Evaluation of *in vitro* and *in vivo* management in brown leaf spot of sugarcane.

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ABSTRACT

Sugarcane is one of the most important cash crops of the India. Sugarcane was cultivated on 8.35 lakh hac .area in Maharashtra (2015-16) with the production of 83.79 lakh tone and productivity is 88 t/ha. The crop being a long duration crop attracts a number of insect, diseases and nutritional disorders. Insect pests and disease cause 20% and 10-15% yield loss. The brown spot (*Cercospora longipes* B.1906) pathogen *Duteromycetes* was coated as the minor one in sugarcane but become major from last three –four years, reported 12 to 20 % loss in recovery and sugar quality**.** ***In vitro*** management of pathogen by different fungicides showed that, Out of 5 different fungicides the Tebaconizole @ 0.1% and Dithen M 45 (mancozeb) @ 0.3 % found significantly most effective in inhibiting the growth of pathogen at 99.21 % and 98.15 % respectively over control. The interaction effect within the treatment was also found significantly superior among the treatment as compare to control. The result indicated that tebaconizole gives 100 per cent inhibition of colony growth followed by other. ***In vivo*** management at CSRS,Padegaon ,(2016-17) Pathology farm out of six fungicides the treatments, Propiconazole @ 0.1 % recorded the lowest brown spot intensity of 10.00 % and the highest per cent disease control of 84.46 %, NMC/ha of 89.68, cane yield of 103.80 t/ha and CCS yield of 14.67 t/ha. It was followed by Mancozeb 0.10 % which recorded the brown spot intensity of 13.00 % and the per cent disease control of 79.79 %, NMC/ha of 86.28, cane yield of 98.0 t/ha and CCS yield of 14.26 t/ha.

Keywords: Sugarcane, *Saccharum officinarum* L., Brown spot, Leaf disease

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the most important food and cash crop of the tropics and subtropics which was cultivated in about 121 countries encompassing approximately half of the world. Sugarcane is a tall, perennial grass (family *Poaceae*, subfamily *Panicoide*), and is cultivated in tropical and warm-temperate regions between 35°N and 35°S and from sea level to altitudes of 1,000 m in a wide variety of soil types They are playing an important role in Indian economy and a key role to the socio-economic prosperity in the state of Maharashtra. They playing an important role in Indian economy, rank second largest producer of sugarcane(18.18%) and sugar (15.81%) after the Brazil[8] Sugarcane was cultivated on 8.35 lakh hac.area in Maharashtra (2015-16) with the production of 83.79 lakh tone and productivity is 88 t/ha[4]. The Govt. of India take a decision of blending the ethanol in petrol at 10 % so in future may enhances its importance.

The brown spot (*Cercospora longipes* B.1906) pathogen *Duteromycetes* was coated as the minor one in sugarcane by the Butler E.J. without the known sexual state (*Telomorph*).There were 260 species were identified in Monograph on Indian *Cercosporace* have known for leaf spot disease to plant [13]. In Maharashtra more than 35 % area was under CoM 0265 the noble cane. Though the brown spot disease is minor on sugarcane, now a day they become major on notable genotypes CoM 0265 one due to the unseasonal and unusual rainfall, change in the humidity pattern and change in other climatic factors with the effect global warming [3]

Materials and methods.

1) ***In vivo*** **evaluation different fungicides against *C. longipes* B.**

The proposed experiment was conducted at Central Sugarcane Research Station , Padegaon Tal. Phaltan Dist. Satara at Pathology farm in the d**es**ign R.B.D **.,** with three replications having Plot size,6.0 x 6.0 m (6 Rows of 6 m) and Fertilizer dose**:** 250:115:115 Kg N, P_2O_5 & K_2O/ ha in *suru* season 2015-16 with the genotypes CoM 0265.

Treatment details:

Treat. No.	Fungicide *a .i.*	Spray conc. (%)	Trade name
T_1	Propiconazole	0.10	Tilt 10 EC
T_2	Hexaconazole	0.10	Contaf 5 EC
T_3	Tridemefon	0.10	Bayleton 25 WP
T_4	Mancozeb	0.30	Indofil M-45 75 WP
T_5	Carbendazim	0.10	Bavistin
T_6	Chlorothalonil	0.25	Kavach
T_7	Water sprayed control	-	

Spray Schedule: 1) 16/08/2016 (Immediately after disease appearance)

2) 19/08/2016

3) 02/09/2016

4) 19/09/2016

1. *In-vitro* evaluation of different fungicides against *C. longipes* B.

The present investigation on brown leaf spot of sugarcane, caused by *Cercospora longipes* B. was carried out during 2014-2016 at Post Graduate Institute Mahatma Phule Krishi Vidyapeeth, Rahuri.,Maharashtra. Infected leaf sample were collected during survey in the western Maharashtra and some samples are collected from Central Sugarcane Research Station, Padegaon, Tal. Phaltan Dist. Satara. Infected leaf samples were analyzed on the day of collection or after keeping for a few days under refrigerated conditions. Maintenance of fungus PDA slants were used for maintenance of the fungus. Poison food technique was followed to test the efficacy of the different fungicides against the pathogen [11]. The pathogen was grown on PDA medium in petriplates for fifteen days prior to setting the experiment. The 100 ml Potato dextrose agar was distributed in 250 ml conical flask and sterilized at 15 ibs pressure for 15 minutes at 121^0C. After sufficient cooling to each of the flasks, measured quantity of different fungicides were added. The flasks were shaken thoroughly and were mixed fungicide in medium and then poured in plates. Three plates of each fungicide were used for each fungal pathogen isolates.

These plates were inoculated with 3 mm fungal disc taken from the periphery of ten day old culture and placed in the centre and incubated at 26 ± 1^0C till growth of the fungus touched the periphery in control plate. Suitable checks were also maintained without addition of any fungicide. The diameter of the colony was measured in two directions and average was worked out. The per cent inhibition of growth was worked out. The per cent inhibition of growth was calculated by using the formula given by[15].

Result and Discussions

1) ***In vivo* evaluation of fungicides against *C. longipes* B.**

The results on intensity of brown spot disease, growth and quality parameters as influenced by different treatments are presented in Table 8. The results on germination percentage at 45 DAP were not significant. The germination in different treatments ranged from 57.33 to 66.00 %. All the fungicides had a significant influence on the brown spot intensity, cane yield and CCS yield. Among the treatments, Propiconazole 0.1 % recorded the lowest brown spot intensity of 10.00 % and the highest per cent disease control of 84.46 %, total height 226.00 cm, No. of Internode 19.87, Internode length 12.77cm, NMC/ha of 89.68, cane yield of 103.80 t/ha and CCS yield of

14.67 t/ha. It was followed by Mancozeb 0.10 % which recorded the brown spot intensity of 13.00 % and the per cent disease control of 79.79 %, total height 223.67 cm, No. of Internode 19.43, Internode length 12.38cm, NMC/ha of 86.28, cane yield of 98.0 t/ha and CCS yield of 14.26 t/ha.

2) I***n vitro*** **evaluation of fungicides against *C. longipes* B.**

The efficacy of 5 fungicides viz. Captan, Carbendazium, Tabeconizole, Copper oxychloride, Mancozb were assayed by food poison techniques. Desired concentration was made in PDA medium. Control was prepared without addition of the fungicides. Mycelial disc of 5 mm size from actively growing fresh culture of the fungus were cut out by using sterile cork borer and one disc was placed at the centre of the disc. All the treatment were replicated thrice and incubated at 26 + 1^0C temperature, and growth was measured at 3 days interval .Final observations were recorded on 15 days.

The maximum mean colony diameter was recorded after fifteen days of inoculation. The maximum mean colony diameter (89 mm) was recorded in the control treatment as compare to other treatments. The rest of the treatments are recorded significantly minimum colony diameter as compare to control. Out of 5 different fungicides the Tebaconizole @ 0.1 % and mancozeb @ 0.3 % found significantly most effective in inhibiting the growth of pathogen at 99.21 and 98.15 per cent, respectively over control. The interaction effect within the treatment was also found significantly superior among the treatment as compare to control.

Table ;01 ***In vivo*** **(field) evaluation of different fungicides against the pathogen**

Treatments		Conc.	Germ. % at 45 DAP*	PDI*	PDC	NMC/Ha (1000)	Cane yield (t/ha)	CCS %	CCS yield (t/ha)	Brix	Purity %	Sucrose %
T_1	**Propiconazole**	**0.10%**	**64.33** (53.35)	**10.00** (18.37)	**84.46**	**89.68**	**103.8**	**14.14**	**14.67**	**20.91**	**96.94**	**19.85**
T_2	**Hexaconazole**	0.10%	57.33 (49.22)	25.00 (29.67)	61.14	83.087	86.6	13.91	12.06	20.05	98.35	19.72
T_3	**Tridemefon**	0.10%	63.67 (52.93)	42.33 (40.56)	34.20	79.04	81.2	13.76	11.17	20.58	95.07	19.58
T_4	**Mancozeb**	**0.10%**	**66.00** (54.33)	**13.00** (21.04)	**79.79**	**86.277**	**98.0**	**14.57**	**14.26**	**20.82**	**97.43**	**19.87**
T_5	**Carbendazim**	0.10%	64.33 (53.32)	25.67 (30.24)	60.10	81.32	85.6	13.90	11.90	20.32	93.28	19.61
T6	**Chlorothalonil**	0.25%	65.33 (53.93)	48.33 (44.02)	24.87	79.387	81.6	13.77	11.23	20.31	96.94	19.62
T7	**Water sprayed control**	--	59.33 (50.39)	64.33 (53.38)		75.03	80.2	13.72	11.00	20.02	95.15	19.51
	SE±		**3.52**	3.48		2.47	2.56	0.17	0.37	0.27	1.11	0.22
	CD at 5 %		**NS**	10.72		7.61	7.90	0.52	1.15	NS	NS	NS

	C.V. %		**9.68**	18.44		5.22	5.04	2.11	5.25	2.33	2.01	1.96

Table; 02 *In vitro* evaluation of different fungicides against the pathogen (mean colony diameter)

Sr. No.	Name of the fungicides	Concentration (%)	Mean colony diameter (cm)*	% inhibition
1	Captan	0.025	3.77	0.78
2	Copper Oxychloride	0.3	5.13	00
3	Carbendezium	0.05	1.10	71.05
4	Tebaconizole	0.1	0.03	99.21
5	Dithen M 45 (Mancozeb)	0.3	0.07	98.15
6	Control (@15 Days) % inhibition	-	3.80	00
	SE ±	0.060		
	CD at 5 %	0.13		

(*): Average of three replication

Have reference of management of brown spot of peanut by benomyl [10], Propiconizole [5],[1] reported that bavistin at 0.1 per cent to control Cercospora leaf spot of groundnut. In our study on behalf of above reference we found that tabeconazole @ 0.1 %, Mancozeb @ 0.3 % found effective to control sugarcane brown spot disease. [14] Reported seed treatment with captan @ 2.5 kg ha-1 to control the Cercospora leaf spot of cowpea.The management of fungal disease of soybean by fungicide spray at 0.2 per cent mancozeb[12] are useful to control the purple strains of soybean seed infected by *C. kukuchi*. The chemicals as that of Dithen M- 45 was used for frog eye spot management of bidi tobacco [6].

The spray of Hexaconiziole at 0.5 per cent after 45 days of planting control the cercospora leaf spot of mungbean[9]. In field the propiconizole @ 0.1% was effective against the brown spot of sugarcane [4]. Same tune was found in our study.

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