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Activities of Mycophagous Beetle *Phalacrus immarginatus* Champ. on Whip Smut of Sugarcane*

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ABSTRACT

Duing the frequent surveys of Saurashtra region in Gujarat, an insect was observed constantly associated with smutted whips of sugarcane later indentified as *Phalacrus immarginatus* Champ. beetle. The grub and adult stages of the beetle proved as heavy spore feeders. The mycophagous beetles were recorded throughout the crop season. The number of grubs and adults per whip recorded were 3 to 52 and 2 to 18 respectively, during the entire crop season in 1991. The highest insect population was recorded in the month of July and lowest in the month of September.

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INTRODUCTION

Sugarcane smut (*Ustilago scitaminea* Syd.) is an important disease in all sugarcane growing areas of the country. In Saurashtra region of Gujarat, it causes heavy quantitative and qualitative losses in most of the popular varieties like Co. 791, Co. 419 and Co. 7527. The smut affected plant produces apical whip consisting millions of smut teliospores which are disseminated by wind as well as insect and therefore act as potential source of secondary infection in nearby sugarcane plants (Antoine, 1961; Grillo and Saucedo, 1985). In Saurashtra region, the beetle, *Phalacrus immarginatus* were found constantly associated with smut whip throughout the crop season. They were seen to damage smut whip and hence the study on the activities of this insect on smutted whip was undertaken.

MATERIALS AND METHODS

During the survey for sugarcane smut, some insects were invariably found on the sugarcane smut whip at the research farm, Gujarat Agricultural University, Junagadh and surrounding areas. The insects were collected and sent to the Director, International Institute for Entomology, London for confirmation of identifications.

The observations regarding marks of identification of eggs, grubs, pupa and adult of the insect were recorded.

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The feeding done by the insect on the smut whip was regularly monitored in the field and observations were recorded. The grubs were simultaneously dissected and observed under microscope to examine the presence of the smut spore in alimentary canal. These spores were cultured artificially to confirm the viability.

Monthly observations on grub and adult population were recorded from January, 1991 to December, 1991 in the heavily smut infected sugarcane fields at the research farm, Gujarat Agricultural University, Junagadh.

The grub and adult feeding on smut whips were collected separately and each were put in 2 ml. of water in a test tube. After shaking well, the spore count was done under microscopic field. The spores, thus observed were counted in 2 ml. of water. Such 25 observations were undertaken each for grub and adult.

RESULTS AND DISCUSSION

The adults of spore feeding insects collected from the smut infected sugarcane fields and sent to the Director, IIE, London and was identified as *Phalacrus immarginatus* Champ. (Coleoptera : Phalacrusidae).

The eggs of *P. immarginatus* were watery white and oblong measuring 0.48 to 0.78 mm in length and 0.15 to 0.30 mm in breadth. The eggs were laid in group of 4-6 inside the silvery membrane of smut whip in infected field. The newly hatched grub was more active, minute and transperant white. Later, it turned to whitish yellow with semi transperant abdominal segments. From the outward appearance, the grub looked blackish due to feeding and ingestion of the smut spores. The grubs posses brown head with retractile mouth parts. The fully grown grub measures 4.80 to 5.60 mm in length and 1.30 to 1.60 mm in breadth. When nearing pupation, it ceases to feed and remain quescent for a time before pupating. The pupation takes place on base of the observed whip with leaf sheath. The pupa looks white in colour measuring 2.60 to 3.50 mm in length and 1.30 to 1.80 mm in breadth. The adult being convex, oval and shining black measuring 2.40 to 3.70 mm in length and 1.40 to 2.50 mm in breadth. The antannae were clavate and 11 – segmented. The elytra covers the abdomen entirely. This is more or less similar with the observations of Agarwal (1956).

The grub and adult stages of insect were found to feed smut spores. The grub forms a tunnel by feeding the spore mass on the basal part of whip which remains covered by the leaf sheath. The adult has always been found feeding spore mass by scraping on the open portion of the smut whip making irregular patches. The silvery membrane of infected smut whip was shredded-off due to insect feeding. Dissection of the grubs collected from the smut whip showed the presence of the spores in the alimentary system. The spores collected from the alimentary canal appeared to be normal but failed to germinate when cultured artificially as was earlier reported by Agarwal (1956).

The observations on the population of *P. immarginatus* were recorded during the crop season from smut infected sugarcane field. The results obtained on grub and adult population are presented in Table 1.

TABLE 1

Grub and adult population of *P. immarginatus* on smut whip of sugarcane.

Sr. No.	*Month*	*No. of whip observed*	*No. of whip infested by P.immarginatus*	*Av. no of P. immarginatur/whip*	
				Grub	*Adult*
1.	January	25	19	14	4
2.	February	38	22	16	3
3.	March	78	56	21	5
4.	April	100	92	12	5
5.	May	100	100	27	13
6.	June	100	100	39	16
7.	July	100	80	52	18
8.	August	88	51	5	2
9.	September	63	12	3	2
10.	October	56	20	21	4
11.	November	92	73	26	6
12.	December	83	62	18	4

The highest population of both the stages was recorded in the month of July, whereas, it was found the lowest in the month of September. The observations on the activities of this beetle while being in association of smutted whips revealed that they were haevy spore feeders and may act as potential biological control agent for sugarcane smut. These were earlier found effective in controlling the smut in Bolivia (Drutt and Colque, 1984) and Cuba (Grillo and Saucedo, 1985).

The results presented clearly indicate that the mycophagous insects were observed throughout the crop season. The maximum number of whips with mycophagous insects were recorded in the months of May and June followed by April and July.

During the crop season, the population of the grub and adult was noted ranging from 3 to 52 (Av. 21.17) and 2 to 18 (Av. 6.87) per whip, respectively. The highest population of both

the stages was recorded in the month of July (52 grubs and 18 adults/whip) whereas it was found lowest in the month of September (3 grubs and 2 adults/whip). The observations on the activities of this beetle while being in association of smutted whips revealed that they were heavy spore feeders and may act as potential biological control agent for sugarcane smut.

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