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ALTERATION OF MINOR NUTRIENTS IN RED ROT DISEASED SUGARCANE

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ABSTRACT

An experiment was conducted to know the alteration of minor nutrient in red rot diseased plants. Due to red rot disease, a differential degradation was observed in the concentration copper and zinc in the cane juice. However, the concentration of iron content was found higher in red rot diseased plant than the healthy sugarcane. The degradation of copper and zinc content was higher in diseased plants than healthy ones. The maximum loss of copper and zinc content was recorded in variety BO102 and minimum in BO130. The increase in iron content was found higher in diseased plant than healthy sugarcane. The maximum increase of iron content was recorded in variety BO102 and minimum in BO130. The degradation and accumulation of these minor nutrients were higher in susceptible than resistance sugarcane varieties. Thus increase and decrease of these minor nutrients were correlated with resistance of sugarcane varieties.

Key words : Red rot disease, Colletotrichum falcatum, minornutrients, sugarcane.

Sugarcane (*Saccharum afficinarum* L.) is an important economical and ancient cash crop. It suffers from several biotic and abiotic stresses in their different growth stages. However various biotic and abiotic factors are responsible for its low yield, diseases are the major cause of concern. Among biotic stresses red rot of sugarcane incited by *Colletotrichum falcatum* was most important disease. Red rot disease is a well known phenomenon and considerable factor for sugarcane cultivation. It was found most destructive disease for sugarcane growing areas in both tropical and subtropical countries. The several outstanding sugarcane varieties became susceptible due to red rot infection in sugarcane. It also becomes a limiting factor in profitable production of sugar cane wherever cultivated. Red rot pathogen creates an imbalance in the nutrients availability in the healthy cane and reduces the quality of cane juice. Keeping in the view of red rot disease, pathogen and minor nutrients status in juice the present experiment was carried out.

MATERIALS AND METHODS

Sugarcane varieties namely BO 91, BO 102, BO 130, BO 131, BO132 and BO 133 were selected for carried out the experiment for analysis of minor nutrient in cane juice.. First the sugarcane plant with characteristic and typical symptoms of red rot disease were collected and brought to the laboratory for isolation and purification of the pathogen. Fifty canes of each variety were inoculated with seven days old culture employing standard plug method. After four months of inoculation samples were collected from both inoculated and without inoculated to observe the change in minor nutrients of cane juice.

In order to determine the concentration of copper (Cu), zinc (Zn) and iron (Fe) in the sugarcane juice, initially 10 ml of cane juice was digested with 10 ml of tri acid solution and filtered. The final volume was made upto 50 ml with distilled water. The concentrations of iron, copper and zinc were determined with the help of atomic absorption spectrophotometer (Model GBC 902).

RESULTS AND DISCUSSION

The present investigation observed changes in the concentration of minornutrients in cane juice due to red rot infection in sugarcane. The concentration of copper and zinc was found lower than the healthy sugarcane. However, concentration of iron was higher in red rot infected cane juice.

Table-1 : Reduction of copper content in red rot diseased plant.

Variety	Cu content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Reduction (%)
BO91	1.64	1.86	11.8
BO102	1.24	1.68	26.1
BO130	1.72	1.88	8.5
BO131	1.38	1.80	23.3
BO132	1.46	1.84	20.6
BO133	1.42	1.81	21.5

The data on copper content due to red rot infection revealed a marked depletion in its cogent in cane juice (Table-1). The depletion of copper content might be possible due to antagonistic effect of iron content in sugarcane. Maximum reduction (26.1%) was recorded in BO 102 and minimum (8.5%) in variety BO 130. In other test varieties reduction was intermediate, ranging from 8.5-26.1 per cent. These findings confirm the observation made earlier by Zinde (1979) and Rao *et al.* (1984).

Table-2 : Reduction of zinc content in red rot diseased plant.

Variety	Zn content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Reduction (%)
BO91	1.88	2.36	20.3
BO102	1.34	2.18	38.5
BO130	1.98	2.32	14.6
BO131	1.36	2.08	34.6
BO132	1.78	2.26	21.2
BO133	1.42	2.06	31.0

Red rot infection showed depletion in zinc content in cane juice. Zinc acts as a catalyst and might be utilized by red rot pathogen as a substrate. The reduction in zinc content in cane juice varied from 14.6 -38.5 per cent (Table-2). However, the magnitude of depletion varied according to the degree of resistance of cane varieties. It was maximum (38.5 %) in variety BO 130, followed by 34.6 per cent in BO 131 and BO133 and least 14.6 per cent in variety BO 130. These findings are in consonance with the observations made earlier by Kumar *et al.* (2000).

Table-3 : Increase of iron content in red rot diseased plant.

Variety	Fe content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Increase (%)
BO91	8.76	8.10	8.1
BO102	8.46	7.06	19.8
BO130	8.64	8.02	7.7
BO131	8.68	7.46	16.3
BO132	8.69	7.94	9.4
BO133	8.92	7.84	13.7

The accumulation of iron might be possible by the action of pathogen which hampers the enzymatic activities of the plant. The accumulation of iron was the highest in variety BO 102 (19.8 %) and the lowest in variety BO 130 (7.7%) (Table-2). The magnitude of increase of iron content was varied according to the degree of resistance of the cane variety. Mishra and Mahmood (1989) also found significant increase of iron concentration in diseased sugarcane.

Findings of the present investigation showed depletion of copper and zinc content however content of iron was found higher in red rot diseased plants.

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