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Vishal GandhiPh.D. Scholar, Department of
Plant Pathology, CCS HAU
Hisar, Haryana, India**Rakesh Mehra**Regional Research Station,
CCS Haryana Agricultural
University, Karnal, Haryana,
India

Efficacy of different fungicides on pokkah boeng disease of sugarcane

Vishal Gandhi and Rakesh Mehra

Abstract

Pokkah boeng caused by *Fusarium moniliforme* Sheldon though earlier considered as minor disease is now one of the economically important diseases of sugarcane, its incidence has been increasing on several varieties in sugarcane growing states. Various methods are classified for the management of plant diseases which includes regulatory, cultural, biological, physical and chemical methods. Among them fungicides play a very important role in pokkah boeng disease management as they are easy to handle and quick acting directly on the disease. The rapid sett treatment tool used to treat the sugarcane planting material with fungicides in order to defend against various fungal diseases. In which, due to decreased pressure produced in the treatment chamber, the soaking period is greatly shortened and the fungicides are more easily absorbed into the sugarcane setts. Nine fungicides viz., carbendazim, copper oxychloride, mancozeb, carbendazim + mancozeb, propiconazole, tebuconazole, hexaconazole, azoxystrobin, chlorothalonil were evaluated under field conditions during 2018-19 as sett treatment with carbendazim and followed by three foliar spray of fungicides. All the fungicides were found effective to control the disease. Carbendazim gave highest disease control (85.88%) followed by tebuconazole (83.18%), carbendazim + mancozeb (79.30%), propiconazole (77.11%), copper oxychloride (76.95%), hexaconazole (67.23%), mancozeb (61.42%), azoxystrobin (57.28%) and chlorothalonil (51.44%).

Keywords: carbendazim, copper oxychloride, *Fusarium moniliforme*, pokkah boeng, sugarcane

Introduction

Sugarcane (*Saccharum officinarum* L.), pertaining to the *Poaceae* family, is an important agro-industrial crop grown in tropical and subtropical regions of the world. It is a vegetatively propagated crop, grown in more than 80 countries across the world and produces 166.19 MT of sugar for industrial and human consumption (Singh and Dewan, 2020) [5]. India is the largest producer of sugarcane and world's leading sugar consumer. In India, Sugarcane is grown in an area of about 46.03 lakh hectares with production of 3705 lakh tones and average productivity of 80.50 tones/ha (Anonymous, 2020) [1].

In India, the agro-climatic regions of sugarcane cultivation are divided into two regions viz., tropical and sub-tropical (Shukla *et al.*, 2017) [4]. In Haryana, it is cultivated in 0.96 lakh hectares with annual production and average productivity of 773.03 lakh tones and 80.27 tones/ha (Anonymous, 2020) [1]. In India, about 180 diseases have been recorded on sugarcane (Viswanathan and Rao, 2011) [7] out of which only 50 are of economic importance to Indian conditions. Among these red rot, smut, wilt, sett rot, grassy shoot are the major one seriously affecting sugarcane production in India. In addition, diseases such as pokkah boeng, leaf scald, mosaic and rust also occurring regularly on predominantly cultivated varieties and are causing significant losses in sugarcane production in many states of the country. Pokkah boeng caused by *Fusarium moniliforme* Sheldon though earlier considered as minor disease is now one of the economically important diseases of sugarcane, its incidence has been increasing on several varieties in sugarcane growing states. The most common symptom observed in the disease is a malformed or twisted top which gives the disease its name pakkah boeng from the Javanese language. The disease manifests in four phases viz., chlorotic phase I, chlorotic phase II, acute or top rot phase and knife cut phase (Tiwari *et al.*, 2020) [6]. Various methods are classified for the management of plant diseases which includes regulatory, cultural, biological, physical and chemical methods (Sharma and Kumar, 2015) [3]. Among them fungicides play a very important role in pokkah boeng disease management as they are easy to handle and quick acting directly on the disease. The rapid sett treatment tool used to treat the sugarcane planting material with fungicides in order to defend against various fungal diseases. In which, due to decreased pressure produced in the treatment chamber, the soaking period is greatly shortened and the fungicides are more easily absorbed into the sugarcane setts (Singh *et al.*, 2019). Not much work has been done on the management of the disease in Haryana and other parts of the

Corresponding Author:**Vishal Gandhi**Ph.D. Scholar, Department of
Plant Pathology, CCS HAU
Hisar, Haryana, India

country. Keeping in view the widespread occurrence and qualitative and quantitative losses caused by the disease, the present work was carried out to evaluate the efficacy of different fungicides on pokkah boeng of sugarcane crop.

Materials and Methods

The experiment was carried out during 2018-19 in research area of CCSHAU, RRS, Karnal using randomized block design (RBD) with susceptible variety Co 0238 of sugarcane with three replications. Efficacy of nine fungicides viz., hexaconazole, azoxystrobin, carbendazim, propiconazole, copper oxychloride, mancozeb, carbendazim + mancozeb, tebuconazole, chlorothalonil and control were tested under in field conditions against pokkah boeng. The plot size was 3×3 m with spacing of 75cm line to line. All the recommended packages and practices of CCS HAU, Hisar were followed for raising the crop (Anonymous, 2011). One spray of each fungicide was done on the initiation of the disease followed by second and third at 15 days interval. Disease incidence was observed regularly and data was recorded on the basis of scale as adopted by AICRP on sugarcane. Disease Incidence (%) was calculated by the following formula:

$$\text{Disease incidence} = \frac{\text{Number of diseased plants}}{\text{Total number of plants}} \times 100$$

Yield of sugarcane was calculated by harvesting the plot of 3 × 3 m² from each plot and weight of cane was recorded on electric weighing machine and converted to tone per hectare.

Results and Discussion

The persusal of data presented in Table 1 and Figure 1 reveals that minimum disease incidence (4.07%) was reported with

sett treatment with carbendazim and three foliar sprays of carbendazim followed by tebuconazole (4.96%), carbendazim + mancozeb (6.01%), propiconazole (6.68%), copper oxychloride (6.71%), hexaconazole (9.64%), mancozeb (11.34%), azoxystrobin (12.44%) and chlorothalonil (14.05%). Disease control (%) was found highest in carbendazim (86.34%) followed by followed by tebuconazole (83.33%), carbendazim + mancozeb (79.80%), propiconazole (77.55%), copper oxychloride (77.46%), hexaconazole (67.62%), mancozeb (61.91%) and azoxystrobin (58.21%). Chlorothalonil (52.80%) was found least effective in per cent disease control. Similarly, sett treatment and foliar sprays with different fungicides had significant effect on the cane yield. Carbendazim gave maximum cane yield (95.56 t/ha) followed by tebuconazole (91.11 t/ha), carbendazim + mancozeb (88.15 t/ha), propiconazole (86.67 t/ha), copper oxychloride (84.07 t/ha), hexaconazole (80.00 t/ha), mancozeb (78.15 t/ha), azoxystrobin (77.78 t/ha) and chlorothalonil (75.93 t/ha). Similarly, per cent cane yield increase was found maximum in carbendazim (34.38%) followed by tebuconazole (28.13%), carbendazim + mancozeb (23.96%), propiconazole (21.88%), copper oxychloride (18.23%), hexaconazole (12.50%), mancozeb (9.90%), azoxystrobin (9.37%). Chlorothalonil exhibited minimum per cent increase in yield (6.77%) as compared to control. These results were in line with the findings of Ranjan *et al.*, (2018)^[2] who reported that sett treated and foliar spray with carbendazim 50 WP gave the minimum disease incidence (1.8%) and significantly control the pokkah boeng disease in sugarcane under field conditions followed by propiconazole (2.4%).

Table 1: Efficacy of fungicides against pokkah boeng of sugarcane under field conditions during 2018-19

S. No.	Fungicides	Concentration (%)	Disease incidence (%)	Disease control (%)	Yield (t/ha)	Yield increase (%)
1	Carbendazim	0.2	04.07 (11.57)*	86.34	95.56	34.38
2	Copper oxychloride	0.2	06.71 (15.00)	77.46	84.07	18.23
3	Mancozeb	0.2	11.34 (19.64)	61.91	78.15	09.90
4	Carbendazim + mancozeb	0.2	06.01 (14.18)	79.80	88.15	23.96
5	Hexaconazole	0.1	09.64 (18.08)	67.62	80.00	12.50
6	Propiconazole	0.1	06.68 (14.97)	77.55	86.67	21.88
7	Tebuconazole	0.1	04.96 (12.86)	83.33	91.11	28.13
8	Azoxystrobin	0.1	12.44 (20.63)	58.21	77.78	09.37
9	Chlorothalonil	0.2	14.05 (22.00)	52.80	75.93	06.77
10	Control		29.77 (33.05)		71.11	
	CD (p= 0.05)		(01.13)		(04.36)	
	CV (%)		(03.60)		(03.05)	

*Data in parentheses are transformed values by using the angular transformation

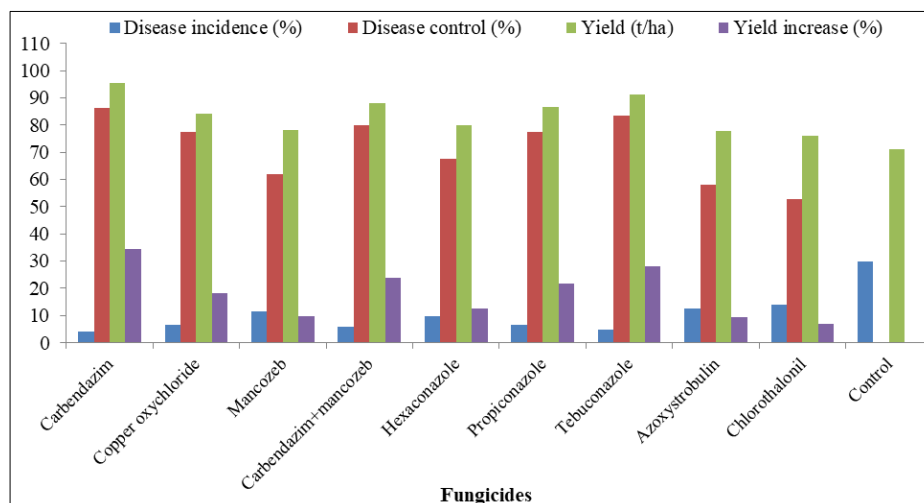


Fig 2: Efficacy of various fungicides against pokkah boeng of sugarcane under field conditions during 2018-19

Conclusion

Among the nine fungicides, minimum disease incidence (4.25%) was observed with carbendazim followed by tebuconazole (5.06%) and chlorothalonil found least effective fungicide which gave minimum 51.44 per cent disease control. Similarly, foliar spray of carbendazim gave maximum cane yield (92.68 t/ha) followed by tebuconazole (87.87 t/ha) and chlorothalonil shows minimum yield (72.87 t/ha).

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