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Saurabh Dubey
Department of Plant Pathology, RPCAU, Pusa, Samastipur, Bihar, India

Md. Minnatullah
Department of Plant Pathology, RPCAU, Pusa, Samastipur, Bihar, India

Shivam Maurya
Department of Plant Pathology, RPCAU, Pusa, Samastipur, Bihar, India

SP Singh
Department of Agricultural Economics, RPCAU, Pusa, Samastipur, Bihar, India

Sudhir Paswan
Department of Statistics & Computer Science, RPCAU, Pusa, Samastipur, Bihar, India

Bipin Kumar
Technical Cell, SRI, RPCAU, Pusa, Samastipur, Bihar, India

Corresponding Author:
Saurabh Dubey
Department of Plant Pathology, RPCAU, Pusa, Samastipur, Bihar, India

Effect and economics of treatments on sugarcane red rot disease

Saurabh Dubey, Md. Minnatullah, Shivam Maurya, SP Singh, Sudhir Paswan and Bipin Kumar

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Abstract
Red rot disease caused by *Colletotrichum falcatum* is major concern and it causes the loss of 10 to 25% to the sugarcane yield. Effective control of red rot has been mainly through resistant varieties, although several fungicides and bio agents have been found effective under *in vitro* but failed to facilitate effective control of the disease in the field condition. Therefore, to see the effect and economics of different treatments were tested in field condition on the different sugarcane parameters at Pusa Farm, SRI, RPCAU, Pusa. It was observed that the treatment not only reduces the red rot disease incidence but also enhance the quantitative as well as qualitative parameters of cane. Among the treatments, the maximum enhancement in all the parameters and also higher returns of Rs. 147818/hectare was observed when the setts were treated with Carbendazim 50 WP @ 0.1% for 15 minutes.

Keywords: Sugarcane, red rot, disease, treatments, economics

Introduction
Sugarcane is one the most important commercial crop of the world which provides livelihood to millions through its cultivation and milling. It is cultivated both in tropics and subtropics in various agro ecological situations and is a major source of sugar and important cash cum industrial crop. The sugar requirement in India is estimated to be 36 million tonnes for which sugar recovery is to be 11% and average cane yield is to be 100 tonnes per hectare which can be fulfilled either by increasing the acreage or productivity (Premachandaran, 2012). Sugarcane red rots disease caused by *Colletotrichum falcatum* Went. is one of the most devastating disease occurring in almost all cane growing countries. It causes serious losses in cane productivity and also degrades the quality characters of the juice. It causes reduction in cane weight, yield and quality of sugarcane cultivars in Indian sub-continent (Satyavir 2003). Minnatullah *et al.* (2012) [4] observed in response to red rot infection appreciable reduction ranging from 17.6 to 20.0 percent in brix 16.8 to 23.4 percent in pol and 19.0 to 23.1 percent in purity. Minnatullah and Kamat (2018) [3] has also reported that due to red rot infection maximum deterioration in cane juice quality was observed in susceptible varieties in comparison to resistant varieties. The losses caused by this disease has become major constraint in the profitable cultivation of sugarcane (Mohan and Sangeeta, 2009). Fungicides often play a vital role in disease management strategies as they control many diseases satisfactory level (Mc Grath, 2004) [2]. Role of sett treatment for the management of primary source of red rot from setts have been established earlier (Malathi *et al*., 2016) [1]. Keeping in view the economic value of crop, seriousness of disease, the present investigation was carried out to know the effect of different treatment on red rot disease development, different cane parameters and their economics so that suitable management strategies were effectively formulated. Praharaj *et al*. (2017) recorded maximum net returns with overnight soaking of setts in 100 ppm Ethephon solution which was Rs 2,43,762/ha with B:C ratio of 2.32.

Materials and Methods
To see the effect of sett treatment with chemicals and bio- agents on red rot disease, a field trial was conducted at Sugarcane Research Institute, Dr. Rjendra Prasad Central Agriculture University, Pusa (Bihar) during 2018-19.

Three budded setts of susceptible variety CoSe 95422 was treated with chemicals and bio-agent suspensions as mentioned in the treatments for 5 and 15 minutes. The treated setts were inoculated with red rot pathogen (*Colletotrichum falcatum*) planted in three replications in randomized block design and size of plot was (5.0 × 2.7 m^2) and row to row distance was kept 90 cm in the month of February, 2018 and observations were made on germination after 45 days of planting till 75 days at 10 days intervals. After 75 days of planting settling mortality were recorded regularly till 120 days at 15 days intervals and the observations were made on disease incidence.

The impact of these treatments were also made on quantitative as well as qualitative characteristics of sugarcane crop at the time of harvesting i.e cane height (cm), cane girth (cm), cane weight (kg), number of internodes, number of milliable canes, number of tillers, number of clumps, cane yield, percentage of brix, sucrose and purity were observed.

Treatments details

T_1 : (Sett treatment with carbendazim 50 WP @ 0.1% for 5 minutes)
T_2 : (Sett treatment with carbendazim 50 WP @ 0.1% for 15 minutes)
T_3 : (Sett treatment with propiconazole 25 EC @ 0.1% for 5 minutes)
T_4 : (Sett treatment with propiconazole 25 EC @ 0.1% for 15 minutes)
T_5 : (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 5 minutes)
T_6 : (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 15 minutes)
T_7 : (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 5 minutes)
T_8 : (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 15 minutes)
T_9 : (Control).

Cane height was measured with the help of scale in centimeter, cane weight is measured by using electric balance, cane girth is measured with the help of slide calipers in centimeter and girth was calculated by the help of formula; Girth= 2πr
Internodes of canes were taken by counting the area between two nodes.
Clumps – Group of side shoots growing from the base at ground level.
Tillers – Side shoot growing from the base of the stem at ground level.
Cane yield is calculated by;
Cane yield = number of milliable cane × cane weight (kg)

$$\text{Cane yield (tones/ha)} = \frac{10}{\text{Plot area}} \times \text{Cane yield (kg/plot)}$$

Brix is the percentage of total solid in sugarcane juice. Its reading was taken by brix hydrometer. Sucrose percentage was measured by Polaris cope. The purity coefficient was calculated by employing the formula:

$$\text{Cane yield (tones/ha)} = \frac{\text{Sucrose percentage}}{\text{Brix percentage}} \times 100$$

Cost benefit ratio (cbr)
Economics in terms of cost of cultivation, gross returns, net returns and B: C ratio was calculated on the basis of mean yield under various treatments as per existing market prices fixed by Government of Bihar for sugarcane were taken into consideration while working out the performance of treatments for management of the red rot disease in sugarcane.
Cost of cultivation (Rs./ha)
The cost of cultivation for each treatment was worked out by adding the common cost of cultivation and cost involved in each treatment.
Cost of cultivation with treatment (Rs./ha)
= Cost of treatment (Rs./ha) + Cost of cultivation (Rs. /ha)
Gross Returns (Rs./ha)
Total income from treatment, by virtue of sales of entire produce is called gross returns. It was calculated by multiplying yield of cane (t/ha) with price of cane (Rs/t).
Gross returns (Rs./ha) = Cane Yield (t/ha) × Price of cane (Rs/t)
Net Returns (Rs./ha)
Net return from each treatment was calculated separately by subtracting the cost of cultivation from the gross return and expressed as Rs./ha.
Net return = Gross return - Total cost of cultivation
Benefit: Cost ratio
Benefit cost ratio (BCR) gives net return per rupee of money invested. It was calculated by dividing net returns with total cost of cultivation.

$$\text{Benefit: Cost ratio} \frac{\text{Net returns}}{\text{Total cost of cultivation}}$$

Statistical analysis
The data were analyzed by the technique of analysis of variance whenever necessary. The value of the standard error of means (SEm) and critical difference at one per cent and five per cent level of significance were computed.

Results and conclusions
Red rot disease is difficult to manage through chemical due to impervious nature of rind and fibrous nodes which do not allow absorption of fungicides in required amount. In view of the nonspecific and general toxic effect of chemical on soil micro flora, it has become desirable to seek more ecofriendly methods to manage the disease. Considering the biological measures or ultimate long term solution to the problems of disease management in sugarcane, therefore, a study on the possible use of biological agents along with chemicals in the management of red rot disease through sett treatment was conducted to manage the disease through fungicides and to find out the impact on germination, settling mortality, quantitative as well as qualitative characteristics *viz.*, cane height, cane weight, cane girth, number of internodes, milliable canes, number of tillers, number of clumps, cane yield, percentage of brix, sucrose and purity of cane juice. The treatment details were described in the materials and methods.

Effect of different treatments on germination, settling mortality and disease incidence
The data so obtained are tabulated in Table 1 it is clear from the data that there was an increase in sett germination due to

sett treatment with carbendazim 50 WP, propiconazole 25 EC, *Trichoderma harzianum* and *Trichoderma viride* over control. Carbendazim 50 WP was found more effective than all the treatments *viz*., propiconaloze 25 EC, *Trichoderma harzianum* and *Trichoderma viride* in enhancing the sett germinability, in reducing the settling mortality and reduction in development of red rot disease. Maximum (43.2%) increase in germination was recorded when setts were treated with carbendazim followed by (29.5%) with propiconazole 25 EC, (24.0%) with *Trichoderma harzianum* and minimum (17.2%) with *Trichoderma viride*, similarly, maximum (49.0%) reduction in settling mortality was observed when setts were treated with carbendazim 50 WP followed by (41.0%) with propiconazole 25 EC, (38.0%) *Trichoderma harzianum* and minimum (35.0%) with *Trichoderma viride*. Whereas, maximum (65.3%) reduction in development of red rot disease was recorded in plots which were treated with carbendazim 50 WP, followed by propiconazole 25 EC (55.0%), (42.5%) with *Trichoderma harzianum* and minimum (37.2%) with *Trichoderma viride*.

The data in Table 1 clearly indicate that the incidence of disease varies from 12.0 to 26.5 percent during course of study. Minimum (12.0%) disease incidence was observed in plot when setts were treated with carbendazim 50WP for 15 minutes, which was observed significantly superior over all the treatments followed by 14.5% incidence with carbendazim 50 WP for 5 minutes, 16.4% with propiconazole 25 EC for 15 minutes, 18.0% with propiconazole 25 EC for 5 minutes, 20.7% with *Trichoderma harzianum* for 15 minutes 23.2% with *Trichoderma harzianum*for 5 minutes. 21.5% with *Trichoderma viride* for 15 minutes while, maximum (26.5%) disease incidence was recorded in setts treated with *Trichoderma viride* for 5 minutes. However, all the treatments were found superior as compared to control where (38.2%) disease incidence was recorded.

Effect of red rot disease on quantitative and qualitative parameters of cane

In order to see the effect of different treatments on red rot infected canes and various characteristics such as cane height, cane girth, cane weight, number of internodes number of clumps, number of tillers, number of milliable canes, cane yield and effect of disease on its juice quality (brix, sucrose, and purity) were observed after harvesting of the crop and the average data so obtained are presented in Table 2 and 3.

Effect on quantitative parameters of cane

Cane height

It is revealed from the data table 2 that maximum (246.0 cm) average height was observed in setts treated with carbendazim 50 WP for 15 minutes followed by 240.0 cm in setts treated with carbendazim 50 WP for 5 minutes, 238.0 cm and 230.0 cm upon setts treated with propiconazole 25 EC for 15 minutes and 5 minutes respectively. 225.0 cm and 222.0 cm height were obtained upon treatment *Trichoderma harzianum* for 15 and 5 minutes respectively, whereas, minimum (220.0 and 216.0 cm) height was obtained when the setts were treated with *Trichoderma viride* for 15 and 5 minutes respectively as compared to control (188.0 cm) height was recorded.

Cane girth

As per the results presented in Table 2 revealed that the effect of different treatments on the average cane girth (cm). The maximum (2.60 cm) girth was recorded in case of setts treated with carbendazim 50 WP for 15 minutes followed by 2.42 cm in setts treated with carbendazim 50 WP for 5 minutes however, the remaining treatments were found superior over control and these were observed, 2.30 cm and 2.26 cm girth was obtain when setts were treated with propiconazole for 15 and 5 minutes respectively, 2.22 cm and 2.12 cm girth was obtained when setts treated with *Trichoderma harzianum* for 15 and 5 minutes respectively whereas, minimum 2.0 cm and 1.86 cm girth was obtained when setts treated with *Trichoderma viride* for 15 and 5 minutes respectively, as compared to control (1.84 cm) girth.

Cane weight

Significantly maximum average cane weight (1.20 kg) was recorded in setts treated with carbendazim 50 WP for 15 minutes followed by (1.10 kg) in setts treated with carbendazim 50 WP for 5 minutes.0.96 kg and 0.94 kg in sett treated with propiconazole for 15 and 5 minutes, 0.90 kg and 0.87 kg in setts treated with *Trichoderma harzianum* for 15 and 5 minutes and minimum (0.80 and 0.78 kg) was recorded in setts was treated with *Trichoderma viride* for 15 and 5 minutes respectively as compared to check (0.69kg). Sett treated with carbendazim 50 WP for 15 minutes was found significantly superior among all the treatments.

Number of internodes

The maximum number of internodes (22.0) was recorded in case of setts treated with carbendazim 50 WP for 15 minutes followed by 20.0 in setts treated with carbendazim 50 WP for 5 minutes, 20.0 and 18.0 internodes in setts treated with propiconazole 25 EC for 15 and 5 minutes. whereas, 18.0 and 16.0 numbers of internodes were observed when setts were treated with *Trichoderma harzianum*, while the minimum (15.0) internodes was recorded in both the treatments when setts were treated with *Trichoderma viride* for 15 and 5 minutes respectively, as compared to control (13.0) number of internodes were recorded. Setts treated with carbendazim 50 WP for 15 minutes were found superior among all treatments.

Number of clumps

Significantly higher number of clumps (25.0) was recorded in the plot when sett treated with carbendazim 50 WP for 15 minutes which was significantly superior over 23.0 clumps in setts treated with carbendazim 50 WP for 5 minutes. 22.0 and 20.0 clumps were observed in setts treated with propiconazole 25 EC for 15 and 5 minutes respectively whereas, (18.0) clumps was observed in both the treatment i.e when setts were treated with *Trichoderma harzianum* for 15 and 5 minutes respectively, while the minimum (17.0 and 16.0) clumps were recorded in setts treated with *Trichoderma viride* for 15 and 5 minutes respectively. All treatments were superior to control where, numbers of clumps (11.0) were recorded. However, treatment with carbendazim 50 WP showed significant increase in number of clumps as compared to propiconazole 25 EC, *Trichoderma harzianum* and *Trichoderma viride*.

Number of tillers

Significantly higher number of tillers (88.0) was recorded in setts treated with carbendazim 50 WP for 15 minutes followed by 82 tillers setts treated with carbendazim 50 WP for 5 minutes. 77.0 and 73.0 number of tillers was recorded in setts treated with propiconazole 25 EC for 15 and 5 minutes.72.0and 67.0 number of tillers in setts treated with *Trichoderma harzianum* for 15 and 5 minutes respectively. Whereas, minimum (64.0 and 61.0) number of tillers were

found in setts treated with *Trichoderma vidride* for 15 minutes and 5 minutes respectively. However, remaining treatments were superior over control (48.0) number of tillers.

Number of milliable canes

Likewise, the maximum number of milliable canes (98.0) was recorded in the plots where setts were treated with carbendazim 50 WP for 15 minutes followed by 93.0 in sett treated with carbendazim 50 WP for 5 minutes, 90.0 and 88.0 in setts treated with propiconazole 25 EC for 15 minutes and 5 minutes 84.0 and 82.0 number of milliable canes was recorded in setts treated with *Trichoderma harzianum* for 15 and 5 minutes. Whereas, minimum milliable canes (78.0 and 76.0) were recorded when treated with *Trichoderma viride* for15 and 5 minutes respectively. Sett treatment with carbendazim 50 WP for 15 minutes gave significantly increase in number of milliable cane as compared to all treatments. However, all the treatments were found to be superior over control plot (60.0) number of milliable canes was recorded.

Cane yield

It was also observed that maximum (87.11 tones) cane yield was obtained when setts were treated with carbendazim 50 WP for 15 minutes followed by 75.78 tones in setts treated with carbendazim 50 WP for 5 minutes. 64.0 tones and 61.27 tones yield were recordedin setts treated with propiconazole 25 EC for 15 and 5 minutes respectively. Whereas, 56.00 and 52.84 t/ha. in setts treated with *Trichoderma harzianum* and minimum 46.22 and 43.91 t/ha. were recorded when setts were treated with *Trichoderma viride* for 15 and 5 minutes respectively. Setts treated with carbendazim 50 WP and propiconazole 25 EC gave significant increase in cane yield as compared to other treatment. Although, all treatments were found superior over control where yield was recorded as 31.11 tones.

Effect of different treatments on red rot disease and cane juice quality

Brix

Results presented in Table 3 showed the effect of different treatments on the brix value. Significantly maximum (19.6%) brix value was obtained from setts treated with carbendazim50 WP for 15 minutes followed by (19.0%) recorded in setts treated with carbendazim 50 WP for 5 minutes. 18.0%and 17.8% in setts treated with propiconazole 25 EC for 15 miniutes and 5 minutes respectively. 17.5% and 16.8% upon treatment with *Trichoderma harzianum* for 15 minutes and 5 minutes. Least (16.5 and 16.2%) brix value was obtained upon treatment with *Trichoderma viride* for 15 and 5 minutes. Brix value obtained from control is 13.1% which illustrate that brix value in all the treatment is superior to control.

Sucrose

The results presented in Table 3 also showed the effect of different treatments on the sucrose per cent of the canes. Maximum sucrose (16.90%) was recorded when setts were treated with carbendazim50 WP for 15 minutes followed by sett treatment with carbendazim for 5 minutes (16.32%). 15.19% and 14.86% sucrose was recorded when setts were treated with propiconazole 25 EC for 15 and 5 minutes while, 14.37% and 13.64% sucrose was recorded when setts were treated with *Trichoderma harzianum* for 15 and 5 minutes whereas, minimum (12.97% and 12.65%) sucrose content was observed in setts treated with *Trichoderma viride* for 15 and 5 minutes. The lowest (9.19%) sucrose content was found in control plots where no treatment was applied. Although, remaining treatments were found significantly superior over control.

Purity

The data in table 3 revealed that maximum (86.22%) juice purity was observed in setts treated with carbendazim 50 WP for 15 minutes followed by sett treatment with carbendazim 50 WP for 5 minutes (85.84%). 84.38% and 83.48% purity was obtained when setts were treated with propiconazole 25 EC for 15 and 5 minutes while, 82.11% and 81.20% purity was recorded upon treatment *Trichoderma harzianum* setts treated for 15 and 5 minutes whereas, minimum purity percentage was recorded when setts were treated with *Trichoderma viride* (78.60 and 78.09%) for 15 and 5 minutes. The lowest (70.15%) juice purity was found in control plots where no treatment was applied.

Effect of different treatments on yield of sugarcane and its economic (cost benefit ratio)

The data on cost benefit ratio (CBR) presented in Table 4 revealed that the net profit over control (Rs/ha) showed considerable difference within the various treatments which were applied to manage the red rot disease. Setts treated with carbendazim 50 WP for 15 minutes followed by sett treated with carbendazim 50 WP for 5 minutes and setts treated with propiconazole 25 EC for 5 and 15 minutes achieved higher returns for Rs./ha *viz.*147818/-, 114961/-, 80283 /-, and 72366/-, respectively, sett treatment with *Trichoderma harzianum* for 15 and 5 minutes Rs 57743/- and Rs 48579/- as well as setts treated with *Trichoderma viride* Rs. 2938/- and Rs. 22682/- for 15 and 5 minutes respectively. Whereas, the loss (Rs. -14078/-) per hectare was obtained from control plot where inoculated canes were not treated with any chemicals or bio agents.

Conclusion

On the basis of results obtained, the treatments not only reduce the red rot incidence but also enhance the different cane parameters. The maximum enhancement was observed in all parameters when setts were treated with Carbendazim 50 WP @ 0.1 percent for 15 minutes. Besides, the treatment has also achieved higher returns of Rs. 147818/- per hectare. Due to the emergence of new pathotypes of this fungus, the newly release resistant variety often becomes susceptible after some periods of Cultivation. To overcome on this fungus and to increase the production the present study may be exploited.

Table 1: Effect of different treatment on germination, settling mortality and disease growth

Treatment	Germination (%)	Increase over control	Mean	Settling mortality (%)	Reduction over control	Mean	Disease Incidence (%)	Reduction over control	Mean
T_1 (Sett treatment with carbendazim 50 WP @ 0.1% for 5 minutes)	28.3	41.5	43.2	14.00	44.0	49.0	14.5	62.0	65.3
T_2 (Sett treatment with carbendazim	29.0	45.0		11.5	54.0		12.0	68.7	

50 WP @0.1% for 15 minutes)									
T_3 (Sett treatment with propiconazole 25 EC @ 0.1% for 5 minutes)	25.6	28.0	29.5	15.5	38.0	41.0	18.0	52.9	55.0
T_4 (Sett treatment with propiconazole 25 EC @ 0.1% for 15 minutes)	26.2	31.0		14.0	44.0		16.4	57.1	
T_5 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 5 minutes)	24.6	23.0	24.0	16.5	34.0	38.0	23.2	39.3	42.5
T_6 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 15 minutes)	25.0	25.0		14.5	42.0		20.7	45.8	
T_7 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 5 minutes)	22.6	13.0	17.2	17.5	30.0	35.0	26.5	30.6	37.2
T_8 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 15 minutes)	24.3	21.5		15.0	40.0		21.5	43.7	
T_9 (control)	20.0			25.0			38.2		
CV	6.60				7.30		9.71		
CD (0.05)	2.13				2.01		3.57		
SEm±	0.67				0.66		1.19		

Table 2: Effect of different treatments on red rot disease and quantitative parameters of cane

Treatment	Disease Incidence (%)	Av. Cane Height (cm)	Av. Cane Girth (cm)	Av. Cane Weight (Kg)	Av. No. of Internodes	No. of clumps/plot	No. of tiller /plot	No. of milliable cane/plot	Cane Yield (tones/ha)
T_1 (Sett treatment with carbendazim 50 WP @0.1% for 5 minutes)	14.5	240.0	2.42	1.10	20.0	23.0	82.0	93.0	75.78
T_2 (Sett treatment with carbendazim 50 WP @0.1% for 15 minutes)	12.0	246.0	2.60	1.20	22.0	25.0	88.0	98.0	87.11
T_3 (Sett treatment with propiconazole 25 EC @0.1% for 5 minutes)	18.0	230.0	2.26	0.94	18.0	20.0	73.0	88.0	61.27
T_4 (Sett treatment with propiconazole 25 EC @0.1% for 15 minutes)	16.4	238.0	2.30	0.96	20.0	22.0	77.0	90.0	64.00
T_5 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 5 minutes)	23.2	222.0	2.12	0.87	16.0	18.0	67.0	82.0	52.84
T_6 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 15 minutes)	20.7	225.0	2.22	0.90	18.0	18.0	72.0	84.0	56.00
T_7 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 5 minutes)	26.5	216.0	1.86	0.78	15.0	16.0	61.0	76.0	43.91
T_8 (Sett treatment with *Trichoderma aviride* @ conidia 10^6/ml for 15 minutes)	21.5	220.0	2.00	0.80	15.0	17.0	64.0	78.0	46.22
T_9 (control)	38.2	188.0	1.48	0.69	13.0	11.0	48.0	60.0	31.11
CV	9.71	7.40	8.42	8.11	11.38	11.07	8.39	7.77	8.55
CD (0.05)	3.57	26.98	0.31	0.08	1.96	3.63	10.20	11.20	8.10
SEm±	1.19	8.16	0.11	0.02	0.61	1.21	3.40	3.73	2.69

Table 3: Effect of different treatments on disease and cane juice quality

Treatment	Disease Incidence (%)	Brix (%)	Sucrose (%)	Purity (%)
T_1 (Sett treatment with carbendazim 50 WP @0.1% for 5 minutes)	14.5	19.0	16.32	85.84
T_2 (Sett treatment with carbendazim 50 WP @0.1% for 15 minutes)	12.0	19.6	16.90	86.22
T_3 (Sett treatment with propiconazole 25 EC @0.1% for 5 minutes)	18.5	17.8	14.86	83.48
T_4 (Sett treatment with propiconazole 25 EC @0.1% for 15 minutes)	16.4	18.0	15.19	84.38
T_5 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 5 minutes)	23.2	16.8	13.64	81.20
T_6 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 15 minutes)	20.7	17.5	14.37	82.11
T_7 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 5 minutes)	26.5	16.2	12.65	78.09
T_8 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 15	21.5	16.5	12.97	78.60

minutes)				
T_9 (control)	38.3	13.1	9.19	70.15
CV%	9.71	1.40	2.36	3.43
CD (0.05)	3.57	0.14	0.58	1.60
SEm±	1.19	0.05	0.18	0.53

Table 4: Effect of different treatments on yield of sugarcane and its economic (Cost benefit ratio)

Treatment	Yield (tones/ha)	Total income (Rs/ha)	Cost of Cultivation (Rs/ha)	Net profit (Rs/ha)	CBR
T_1 (Sett treatment with carbendazim 50 WP @0.1% for 5 minutes)	75.78	219762	104801	114961	1:1.10
T_2 (Sett treatment with carbendazim 50 WP @0.1% for 15 minutes)	87.11	252619	104801	147818	1:1.41
T_3 (Sett treatment with propiconazole 25 EC @0.1% for 5 minutes)	61.27	177683	105317	72366	1:0.69
T_4 (Sett treatment with propiconazole 25 EC @0.1% for 15 min.)	64.00	185600	105317	80283	1:0.76
T_5 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 5 minutes)	52.84	153236	104657	48579	1:0.46
T_6 (Sett treatment with *Trichoderma harzianum* @ conidia 10^6/ml for 15 minutes)	56.00	162400	104557	57743	1:0.55
T_7 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 5 minutes)	43.91	127339	104657	22682	1:0.22
T_8 (Sett treatment with *Trichoderma viride* @ conidia 10^6/ml for 15 minutes)	46.22	134038	104657	29381	1:0.28
T_9 (control)	31.11	90219	104297	(- 14078)	1: (- 0.13)

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