious pests of sugarcane; it reduce yield seriously through the boring of stem. This pest is uncontrollable by using insecticides and it a major problem of sugarcane cultivation. So, it is necessary to develop integrated pest management to control the pests. In addition, other main problems of the sugarcane farmers are marketing facilities; the sugarcane mills purchase the sugarcane when it loses its weight due does dry. So, for the save of nation and sugar mills for sugar production as well as supply of sugarcane, the mills would take a suitable process to purchase sugarcane from the farmers in due time.

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