Effect of Different Infestation Levels of *Chilo Infuscatellus* (Snellen) on Quantity and Quality Parameters of Sugarcane

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Abstract: Population dynamics of sugarcane stem borer on commercial varieties of sugarcane were evaluated. The adults of *Chilo infuscatellus* (Snellen) emerged from over wintering larvae during fourth week of February. The population of adults of *C. infuscatellus* remained low in early vegetative growth stage of sugarcane crop. The number of moth/ trap increased gradually as the growth of the crop advanced and the maximum population of 37.4± 2.20 was recorded during August. When mean number of 18.98 moth/ trap were collected. The population of *C. infuscatellus* was declined after August and 28.6±2.42, 14.6 ± 1.74 moths were captured/ trap in month of September and October, respectively. The infestation of sugarcane stem borers was inversely proportional to the quantity and quality of sugarcane. Maximum cane weight of 13.5 ± 0.21 and 12.1± 0.05 kg were recorded in CPF-237 and Thatta-10 varieties at 0% infestation level, while minimum at 20% infestation (9.3±0.12 and 8.5 ±0.12 kg), respectively. Highest sugar recovery (11.0 ±0.08 and 10.2±0.11%) was observed at 0% infestation while lowest (9.3±0.12 and 8.5 ±0.12%) at 20% infestation in both the varieties.

Keywords: Infestation, *Chilo infuscatellus*, quantity, quality, sugarcane.

INTRODUCTION

The importance of sugarcane (*Saccharum officinarum L*.) in the agrarian economics of Pakistan needs no emphasis because of its higher value as a cash crop, a major source of white sugar, shakkar and gur [1]. Sugarcane crop is currently facing severe crisis in the country and both farming community and the industry are striving for its sustainable existence and growth. The major challenges faced by the crop are lower than average per area production, low sugar recovery and higher cost of production. Regardless of pronounced developments in sugarcane research and expansion in sugar industry, our national average sugarcane yield is 49.00 tons per hectare, whereas, the potential is between 150-250 tons per hectare [2]. There are several reasons for this low yield but different types of borers are the most serious pests of sugarcane, of which the stem borer *Chilo infuscatellus* is the most notorious and destructive one. The stem borer is active from March to November and passes the winter as full grown larvae in the stubble. The borer tunnels in the sugarcane stalks feeding on plant tissue and disrupting the flow of nutrients in the plant. Each sugarcane borer female lays about 200 eggs; there are four generations each summer, resulting in 202 million potential offspring from each female emerging in spring [3]. The damaged plants attacked by this pest produce dead hearts during growing season till the formation of canes; its attack is confined to internodes only. It reduce sugarcane yield from 30-70 percent [4].

MATERIAL AND METHODS

Population dynamics of adults of *Chilo infuscatellus* in sugarcane field was assessed by installing the light trap and the observation on larval infestation of sugarcane stem borer was recorded at weekly interval, starting from month of February till October. The borer damage was assessed on dead heart basis in early stage while on internode basis at later stage. For this purpose a block (4 acres) of autumn sown Thatta-10 sugarcane variety was selected on farmer's field at village Hussein Khan Thoro. Normal cultural practices were done with fulfilling irrigation and fertilizer requirements. Neither insecticide nor parasitoid treatment was used against sugarcane borers. Population of sugarcane stem borer was studied by installing locally manufactured light traps consisted of aluminum funnel (47cm) Dia at the top and 12 cm at the base, height 60 cm). Traps were placed at the wooden stand at the top of which 100 W electric bulbs was fixed and lighted. The plastic jar was placed at the base of funnel having Coopex powder as killing agent. The light trap was kept in the sugarcane field from sunset till morning. This practice was continued throughout growing season with weekly intervals. The insects captured in the jar were brought to the laboratory and identified. The observation on infestation of sugarcane stem borers was recorded at weekly intervals starting from month of February till October. The borer damage was assessed on dead

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heart basis in early stage while on internode basis at later stage.

The experiment was conducted to assess the effect of different infestation levels of sugar stem borer on the quantity and quality parameters of sugarcane. Two commercial varieties CPF -237 and Thatta -10 were sampled from sugarcane fields of Pangrio Sugar Mills area in the end of season when crop was harvested. Hundred cane stalks of each variety were pulled out from respective plots, after removing the leaf sheaths the canes were dissected for assessment of bored internodes. Five samples were collected with 250 internodes at different infestation levels i-e 0, 5, 10, 15 and 20%. These samples were brought to the laboratory and weight loss, brix % and sugar recovery were analyzed.

RESUTS AND DISCUSSION

Emergence of adults from over wintering larvae started during the fourth week of February (Table **1**). The population of adults of *C. infuscatellus* remained low in early vegetative growth stage of the crop. The number of moths/ trap increased gradually as the growth of the crop advanced and the maximum population of 37.4 moths/trap were recorded during August. The population of *C. infuscatellus* declined after August and 28.6, 14.6 moths were captured/ trap in month of September and October, respectively.

Larval infestation in young seedling started during the month of March and increased gradually as the crop growth advanced reaching to highest levels in September followed by October (23.2%), August (20.4%), respectively. Mean values of moths trapped in light traps coincided with the larval infestations with the respective month.

Effect of different infestation levels (i-e 0, 5, 10, 15 and 20%) of sugar stem borer on tonnage and millage of two sugarcane commercial varieties CPF -237 and Thatta -10. The data revealed that cane weight and recovery significantly reduced in both commercial varieties as borer infestation percentage increased (Table **2**). The brix % has significant positive correlation with sugar recovery. Maximum cane weight of 13.5 ± 0.21 and 12.1± 0.05 kg were recorded in CPF-237 and Thatta-10 varieties at 0% infestation level, while minimum at 20% infestation (9.3±0.12 and 8.5 ±0.12 kg), respectively. Highest sugar recovery (11.0 ±0.08 and 10.2±0.11%) was observed at 0% infestation while lowest (9.3±0.12 and 8.5 ±0.12%) at 20% infestation in both the varieties.

The results to determine economic threshold level of sugarcane stalk borer on the basis of moth catches in light traps and larval infestation in sugarcane field revealed that the emergence of adults from over wintering larvae started during the fourth week of February .The population of adults of *C. infuscatellus* remained low in early vegetative growth stage of sugarcane crop. The number of moth/ trap increased gradually as the growth of the crop advanced and the maximum population was recorded during August and September, when mean number of 18.98 moth/ trap were collected. The same study reported by [4]. stem borer is active from March to November and passes the winter as full grown larvae in the stubble. The damaged plants attacked by this pest produce dead

Table 1: Activity of Sugarcane Stem Borer on Basis of Moth Catches in Light Trap and Larval Infestation

Months	Mean temp. (Mean ± SE)	Larval infestation (Mean ± SE)	Moth trapped in light trap (Mean ± SE)
Feb.	19.75	0.0 ± 0.00 h	0.4± 0.40f
March	25.25	5.8 ± 0.58 g	8.4±1.24 e
April	28.85	9.4 ±1.02 fg	13.6±1.20 d
May	32.1	14.4+1.60 de	17.4±2.08 d
June	32.4	12.2 ±1.46 ef	22.8 ±1.28 c
July	31.45	17.8 ±1.28 cd	27.6±1.53 bc
August	30.5	20.4 ±1.69 bc	37.4±2.20 a
Sept.	29.7	25.6 ±1.7 2 a	28.6±2.42 b
Oct	27.55	23.2±1.82 ab	14.6±1.74 d
Mean		14.47	18.98

In a column means followed by the same letter are not significantly different at P=0.05 LSD Test.

Table 2. Effect of Different Infestation Levels of *Chilo infuscatellus* on the Yield and Sugar Recovery Percent

Infestation levels	CF-237			Thatta-10		
	Cane weight (Mean ± SE)	Brix % (Mean ± SE)	Recovery % (Mean ± SE)	Cane weight (Mean ± SE)	Brix % (Mean ± SE)	Recovery % (Mean ± SE)
0	13.5± 0.21[a]	22.7±0.13[a]	11.0 ±0.08[a]	12.1± 0.05[a]	21.9 ±0.04[a]	10.2±0.11[a]
5	12.5±0.12[b]	22.8±0.02[a]	10.7 ±0.09[b]	11.1± 0.09[b]	20.5 ±0.16[b]	9.6±0.12[b]
10	11.0±0.13[c]	22.6±0.02[a]	10.2±0.11[c]	9.6 ± 0.11[c]	20.5 ±0.06[b]	9.2±0.11[c]
15	10.2 ±0.09[d]	22.1 ±0.03[b]	9.9 ±0.07[d]	8.8 ± 0.18[d]	20.4 ± 0.19[b]	8.9±0.06[d]
20	9.3±0.12[e]	21.9±0.03[c]	9.4±0.10[e]	7.9± 0.02[e]	19.9 ±0.05[c]	8.5 ±0.12[e]

In a column mean followed by same letter are not significantly different at P=0.05 LSD Test.

hearts during growing season till the formation of canes; its attack is confined to internodes only. It reduce sugarcane yield from 30-70 percent. Monitoring studies using light traps showed that the peak period of the sugarcane early shoot borer was May and September [5]. The predetermined Economic injury level of borers, the maximum (10%) loss of crop was observed during July & August [6, 7]. Reported a gross negative correlation between the intensity of infestation and sucrose contents and recorded reduction of sucrose beyond 10% borer infestation on internode basis.

Different infestation levels (i-e 0, 5, 10, 15 and 20%) of sugar stem borer showed the positive and variable impact on the quantity and quality of two sugarcane commercial varieties CPF -237 and Thatta -10. The infestation of sugarcane stem borers was inversely proportional to the quantity and quality of sugarcane. The potential for using different economic injury threshold levels was assessed in management of sugarcane stem borer (*Eldana saccharina* Walk) on susceptible and resistant commercially produced cultivars of sugarcane (Saccharum spp. hybrids) based on percentage of bored internodes [7-10]. Reported that economic injury levels of borers, potential of yield and susceptibility of currently grown varieties. The same study reported that economic injury level can be as higher as 12% if a resistant variety is grown. The damage caused by borers not only reduces the crop yield but also affects the sucrose contents of cane and have reported a gross negative correlation between the intensity of infestation and sucrose contents and recorded reduction of sucrose beyond 10% borer infestation on internode basis. In respect to borer infestation levels and subsequent sugar recovery a cane yield of 9, 19 and 31% and sugar recovery losses of 22, 34, and 52 % were observed with borer infestations of 25, 50, and 75 % respectively [11].

RECOMMENDATIONS

Based on these results, it is concluded that stem borer is the serious pest sugarcane. There is strong need to launch a project to educate the sugarcane growers and the sugar industry people about strategies for the management of this notorious and destructive pest through environment friendly techniques and keep the population below economic threshold levels.

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