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STATUS OF MAJOR NUTRIENT IN RED ROT INFECTED SUGARCANE

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ABSTRACT

Sugarcane is an important cash crop worldwide. An experiment was carried out for study of status of major nutrients in red rot diseased and healthy plants. The juice of red rot infected plants showed differential increase and decreased of different major nutrients than healthy ones. Due to red rot infection, there was an increase of nitrogen content in sugar cane 'rice. Higher accumulation of nitrogen content was recorded in susceptible variety, BO 120 as compared to resistant variety BO 130. A considerable loss of phosphorus content and potassium content wad also observed in case juice due to red rot infection. Maximum loss of macro-nutrients namely phosphorus and potash was observed in variety BO 120 and minimum in BO 130.. The increase and decrease of these major nutrients were varied according to the degree of resistance of sugarcane varieties.

Key words : Sugarcane, red rot disease, major nutrients.

Sugarcane is an important cash crop of India. It is cultivated in most of the states of India. It is the second most important agro industrial crop in India, next only to cotton. India is the largest consumer of sugar in the world and second most important producer in the world. In India average yield of sugarcane per unit input is very low. Diseases are one of the major constraints in the profitable cultivation of sugarcane. Red rot disease caused by *Colletotrichum falcatum* is the most destructive ones. It causes considerable losses and aptly called as "Cancer" of sugarcane. It causes imbalance in the macro nutrient availability and ultimately reduces quality of cane products. Keeping in view of the importance of sugarcane, seriousness of red rot disease and its availability of macro nutrients the present investigation was carried out.

MATERIALS AND METHODS

In course of experiment, sugarcane varieties namely BO 91, BO 102, BO 120, BO 130, BO 131, BO 132 and BO 133 with typical symptoms of red rot disease were collected from research farm of RAU, Pusa, Samastipur, Bihar. Red rot diseased samples 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 determine the changes in major nutrients of sugarcane juice.

In order to determine the nitrogen content, 10 ml cane juice was mixed with 5 g potassium sulphate, 1 g copper sulphate and 30 ml concentrated sulphuric acid and kept in Kjeldah's flask and heated for digestion. After completion of digestion, it was allowed for cooling and then whole material was transferred into distillation flask. In distillation flask red litmus paper was inserted and 40 per cent sodium hydroxide solution was added till red litmus paper turned blue. In receiver 20 ml of 2 per cent boric acid solution was taken and 2 to 3 drops of mixed indicator was added. The titration of distilled collected in receiver was done against N/20 sulphuric acid solution and content of nitrogen was determined by K Jeldlah's method.

In order to determine the content of phosphorus calorimeter with the help of calorimeter by applying 660 nm red filter and using chlorostanous reduced molybdophosphoric blue method in hydrochloric acid system (Jackson, 1967) was applied.

To determine the potassium content 10 ml cane juice was taken and digested with 10 ml triacid. After completion of digestion it was filtered and volume made up to 50 ml with distilled water from that aliquot potassium content was determined by using flame photometer.

RESULTS AND DISCUSSION

The present investigation observed the effect of red rot pathogen on macro nutrients in cane juice. The results on the effects of red rot infection on nitrogen content in cane juice clearly showed an increase in Nitrogen level,

however, the magnitude of accumulation was varied according to the degree of resistance of cane varieties.

Table-1 : Increase of nitrogen content in red rot diseased plant.

Variety	Nitrogen content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Increase (%)
BO91	112.0	103.4	8.3
BO102	126.0	106.8	17.9
BO130	101.5	94.2	7.7
BO131	115.5	102.4	12.7
BO132	105.0	96.2	9.1
BO133	108.5	96.8	12.0

Increase in nitrogen content might be responsible for decline in sugar storage and decrease in the sucrose content. Maximum increase (17.9 %) was recorded in variety BO 102 while it was least (7.7 %) in variety BO 130 and it was ranged between 7.7-17.9 per cent in the remaining test varieties. Rao and Sharma (1978) also observed an accumulation of nitrogen content in cane juice due to red rot infection.

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

Variety	Phosphorus content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Reduction (%)
BO91	240.0	276.0	13.0
BO102	190.0	265.0	28.3
BO130	253.0	278.0	9.1
BO131	200.0	268.0	25.3
BO132	230.0	280.0	17.8
BO133	218.2	276.4	21.0

The results on the effect of red rot infection on phosphorus content in cane juice clearly indicated that there was a decline in phosphorus concentration, ranging from 9.1-28.3 per cent. The maximum reduction (28.3 %) was found in variety BO 102 and minimum (9.1%) in variety BO 130. The reduction in phosphorus might be possible due to accumulation of nitrogen and also due to depletion in potassium content (Humbert, 1963). These findings are in conformity with the observations made by Kumar et al. (2000).

Table-3 : Reduction of potash content in red rot diseased plant.

Variety	Potash content (mg/100 ml) in cane juice		
	Diseased plant	Healthy plant	Reduction (%)
BO91	8.2	9.3	11.8
BO102	7.5	9.1	17.5
BO130	8.6	9.1	5.4
BO131	8.0	9.4	14.8
BO132	7.8	8.9	12.3
BO133	7.4	8.6	13.9

The data on potassium content due to red rot infection in cane juice revealed a significant decrease in its content in all test varieties. The loss of potash content was varied from 5.4 to 17.5 per cent. It was found maximum loss in variety BO 102 (17.5%) and minimum in variety BO 130 (5.4 %). Depletion in potassium content might be possible due to its utilisation by red rot pathogen. The decline in potassium content was also confirmed by earlier worker Zinde, (1979) and Kumar *et al*. (1999).

Present findings clearly showed that there was increase in nitrogen content and loss of phosphorus and potassium content in cane juice due to red rot infected sugarcane.

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