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IMPACT OF RED ROT DISEASE ON YIELD ATTRIBUTES AND JUICE QUALITY OF SUGARCANE

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ABSTRACT

An experiment was conducted to find out the impact of red rot disease caused by *Colletotrichum falcatum* on yield attributes and quality of sugarcane. The pathogen has considerable impact on yield characters and juice quality. The pathogen showed their impact on fifty canes of all six varieties. Test varieties like BO91, BO102, BO130, BO131, BO132 and BO 133 showed different degree of resistance. Red rot pathogen adversely affected the yield attributes and quality of cane juice. Maximum reduction in cane length and girth was observed in variety BO 102 while minimum in BO 130. Cane juice quality like Pol, Brix and Purity were also adversely affected by red rot pathogen. The maximum reduction of these cane juice quality was found in variety BO102 and minimum in BO130. The reduction of these yield attributes and juice quality varied according to the resistance of cane varieties.

Key words : Yield attributes, juice quality sugarcane, red rot pathogen.

Sugarcane is an important food-cum-cash crop of India. In India, it is mainly cultivated in states like Maharastra, Andhra Pradesh, Karnataka, Tamilnadu and Uttar pradesh. It is the second most important agro industrial crop in India after cotton. India is the largest consumer of sugar in the world. It is valuable mainly because of its ability to store high concentrations of pol, brix and purity in the stem. Globally, sugarcane is an important source of commercial sugar accounting for almost two thirds of world sugar production. Brazil is the largest sugarcane producer, contributing with 40% of the world production, followed by India and China.

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 is the most common disease of sugarcane, caused by the fungus *Colletotrichum falcatum* Went. It causes severe loss in yield and quality of the susceptible cultivars. It causes considerable yield and quality losses of sugarcane. It causes imbalance in the nutrient availability and ultimately reduces quality of cane products. Keeping in view of the importance of sugarcane, seriousness of red rot pathogen on yield and juice quality of sugarcane 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 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 quality of cane juice.

In order to know the changes in cane length due to red rot infection, fifty healthy and diseased canes of each variety were randomly selected. The length of each cane was measured centimetre with the help of scale.

Cane girth was measured with the help of slide callipers in centimetre. The girth of owe was calculated with the help of following formula :

$$\text{Girth} = 2 \quad r$$

For determination of Pol, brix and purity of healthy and diseased canes of each variety were selected for juice analysis. Pol reading was taken by polariscope, brix reading by brix hydrometer and purity was determined as coefficient of purity according to procedure given by Spancer and Meade (1955).

RESULTS AND DISCUSSION

The present investigation showed the adverse impact

Table-1 : Impact of red rot disease on yield attributes of sugarcane.

Variety	Cane length (cm)			Cane girth (cm)		
	Diseased	Healthy	Reduction (%)	Diseased	Healthy	Reduction (%)
BO91	176.2	210.6	16.3	5.8	6.2	6.4
BO102	126.8	174.2	27.3	5.5	6.4	14.0
BO130	169.8	198.4	14.4	5.6	5.9	5.0
BO131	149.6	200.4	25.3	5.3	5.8	8.6
BO132	128.0	160.5	20.2	5.2	5.6	7.9
BO133	129.0	166.4	22.4	5.7	6.2	8.0

Table-2 : Impact of red rot disease on juice quality (Pol and Brix) of sugarcane.

Variety	Pol Percentage			Brix Percentage		
	Diseased	Healthy	Reduction (%)	Diseased	Healthy	Reduction (%)
BO91	14.4	15.8	8.8	17.1	18.0	5.0
BO102	11.6	15.1	23.1	15.2	18.2	16.4
BO130	14.8	16.0	7.5	17.4	18.2	4.3
BO131	12.2	15.1	19.2	15.9	18.4	13.5
BO132	13.5	15.2	11.1	16.4	17.6	6.8
BO133	11.0	13.4	17.9	14.2	16.2	12.3

Table-3 : Impact of red rot disease on juice quality (Purity) of sugarcane.

Variety	Purity Percentage		
	Diseased	Healthy	Reduction (%)
BO91	84.2	87.7	3.9
BO102	76.3	82.9	7.9
BO130	85.0	87.9	3.2
BO131	76.7	82.0	6.4
BO132	82.2	86.3	4.6
BO133	77.4	82.7	6.4

of red rot disease of sugarcane on yield attributes and juice quality of sugarcane.

Red rot infection clearly slowed the reduction of cane length which varied from 14.4 per cent to 27.3 per cent depending on degree of resistance of cane variety (Table 1). Maximum reduction was observed in BO 102 and minimum (14.4%) in variety BO 130. These results confirm the earlier Endings of Yin-Zhi *et al*. (1997).

Red rot infection also reduced the cane girth, varying from 5.0-14.0 per cent depending upon degree of resistance of cane varieties (Table 1). Maximum reduction was found in variety BO 102 whereas; it was minimum variety BO 130. These findings are in consonance with earlier finding made by Joshi and Sharma (1968).

Red rot pathogen produced marked adverse effect on normal metabolism of sugarcane causing reduction in pol, brix and purity of cane juice. The losses might be due to impaired biosynthesis of carbohydrate in leaf tissues and consequently low accumulation of sugar in parenchymatous tissues or due to inversion of sucrose due to an increase in invertase activity.

The extent of losses varied according to degree of resistance of test cane varieties. Maximum reduction in Pol (23.1%) was observed in variety BO 102 and the minimum (7.5%) in variety BO 130, whereas, other variety showed intermediate reduction (Table 2). These findings were in conformity with the earlier observations made by Beniwal *et a*l. (1989).

Regarding reduction in brix content, It was maximum (18.0%) recorded in BO 102 and minimum 4.3 per cent in BO 130 (Table 2). This observation was also in consonance with earlier findings made by Kumar *et al*. (2000).

In case of purity, reduction of purity was also varied according to the degree of resistance of cane varieties.

The reduction of purity of cane juice was found maximum reduction (7.9 %) in variety BO 102 and minimum (3.2%) in BO 130 (Table-3). These findings also corroborate the previous findings of Vishwanathan and Samiyappan (1999).

Results of present investigations showed that red rot disease reduced the yield attributes and impaired cane juice quality.

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