

Chemical Control of Sugarcane Smut Through Sett Treatment with Fungicides

V. BHARATHI

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V. BHARATHI

Farmers Call Centre,
Acharya N.G. Ranga
Agricultural University,
Sitafalmandi,
HYDERABAD (A.P.)
INDIA

SUMMARY

Smut disease caused by *Ustilago scitamineae* is a dreadful disease of sugarcane and is endemic in most of the tropical regions. Sett treatment with triademifon (0.1%) followed by propiconazole (0.1%) for different periods 2h and 4h had shown radical reduction in smut incidence. There was slight smut incidence with triademifon or propiconazole for 2 h dip but with 4 h there was no smut incidence. Sett treatment with fungicide did not exhibit any influence on germination and shoot production. Hence, sett dip with triademifon (0.1%) or propiconazole (0.1%) for 2h can be recommended for an effective management of sett transmitted sugarcane smut.

Key words :

Sugarcane, Smut,
Ustilago
scitamineae,
Fungicides,
Management, Sett
treatment

Culmicolous smut (*Ustilago scitamineae*) is cosmopolitan in distribution and is one of the most dreadful disease of sugarcane. The disease was first reported from Natal in South Africa around 1877 according to a reports of the Victoria planters association. It is quite difficult to make a precise assessment of the economic importance of smut, since most estimates of yield loss are based on observation and experience rather than rigorous experimentation. In addition to cane tonnage losses, smut also appears to reduce cane quality. However, loss may be quite severe in susceptible varieties under conditions suitable for disease development. Rao *et al.* (1985) reported loss in yield (68 to 80%) and juice quality (32%) in susceptible varieties which was further increased in ratoons. The decrease in cane yields is due to decreased number of millable canes and size of cane girth. Smut epidemics in various countries suggest that disease severity is associated with hot dry climates where crop may experience water stress (Singh *et al.*, 1988). Padmanabhan *et al.* (1987) stated a negative and significant correlation existed between smut incidence and yield. Growing resistant varieties is the best method to curtail the disease. Breeding and selection process in sugarcane are cumbersome. Though hot water treatment is suggested for the control of smut disease. Bailey (1983) found that sett treatment for 2h at 50° C with 500 ppm of triademifon had a significantly lower rate of infection in the resultant crop than did the equivalent controls.

This was at variance to observations of Goyal *et al.* (1983) who felt that hot water treatment could overcome infection but tedious process makes farmer difficult to do on their own. Hence, a study was made to evaluate sett treatment with fungicides to control sett borne infection of smut during these consecutive years (2002-03 to 2004-05).

MATERIALS AND METHODS

A field experiment was conducted at Regional Sugarcane and Rice Research Station, Rudrur, Nizamabad district in Andhra Pradesh during 2002-2003, 2003-2004 and 2004 – 2005. Treatments with six fungicides *viz.*, 0.15% carbendazim, 0.1 % triademifon, 0.1% propiconazole, 0.2% Hexaconazole, 0.1% Difenconazole and 0.1% carboxin were tried and untreated treatment control. Fresh smut whips were collected from smut affected fields of susceptible varieties in and around fields for use as inoculum. After shade drying, the teliospores were gently scrapped and thoroughly sieved. The germination of the teliospores on plain agar plates was found to be 90 per cent at the time of inoculation. Two budded setts of the sugarcane Co 6907 were artificially inoculated by soaking them in viable smut spore suspension of concentration (1x10⁶ spores/ml) for 30 min and were incubated in moist gunny bags for 24 h. A sticker (Indtron) @ 0.5 ml/l was added to the smut spore suspension for equal distribution of spores and to make the solution more tenacious (Shah *et al.*, 1997). The inoculated setts were then

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soaked in different fungicidal solutions for 2 h and 4 h and planted. Twenty five, two budded setts were planted in each row of 5 m length in five rows with three replications. Setts inoculated with smut spore suspension but without fungicidal treatment served as control. The treated setts along with the untreated setts were planted in the furrows of which were at 90 cm apart in between two rows on either side of the furrow to facilitate easy recording of smut incidence. Data on sett germination were recorded at 35 days after planting. Smut incidence was recorded at fortnightly intervals. The smut clumps noticed were roughed out after each observation and destroyed to avoid secondary infestation. Cumulative incidence of smut in each replicate was calculated on the basis of total setts germinated.

RESULTS AND DISCUSSION

Data on per cent germination disease incidence for three seasons 2002-2003, 2003-04 and 2004-05 indicated that there was considerable reduction of smut in all the treatments compared to control (Table 1). Variation in per cent smut incidence among different treatments with six chemicals showed significant differences. Fungicidal dip in triademifon followed by propiconazole for 2 h and 4 h was able to provide complete control of smut incidence with 4 h sett dip treatment as compared to 2 h treatment. It is evident from the results that fungicide dip in 0.1% triademifon and 0.1% propiconazole for 2 h or 4 h could provide complete control of smut infection through out the crop season either as sett dip at 2 h or 4 h after inoculation. During the next season (2005 – 06) the only

one treatment with fungicides triademifon was found to be free from smut incidence. Baily (1983) found that setts treated for 2 h at 50°C with 500 ppm of triademifon had a significantly lower rate of smut infection in the resultant crop than did the equivalent controls. Soaking two budded sett in triademifon (0.1%) for 5 min was reported to reduce systemic infection of smut (Natarajan and Muthusamy, 1981). Mean values of three years indicated that the per cent smut incidence in 4 h sett dip duration ranged from 8.38 (Difenconazole 0.1%) to 18.79 (Carbendazim 0.15%) where as the per cent incidence of smut in 2 h sett dip ranged from 2.35 (triademifon 0.1%) to 24.2 (carbendazim @ 0.15%). This was at variance with observations of Goyal *et al.* (1983) who clearly pointed out that triademifon in controlling smut infection. Vijaya (2000) also obtained encouraging results in managing sett borne infection of sugarcane smut by employing carbendazim, triademifon, triademorph and chlorothalonil etc. From Iran, Sharififar and Kazeni (1999) reported effective control of smut infection through the use of propiconazole as sett dip. In a preliminary study, Satyanarayana *et al.* (2001) found propiconazole sett dip treatment as promising.

On the basis of results from the study, sett dip treatment either at 0.1% triademifon solution for 4 h or propiconazole @ 0.1% before planting can be recommended for a complete elimination of sett borne inorculum which is the primary source to initiate infection even in moderately susceptible varieties in the sick field.

Table 1 : Effect of different fungicides on sett germination and smut incidence in sugarcane

Treatment	Concentration (%)	Duration of sett dip (h)	Per cent germination			Pooled analysis	Per cent smut incidence			Pooled analysis
			2002-03	2003-04	2004-05		2002-03	2003-04	2004-05	
Triademifon	0.1	2	76.26	74.32	80.02	76.80	0.00	2.44	2.26	2.35
	0.1	4	80.30	82.90	84.30	82.50	0.00	0.00	0.00	0.00
Propiconazole	0.1	2	79.20	76.29	86.20	80.50	0.00	6.30	7.01	6.65
	0.1	4	82.60	80.40	81.00	81.33	0.00	0.00	4.21	4.21
Hexaconazole	0.2	2	78.50	75.00	80.15	77.88	16.10	12.40	12.77	13.73
	0.2	4	79.10	84.10	83.90	82.4	9.36	11.12	9.86	10.11
Difenconazole	0.1	2	80.26	84.46	74.10	79.60	12.24	10.03	7.91	10.06
	0.1	4	83.90	85.20	77.50	82.2	9.26	9.45	6.43	8.38
Carboxin	0.1	2	76.26	73.26	74.60	74.70	11.45	14.06	12.16	10.08
	0.1	4	74.25	80.40	82.90	79.18	10.11	12.11	8.01	24.21
Carbendazim	0.15	2	82.90	76.90	77.11	78.9	24.80	26.50	21.33	24.21
	0.15	4	81.50	86.10	80.20	82.6	19.20	18.55	18.62	18.79
Control	-	-	58.24	63.10	56.28	59.20	62.40	70.77	69.50	67.56
C.D. (P=0.05)			2.08	2.19	2.14		2.12	1.29	1.94	2.01

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