

Effects of Eight Carbendazim Fungicides on Incidence of Sett rot Disease (*Ceratocystis paradoxa*) of Sugarcane

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ABSTRACT

An investigation was conducted to screen eight fungicides under Carbendazim group namely Aimcozim 50WP, Bavistin 50WP, Evazim 50WP, Genuine 50WP, Agridazim 50WP, Syndazim 50WP, Forastin 50WP and Avistin 50WP against sett rot disease (*Ceratocystis paradoxa*) of sugarcane under inoculated and field conditions. Setts of sugarcane were treated in 0.1% suspension of individual fungicides for 30 minutes just before planting. Except Syndazim 50WP other seven fungicides gave appreciable increase in sett germination and cane yield, and satisfactory reduction in incidence of the disease. Among the effective fungicides Evazim, Bavistin and Genuine 50WP showed best performance to decrease disease incidence, and to increase germination and cane yield. The three fungicides caused respectively 90, 89 and 85% reduction in sett rot incidence, 43.66, 24.48 and 40.93% increase in germination and 30.11, 20.45 and 25.14% yield increase over control.

Key words : Sett rot, *Ceratocystis paradoxa*, carbendazim fungicides, control

INTRODUCTION

Sugarcane is a major industrial crop in Bangladesh. It covers about 2.05% of total cultivable land and annual cane production is 7-7.5 million ton (Pal *et al.*, 2005). Sugarcane is vulnerable to a number of diseases (Agnihotri, 1983). Sett rot/pineapple caused by *Ceratocystis paradoxa* Moreau is one of the major fungal diseases of the crop. The pathogen mainly affects the setts, damages the bud and thus markedly hampers the germination of cane. In about 80% cases seed pieces decay before the bud sprouts or the shoot attains a height of 6-12 cm (Bell, 1936). The pathogen attacks the seed piece in soil. Extra dry or wet soil condition enhances the pathogenic infection and germination can be reduced up to 47% (Anon., 1999). The cane yield also can be reduced by 31-35% (Anon., 2000). However, since the pathogen attacks the setts in soil so treatment of setts with fungicides before planting is one the efficient strategies to avoid the infection and minimize the losses caused by the disease.

With this view in mind, the present investigation was undertaken to evaluate the effect of eight fungicides under Carbendazim group against sett rot disease of sugarcane caused by *Ceratocystis paradoxa*.

MATERIALS AND METHODS

Eight fungicides namely Aimcozim, Bavistin, Evazim, Genuine, Agridazim, Syndazim, Forastin and Avistin were tested as sett treating chemicals. All of them were 50 WP formulation of Carbendazim. Suspension of the fungicides was prepared in tap water at a concentration of 0.1%. Setts with two internodes were cut from apparently healthy stalks of sugarcane cultivar Isd 31. The variety is susceptible to sett rot caused by *Ceratocystis paradoxa*. For treatment, the setts were dipped in freshly prepared suspension of individual fungicides for 30 minutes prior to plantation. The under control were treated with plain water.

The experiments were conducted in the research farms of Bangladesh Sugarcane Research Institute (BSRI), Ishurdi and Regional Station of Sugarcane Research (RSRS), Thakurgaon during 2003 and repeated during 2004. After final land preparation furrows were made maintaining 1 m row to row distance. Recommended doses of compost and chemical fertilizers were mixed with the bottom soil of each furrow. The soil of the furrow was inoculated with spore suspension of *C. paradoxa* containing 10^5 - 10^6 conidia per ml of sterilized distilled water. Just before planting of setts, the spore suspension was sprayed in the furrow and thoroughly mixed with the bottom soil. Immediately after treatment, the setts were placed in the furrow in a continuous row and covered with inoculated soil. Whenever necessary, water was sprinkled in the furrows to maintain proper moisture level suitable for germination. The experiments were laid out in a completely randomized block design with three replications. The unit plot size was 4m X 8m. Data on germination and incidence of sett rot disease were recorded after 60 days of planting. Setts failed to germinate were removed from the furrow and examined in the laboratory to detect infection of *C. paradoxa* and to record the incidence of sett rot disease. Germination of setts and incidence of sett rot were expressed in percentage on the basis of total number of setts planted in each unit plot. After harvest cane yield per plot was recorded and expressed in ton per hectare based on total yield per unit plot. Pooled data of two years and average of two locations were subjected to statistical analysis.

RESULTS AND DISCUSSION

Under all treatments including control germination was higher at BSRI as compared to RSRS farm (Table 1). This might be due to variants in soil environment in two locations. In both the locations, germination increased appreciably over control due to sett treatments with all fungicides except Syndazim (Table 1). The average germination under Aimcozim, Bavistin, Evazim, Genuine, Agridazim, Forastin and Avistin ranged from 18.54 to 43.66%. Their efficacy to increase germination was significant as compared to control. Significantly the highest germination was achieved with Evazim, which was followed by Genuine showing 40.93% germination. Efficacy of Aimcozim, Bavistin, Forastin and Avistin was statistically similar and gave 24.15 to 25.18 % germination. The increase in germination was 18.54 where the setts were treated with Agridazim (Table 1). The incidence of sett rot was 80% under control and it was reduced to 10-20% due to sett

treatment with all the tested fungicides. All of them gave significant decrease in incidence of sett rot caused by *C. paradoxa* as compared to control. However, their efficacy against the disease was statistically similar and gave 80-90% reduction in disease incidence (Table 1).

Table 1: Efficacy of sett treating fungicides on germination and disease control of sugarcane in the cropping season 2003 and 2004

Fungicides (0.1% suspension)	Germination of setts (%)			Germination Increase over control (%)	Sett rot incidence (%)	Reduction of sett rot (%)
	BSRI, Ishurdi	RSRS, Thakurgoan	Average			
Aimcozim-50WP	67.00	51.33	59.17 c	24.15	15 b	85
Bavistin-50WP	74.33	44.33	59.33 c	24.48	15 b	85
Evazim 50-WP	77.33	59.33	68.33 a	43.66	10 b	90
Genuine 50 WP	76.00	58.33	67.17 b	40.93	11 b	89
Agridazim-50WP	68.67	44.33	56.50 d	18.54	12 b	88
Syndazim-50WP	59.67	36.67	48.17 e	1.07	20 b	80
Forastin 50WP	67.00	52.33	59.66 c	25.18	17 b	83
Avistin- 50WP	68.67	50.33	59.50 c	24.84	17 b	83
Control	60.00	35.33	47.66 e	-	80 a	-

Figures in the column followed by the same letter do not differ significantly (P=0.05).

Cane yield was 39.29 t/ha at BSRI and 33.96 t/ha at RSRS when setts were treated with plain water (control). The yield was increased to 42.81- 52.71 t/ha at BSRI and 38.33-45.94 t/ha at RSRS. Average of the two locations showed that all fungicides gave significant increase in cane yield over control. The range of average yield increase was 12.61-30.11%. The lowest yield increase was obtained with Syndazim and the highest with Evazim, which was followed by Avistin giving 30.0%. Other five fungicides caused 22.30 to 25.14 % increase in cane yield over control (Table 2).

Among the fungicides tested the most effective ones were Evazim, Genuine and Avistin in terms of increase in germination and cane yield, and reduction in sett rot incidence. Other investigators also found effective control of the disease using fungicides. Tewari *et al.* (1988) evaluated inhibitory concentration of five fungicides against *C. paradoxa* and found that Bavistin and Tecto-40 were more effective *in-vitro* and gave 95 and 85% control respectively. In another trial Kalaimani *et al.* (1996) found that pre plant application of Carbendazim at 0.05% gave 46% less disease incidence.

Considering the efficacy of the fungicides in increasing germination and cane yield, and disease control they may be recommended for pre plant sett treatment to manage sett rot disease of sugarcane caused by *Ceratocystis paradoxa*.

Table 2: Effect of sett treating fungicides on yield of sugarcane in the cropping season 2003 and 2004

Fungicides (0.1% suspension)	BSRI, Ishurdi	Yield of Cane (t ha ⁻¹) RSRS, Thakurgoan	Average over control	% Increase
Aimcozim –50WP	52.71	38.33	45.52 be	24.27
Bavistin –50WP	48.12	40.11	44.12 d	20.45
Evazim 50-WP	51.77	43.54	47.66 a	30.11
Genuine 50 WP	47.19	44.48	45.84 b	25.14
Agridazim –50WP	43.65	45.94	44.80 cd	22.30
Syndazim –50WP	42.81	39.69	41.25 e	12.61
Forastin 50WP	47.19	43.65	45.42 bc	24.0
Avistin- 50WP	51.14	44.17	47.60 a	30.0
Control	39.29	33.96	36.63 f	-

Figures in the column followed by the same letter do not differ significantly (P= 0.05).

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