IMPACT OF FEEDING INJURY OF *CYRTOPELTIS TENUIS* REUT. (HEMIPTERA:MIRIDAE) ON SOME BIOCHEMICAL CHANGES IN *LYCOPERSICON ESCULENTUM* MILL. (*SOLANACEAE*)

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MALFORMATION and lesions in crop plants due to feeding by mirid bugs are well known[1]. Frequent stylet insertion and desapping of the plant along the stylet track, resulting in the necrosis of cells and the appearance of a brownish, ring-like area externally around tender stem and petiole, has been observed on tomato, *Lycopersicon esculentum* Mill. due to feeding by *Cyrtopeltis tenuis* Reut[2]. Extensive feeding also leads to the withering of tender shoots followed by the drying of flower stalks and shedding of flower buds. In addition to the feeding process, consideration of the wound-response of the plants also appear essential in order to have a complete idea regarding the feeding injury by any phytophagous species. Hence, the present paper highlights the feeding injury of *C. tenuis* along with the biochemical changes in terms of total proteins, carbohydrates, phenols and oxidative enzymes *viz* peroxidases (PO) and polyphenol oxidases (PPO) in the healthy and injured tissues of *L. esculentum*.

Healthy and mirid injured stem and petiole of *L. esculentum* were collected from the field in Loyola College Campus. For phenol estimation 5 g of the injured and healthy plant parts were chopped into small bits and was extracted in boiling 80% ethanol, for 5 min. The material was blended using mortar and pestle and filtered through Whatman 1 filter paper. The residue was transferred back to 5 ml of 80% ethanol and reextracted. Filtrates were pooled and finally made upto 25 ml with 80% ethanol. Phenol was estimated using this extract according to the method of Bray and Thrope[3]. Equal weights of the plant materials were dried in an hot air oven for 3 days and the total phenol content was expressed as mg phenol/g of dry weight of the tissue. For the estimation of proteins[4], carbohydrates[5], and enzymes, the healthy and injured tissues were homogenized separately in ice-cold acetone. The acetone extract was filtered, residue-dried and used for the estimation. The oxidative enzymes PO was determined using pyrogallol as the substrate[6] and PPO using L-DOPA as the substrate[7] Incidentally attempts were also made to analyse proteins qualitatively in healthy and injured tissues of *L. esculentum* with disc gel electrophoresis using 7.5% polyacrylamide gel and Tris-glycine buffer, pH 8.6 as tank buffer[8]. After 2½ hr of run, the gel columns were removed and stained with 0.02% coomassie brilliant blue in methanol, acetic acid, water (25:7:68) for 24 hr and destained in the same solvent mixture without the stain until the bands were clear, after which it was fixed in 8% acetic acid. For PPO, the gels were stained using 1% DOPA, the gel columns were continuously shaken for 30 min to facilitate faster appearance of bands and subsequently fixed in acetic acid.

Feeding by *C. tenuis* was confined to the vascular bundles, particularly phloem tissues and the neighbouring parenchyma cells (figure 1). Histological observation of the feeding zone showed hypertrophy and hyperplasy of cells surrounding the phloem region which subsequently transformed into a brown coloured area at the feeding site resulting in necrosis[2]. From the present study it was found that the concentrations of total proteins, carbohydrates, phenols, PO and PPO were higher in tissues injured by *C. tenuis* when compared with those of healthy tissues (table 1). These substances also increased by 34.29, 37.33, 22.54, 47.38, and 64.99% respectively in the damaged tissues. Increased levels of sugars, amino acids, proteins, phenolic compounds and oxidative enzymes have been reported in the case of tissues injured by the mirid, *Lygus disponsi* Linña. infesting sugar beet[9,10].

Damage to plant tissues from insect feeding, sets in motion a series of wound-response reaction in plants particularly characterised by the release of phenolic

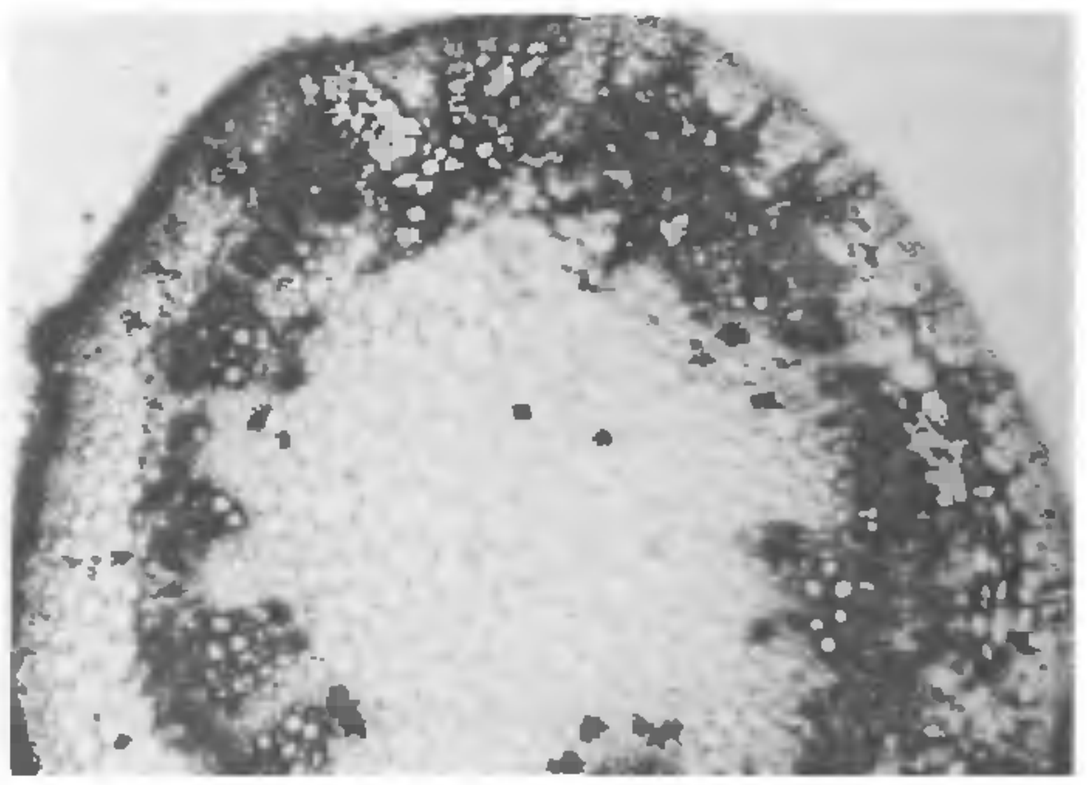

Figure 1. T.S. of injured stem of tomato showing the feeding zones of *C. tenuis* and subsequent necrosis in phloem and adjoining parenchyma cells.

Table 1 *Enzyme activities and quantities of other substances in the injured and healthy tissues of L. esculentum* infested by *C. tenuis.*

Enzymes and other substances	OD units/0.01/h/mg of protein		Percentage increase over healthy tissues
	Healthy tissues	Injured tissues	
Proteins[a]	2.05	3.12	34.29
Carbohydrates[a]	9.40	15.00	37.33
Phenols[a]	1.10	1.42	22.54
Peroxidase[b]	24.39	46.35	47.38
Polyphenol oxidase[b]	10.93	31.22	64.99

[a] mg/g dry wt. of sample [b] OD units per g of sample

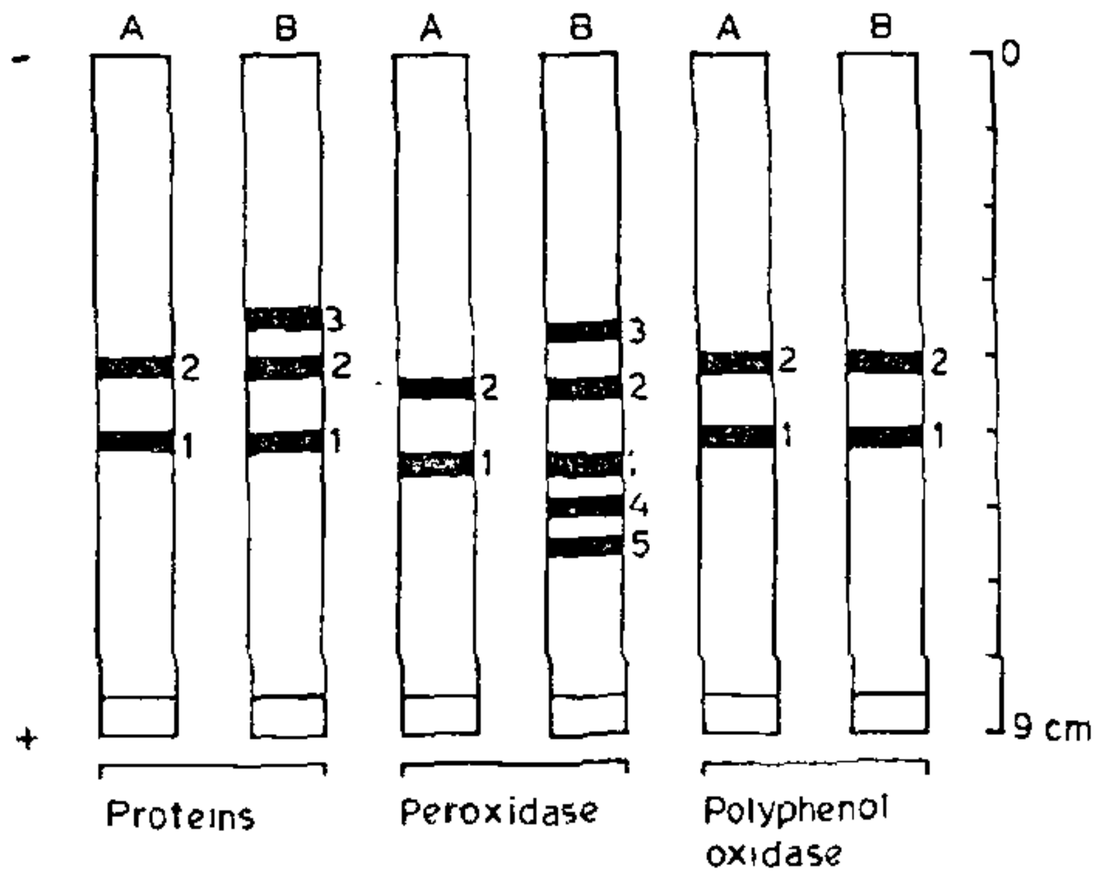

Figure 2. Electrophoretic studies of proteins and oxidative enzymes in the injured and healthy tissues of *L. esculentum.*

compounds which are oxidised to quinones and subsequently forms nontoxic polymers producing the characteristic brown discolouration of wounded tissues[11]. While electropherograms of healthy tissues showed only two light bands for proteins, injured tissues revealed three conspicuous bands (figure 2). Similarly, healthy tissues exhibited only two light bands for PO and PPO where as injured tissues showed five and two clear bands for PO and PPO respectively. Changes in the patterns of proteins, PO and PPO also emphasize the fact that there appears an alteration of these substances in the injured tissues of *L. esculentum.* Thus the increased levels of these substances could have resulted from the disruption of translocation in the vascular elements of the damaged tissues[9]. Further the feeding areas have also been considered to be regions of increased metabolic activities characterized by an action-imbalance of growth promoting substances[12]. It is therefore assumed from the present study that necrosis at the feeding site of *C. tenuis* was due to the localized secretion of various substances[12] coupled with mechanical injury[13] which could lead to decreased growth-promoting activity through increased levels of oxidative enzymes and phenolic compounds.

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