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Digestive enzymes in the gut and salivary gland of the larvae of *Chilo auricilius* Ddgn.

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Summary. Amylase, α- and β-glucosidase, α- and β-galactosidase, β-fructosidase, trypsin, aminotripeptidase, leucine-aminopeptidase, prolinase, prolidase glycyl-L-leucine dipeptidase and glycylglycine dipeptidase are present in the 3rd instar larvae of *Chilo auricilius.*

Chilo auricilius, stalk borer, is a destructive pest of sugarcane in subtropical India. Sugarcane cultivars exhibit varying degree of resistance to this pest. Precise information on the basis of resistance, apparently connected with feeding behaviour of the pest, is not available. Artificial diets have been formulated for rearing this insect[2], however, and there appears to be scope for its modification so as to simulate the insect's behaviour and fecundity as found in nature.

Table 1. Carbohydrases in the gut and salivary glands of *Chilo auricilius* Ddgn.

Enzymes	Salivary gland	Foregut	Midgut	Hindgut
Amylase	+	−	+	−
Cellulase	−	−	−	−
α-Glucosidases				
a) Maltase	+	+	+	+
b) Sucrase	+	+	+	+
c) Trehalase	+	+	+	+
d) Melezitase	+	−	+	+
β-Glucosidase	−	−	+	−
α-Galactosidase	−	−	+	−
β-Galactosidase	−	−	+	−
β-Fructosidase	+	±	+	+

±, Slight activity; +, activity present; −, activity absent.

Table 2. Proteases in the gut and salivary glands of *Chilo auricilius* Ddgn.

Enzymes	Salivary gland	Foregut	Midgut	Hindgut
Trypsin	−	−	+	+
Peptidases				
Carboxypolypeptidase	−	−	−	−
Aminopeptidases				
1. Aminotripeptidase	+	+	+	+
2. Leucine aminopeptidase	+	+	+	+
Dipeptidases				
Prolinase	+	+	+	+
Prolidase	±	−	±	−
Glycyl-L-leucine dipeptidase	+	+	+	+
Glycyl glycine dipeptidase	+	+	+	+

±, Slight activity; +, activity present; −, activity absent.

With this in view, work was initiated to determine the enzymes involved in the digestive system of the insect. The present report covers carbohydrases and proteases only in 3rd instar larvae.

Materials and methods. 3rd instar larvae of *chilo auricilius* were collected from the fields of sugarcane cultivar Co 1148 at the Institute farm in August–September. The larvae were immobilised by chilling at 0 °C for 10–15 min and dissected immediately after, in distilled water. Salivary glands and alimentary canal were taken out and collected in ice-cold distilled water. Fore-, mid- and hind-gut were collected separately and enzyme homogenates were prepared[3]. 16 larvae were used for 1 test. Enzymes were detected by paper chromatography[4]. The experiment was replicated 4 times.

Results and discussion. The enzymatic pattern of the larvae of *C. auricilius* has been elucidated in tables 1 and 2. The larvae secrete a wide range of carbohydrases, but they are not able to hydrolyse cellulose as cellulase is absent from their system (table 1). Amongst proteases tested, all the enzymes except carboxypolypeptidase are present in the digestive tract of the larvae (table 2). This indicates their ability to hydrolyse proteins besides carbohydrates.

C. auricilius is a pest of sugarcane, rich in sucrose. The larvae of this pest feed only on sugarcane almost all round the year. However, their wide enzymatic spectrum would enable them to digest a variety of proteins and carbohydrates. Hence the pest does not appear to be dependent upon sugarcane alone for its survival. It is well adapted to feed on alternate host plants under adverse conditions. However only 1 alternate host plant, *Sorghum helipens*[5], has been reported for *C. auricilius* so far.

The enzymatic pattern of the larvae is almost similar to that of the pink borer *Sesamia inferens*[3], and the leaf hopper *Pyrilla perpusilla*[6]. Both are pests of sugarcane, but have also been reported from a variety of other plants[7,8] with little sucrose. Unlike *C. auricilius,* both these pests are only active on sugarcane for a few months. There is a difference in their feeding behaviour as well; *S. inferens* usually feeds on sugarcane in the initial stages of the crop growth before sucrose accumulation starts, whereas *Pyrilla* feeds on leaves only. The main activity of the larvae of *C. auricilius* is in well developed stalks after sugar accumulation starts, but they are also found in young shoots.

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