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STUDIES ON THE BIOCHEMICAL CHANGES IN *Sorghum bicolor* DUE TO LEAF BLIGHT DISEASE AND TRIDEMORPH APPLICATION

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Biochemical changed due to leaf blight infection caused by *Exserohilum turicum* and Tridemorph application on foliage of sorghum was studied under *in vitro* conditions. The HCN content was more in inoculated susceptible plants than in healthy susceptible plants. The level of HCN reduced both in inoculated and healthy resistant plants and also in Tridemorph treated plants than in the leaf blight infected and healthy susceptible plants. There was no significant difference in the total soluble solids content between the treatments.

Leaf blight disease incited by *Exserohilum turcicum* (Pass) Leonard and Suggs is considered as highly destructive disease of rainfed sorghum. With a view to study the biochemica changes taking place in leaf blight infected plants, healthy resistant plants, fungicide treated plants and susceptible healthy plants, studies were undertaken. The results are discussed here under.

MATERIALS AND METHODS :

Sorghum cultivars K4 (susceptible to leaf blight) and K5 (resistant) were raised in earthenware pots with uniform soil mixtures and nutrients. These plants were inoculated with spore suspension (10^6 spores/ml) of *E. turcicum* 30 days after sowing. The uninoculated K4 and K5 served as control. The susceptible and resistant cultivar plants were sprayed with tridemorph at 0.1 per cent immediately after spraying of spore suspension. Leaf samples were collected from all above treatments 15 days after inoculation and analysed for HCN content, total phenols, total soluble solids content.

Alcohol extraction of leaf tissue : (Chandramohan *et al.* 1967)

Five g of leaf extract sample was taken and chopped into small bits. They were plunged into 80 per cent ethanol and boiled in water bath for 10 min and cooled in running tap water. The tissues were crushed thoroughly in a pestle and mortar and squeezed through two layers of cheese cloth. The fluid was collected in a beaker. The extracts were pooled and made upto 25ml with 80 percent ethanol in a volumetric flask. This extract was used for the estimation of phenolic content.

Hydrocyanic acid content : (Hogg and Ahlgren, 1942)

Three g of leaf tissues were collected and immediately frozen at-17°C in moisture proof bags for two and half hr. The fresh frozen leaves were incubated in tightly stoppered 500 ml Erlenmeyer flasks. Strips of filter paper (15.0 X 2.0 cm) were soaked in a solution of 2.5 per cent sodium carbonate and 0.5 per cent picric acid. This was suspended inside the

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Table. 1. Changes in HCN content due to inoculation

Sl. No.	Treatment	HCN content ppm/g (Mean of 4 replications)			Mean
		15 DAS	30 DAS	60 DAS	
1.	Susceptible K 4				
	Healthy	196.42	120.50	70 00	112.30
	Inoculated	310.50	210.75	110.00	210.41
2.	Resistant K5				
	Healthy	172.50	108.65	48.70	109.95
	Inoculated	181.25	215.10	51.25	149.20
3.	Tridemorph	147.40	48 65	17.65	71.23
	Mean	201.61	140.73	59.62	

CD=P (0.05)

Treatment	15.14
Age	11.31
Interaction	NS

flasks with tight stoppers. The leaf tissues were incubated at room temperature for 24 hr. The strips were then transferred to 100 ml of water and allowed to stand until the colour was extracted. Checks were run with the soaked filter strips suspended in empty conical flasks. The colour development was assessed at 48 nm using "Beckman Due spectrophotometer." Standard curves were prepared using different quantities of HCN.

Total phenolic content:

(Bray and Thorpe, 1954)

One ml of ethanol extract, one ml of Folin Ciocalteau reagent (diluted 3 times with distilled water) and two ml of 20 per cent sodium carbonate were added together and the mixture was heated in a boiling water bath for one minute. The volume was made upto 25 ml with distilled water. Reagent blank was maintained with one ml of distilled water. The intensity of colour developed was read at 725 nm in a Spectronic 20. Pyrogaiiol was used to prepare standard curve. Total phenols were expressed as $\mu g/g$ of fresh tissue.

Total soluble solides content:

The percentage of total soluble solids was found by using 'BRIX' hand refractometer in diseased leaves, resistant leaves and in fungicide sprayed leaves.

RESULTS AND DISCUSSIONS

The HCN content decreased with increase in age of the plants. The HCN content was more in inoculated susceptible plants but low in healthy susceptible plants. Moreover reduced level of HCN was recarded both in inoculated and healthy resistant plant and also in Tridemorph treated plants. This suggests that the HCN content at the

Table 2. Changes in phenolic content due to inoculation

Sl. No.	Treatment	Phenol content (/ug/g)			
		15 DAS	30 DAS	60 DAS	Mean
1.	Susceptible K4				
	Healthy	173.65	232.15	235.75	213.51
	Inoculated	137.50	201.10	205.40	181.33
2.	Resistant K5				
	Healthy	197.00	268.45	268.50	244.31
	Inoculated	195.25	266.10	269.40	243.58
3.	Tridemorph sprayed	196.85	265.15	258.65	240.21
	Mean	180.50	246.79	247.54	

CD=P (0.05)

Treatment	4.14
Age	3.20
Interaction	NS

Table 3. Changes in total soluble solids.

Sl. No.	Treatment	T.S.S. content % (Mean of 4 replications)			Mean
		15 DAS	30 DAS	60 DAS	
1.	Susceptible K4				
	Healthy	7.25	8.50	12.50	9.41
	Inoculated	9.00	10.85	17.50	12.11
2.	Resostant K5				
	Healthy	7.00	9 00	11.00	9.00
	Inoculated	7.00	9 25	11:50	9 25
3.	Tridemorph	7.50	8.80	11.85	9.38
	Mean	7.35	9.28	12.87	

CD=P (0.05)

Treatment	NS
Age	0.53
Interaction	NS

initial stages of crop growth may play a role in resistant reaction. Sorghum varieties with low HCN were found to be susceptible to *H. turcicum* (Carlson, 1958).

The phenolic content of the susceptible and resistant varieties increased with age of the plants. However the increase was more in resistant and fungicide treated plants (Table 2). The phenolics are known to play an important role in the development of resistance to diseases (Goodman *et al.*, 1967; Kosuge, 1969). The total phenolic content of infected plants was lesser than the healthy plants at 60 days of age. Similiar reduction in phenolic content was observed on sorghum and infected by *H. turcicum* and *H. rostratum* (Arjunan, 1970, Singh Chand, 1982). The reduction may be

due to reduced synthesis of phenols or may be due to utilization by the pathogen for its development (Farkas and Kiraly, 1958.

The total soluble solids increased in the infected susceptible plants. In healthy and inoculated resistant types there was no appreciable change in total solids (Table 3). Sugar play an important role in disease incidence (Horsfall and Dimond, 1957). Post infectional accumulation of sugar have been reported in many other host parasite interaction (Gerwitz and Durbin, 1960; Shaw and Coltelo, 1961; Inman, 1965) This is considered to be due to inhibition of starch synthesis or breakdown of starch leading to accumulation of sugar (Arjunan, 1970). The resistant variety had lower sugar content compared to susceptible variety. However, Vidhyasekaran (1974) reported that higher sugar content may be inhibitory to *Helminthosporium* sp affecting ragi.

The results suggest that initial higher level of HCN may be considered to offer resistance in the initial stages of crop growth while the higher phenolic content may be responsible for resistance against leaf blight pathogen *E turcicum*. The fungicide tridemorph is responsible for induced resistance to sorghum plants. However detailed studies are required to study the exact mechanism involved in the resistance.

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