CATALASE AND PEROXIDASE ACTIVITY IN *DIOSCOREA COMPOSITA* LEAVES INFECTED WITH *GLOEOSPORIUM PESTIS* MASSEE

FUNGAL infection usually brings about drastic changes in the physiological processes of the host cells. Among the physiological effects of fungal infection on host plants, changes in overall nitrogen, carbohydrate and mineral composition and in respiratory activities have been observed[1-5]. Changes in the levels of activity of oxidative enzymes have also been observed both in fungus[5,10] and in virus infected plants.[6,7]

The present investigation describes the effect of *Gloeosporium pestis* Massee infection of leaves of *Dioscorea composita* on the catalase and peroxidase levels in the leaves.

Leaves from healthy and infected plant of *Dioscorea Composita* were analysed for catalase and peroxidase activities. Activity or catalase was measured by the method of Dekock *et al.*[8] with slight modifications. For enzymes preparations, 1 g of fresh leaf tissue was crushed in chilled mortar with 10 ml of phosphate buffer (pH 6·8) and a pinch of acid washed sand. The homogenate was made up to 25 ml with distilled water. A series of flasks containing 5 ml of 1·5% sodium borate and 1·5 ml of phosphate buffer (pH 6·8) was prepared. At zero time, 1 ml homogenate was pipetted into each flask. The reaction was stopped in successive flask after 1, 2, 3, 4 and 5 min, by rapidly adding 10 ml of NH_2SO_4. The remaining perborate was then titrated with 0·05 N $KMnO_4$ to the first pink colour which lasted for 30 sec. Peroxidase activity was measured by the procedure given by Perur[9]. Enzyme preparation was made by grinding 1 g of healthy or infected *Dioscorea* leaf in a chilled mortar with 5 ml of distilled water. The homogenate was made up to 50 ml, filtered through muslin cloth, and used as the enzyme. In a test-tube, 10 ml of 0·2 M acetate buffer (pH 4·5), 1 ml of the enzyme and 0·5 ml of 1% pyrogallal were mixed. At zero time, 0·5 ml of 0·05 N hydrogen peroxide was added and the change in optical density was recorded at 430 nm at the end of 10 min, using a spectronic 20 colorimeter. Each sample was replicated 5 times.

The results (Tables I and II) indicate that the catalase activity was significantly ($P < 0·01$) lower, whereas the peroxidase remained significantly ($P < 0·01$) higher in infected samples as compared to the control. The maximum per cent decrease was noted in severe infection (25·6) in the case of catalase activity followed by mild (23·1) and early infection (10·2) (Table I). However, for peroxidase the maximum per cent increase was observed in mild infection (53·3) and the minimum was recorded in early infection (20·0). Severe infection did not show any consistent effect (33·3) (Table II).

TABLE I

Catalase activity of healthy and infected samples of Dioscorea composita *leaves*

	Healthy (control)	Early infection	Mild infection	Severe infection	C.D. at 1%
Units/g fresh weight	3·9	3·5**	3·0**	2·9**	0·34
Per cent decrease in catalase activity of infected tissues as compared to control	..	10·2	23·1	25·6	..

** Significant at $P < 0·01$.

TABLE II

Peroxidase activity of healthy and infected samples of Dioscorea composita *leaves*

	Healthy (control)	Early infection	Mild infection	Severe infection	C.D. at 1%
Changes in optical density (O.D.)	1·5	1·8**	2·3**	2·0**	0·098
Per cent increase in peroxidase activity of infected tissues as compared to control	..	20·0	53·3	33·3	

** Significant at $P < 0·01$.

It is common practice to group catalase among the respiratory enzymes, although its actual function is poorly known at present[5]. The activity of catalase generally decreased in the infected host[11]. It seemed that the host cell catalase is enclosed in high molecular protein during the process of sporulation so that the activity of the enzyme can only be exerted under appropriate concentrations after the sporulation of the fungus. The lower content of catalase in the case of virus infection has also been explained on the basis of its multiplication[10].

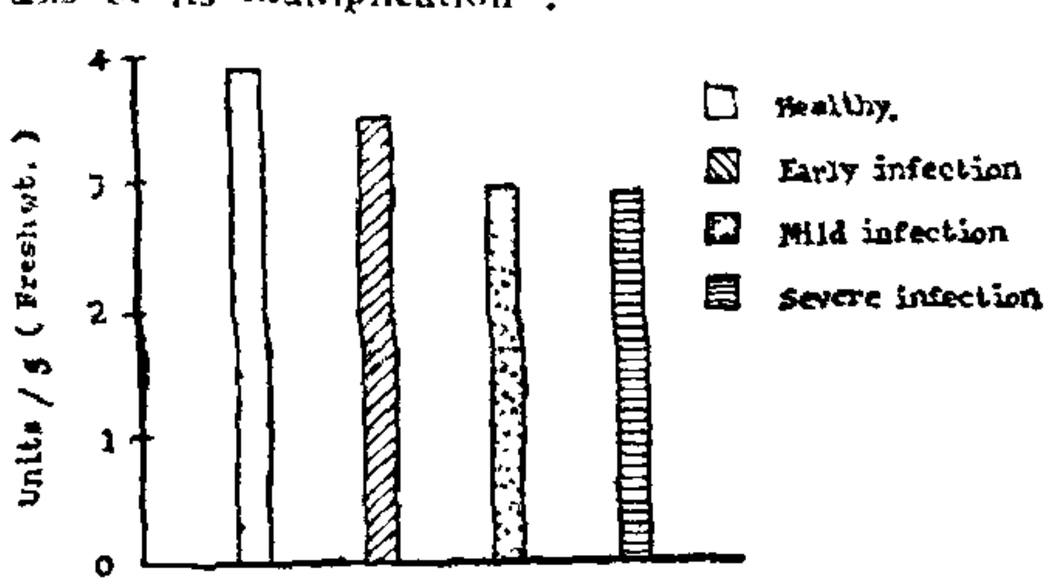

FIG. 1. Catalase activity of healthy and infected diseased samples of leaves.

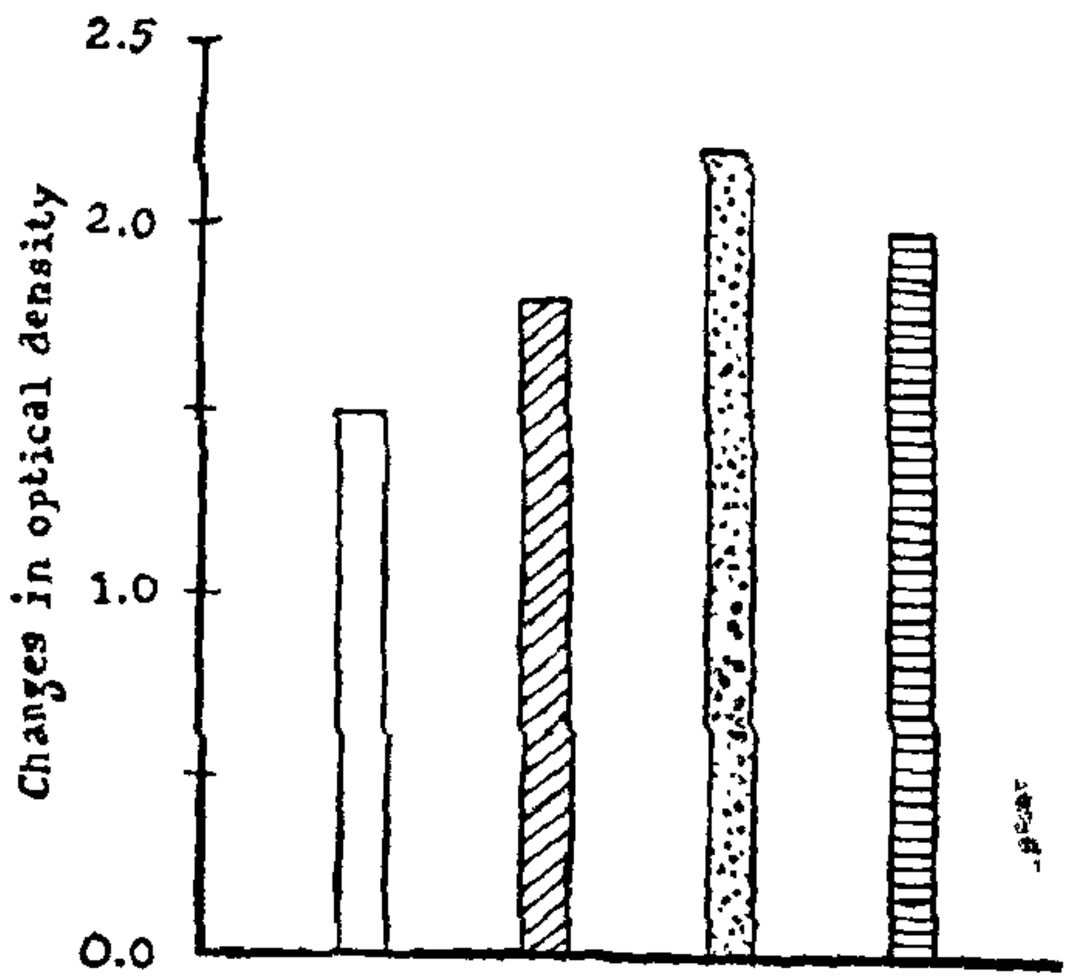

FIG. 2. Peroxidase activity of healthy and infected diseased samples of leaves.

Several workers have demonstrated an increase in peroxidase activity in different virus and bacterial infected plants[4,7,12,13,14,15,16,18]. Loebenstein and Linsey[4] showed a positive relation between peroxidase activity and developing of vein clearing in infected sweet potatoes. As yet, the physiological role of peroxidase, even in normal metabolism, is not clearly understood, although it is known to catalyse the oxidation of phenolic substances and aromatic amines to quinones in the presence of H_2O_2[17]. An increase in content of peroxidase due to infection discussed for viruses and bacteria might also be true for infection caused by *Gloeosporium pestis* Massee.

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BACTERIAL LEAF SPOT AND STEM BLIGHT—A NEW DISEASE OF SAFFLOWER IN INDIA CAUSED BY *PSEUDOMONAS SYRINGAE*

A BACTERIAL disease of Safflower, *Carthamus tinctorius*, L. occurred in severe proportions during October–November, 1977 in Coimbatore immediately after the rains. Plants (3–4 week old) in their rosette stage exhibited severe blight which appeared as dark necrosis in their shoot tips and stem tissues. The interior tissues of the stem were rotten (Fig. A), which