



## **Evaluation of Promising Sugarcane Clones in Plant Cane against Natural Infection of Pokkah Boeng Disease**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI:10.9734/CJAST/2020/v39i2130831

#### Editor(s):

(1) Ming-Chih Shih, Chinese Culture University, Taiwan.

#### Reviewers:

(1) Eid Mehareb, Sugar Crops Research Institute, Egypt.

(2) Robson da Silva Ramos, Rural Federal University of Pernambuco, Brazil.

(3) Crépin B. Péné, Ivorian Science Academy, Ivory Coast.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/58062>

**Short Research Article**

**Received 26 May 2020**

**Accepted 02 August 2020**

**Published 08 August 2020**

### **ABSTRACT**

Pokkah boeng caused by *Fusarium sp* is becoming a serious fungal disease on basis of its rapid spread during last few years, posing new threat to sugarcane cultivation. Earlier Pokkah boeng disease was of minor importance but now it has become matter of concern as it is spreading rapidly in sugarcane growing areas having monoculture of single variety. The present investigation entitled "Evaluation of promising sugarcane clones in plant cane against natural infection of pokkah boeng disease" was carried out at Regional Sugarcane and Rice Research station, Rudrur,

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Nizamabad, Telangana (India) to identify the source of resistance with single series design. Among the ten promising sugarcane clones evaluated in plant cane against Pokkah boeng disease three clones viz., 2014R11, 2010R854 and 83R23 showed resistant reaction.

**Keywords:** Pokkah boeng; clones; sugarcane.

## 1. INTRODUCTION

Sugarcane (*Saccharum spp.*, L) is one of the major cash and industrial crop. The sugarcane crop is affected by several diseases which caused great losses in yield of sugar and cane. Amongst the foliar diseases, the pokkah boeng disease caused by the fungus *Fusarium moniliforme*, pokkah boeng is a Javanese term, which describes a disease affecting sugarcane tops [1]. Basically it is an air borne disease and primarily transmitted through the air and secondary infection takes place through the infected setts, irrigation water, splashed rains and soil. The pathogen can survive for 12 months in the plant debris under natural conditions. *Fusarium moniliforme* associated with a wide range of hosts such as banana, maize, cotton, mango, sugarcane and other important crops [2]. Yield losses in sugarcane varied from 40 to 60 per cent in the susceptible varieties Goswami et al. [3]. Karuppaiyan, et al., [4]. also reported that the disease incidence was ranged from 6.9 to 25.30 per cent. Duttamajumdar [5].also observed that incidence of Pokkah boeng disease from trace to moderate level on most of the commercial varieties.

## 2. MATERIALS AND METHODS

The study was carried out at Regional Sugarcane and Rice Research station, Rudrur, Nizamabad. Ten promising Sugarcane clones viz., 2013R76, 2013R81, 2014R50, 2014R11, 97R129, 2010R854, 2015R21, 2015R33, 83R23 and COC671 along with check of different maturity groups were evaluated on the basis of the resistance and susceptible reaction of the clones in natural field condition with single series design. Two rows of six meter length were planted during the month of February using sugarcane clones of different maturity groups (early and mid-late) for evaluating against Pokkah boeng disease under natural field conditions. Recommended package of practices were followed to raise the crop [6]. Observations for disease development on the individual clone were taken to know their response to pathogen. For statistical analysis, windostat version 9.2 software package was used. It is required to

maintain at least 20 clumps in each clone/genotype before arriving at the percentage of infection. The presence or absence of disease in field was identified on the basis of symptoms from June to October as;

Mild - Green plants with curling/ twisting of spindle leaves, tearing of leaves, whitish/chlorotic streaks on the leaves at varying intensities.

Moderate - Yellowing of 3<sup>rd</sup>/ 4<sup>th</sup> leaf followed by complete yellowing of foliage and expression of top rot symptom.

Severe - Yellowing of leaves + discolouration (light coloured) of stalks + wilting symptom in opened stalks).

The Per cent Disease incidence was calculated by using the following formulae:

Per cent Disease incidence = No. of diseased clumps / Total no. of clumps x 100 [7].

### Disease reaction

Scale per cent	Rating
0 - 5	Resistant
> 5 - 10	Moderately susceptible
>10 - 20	Susceptible
> 20	Highly susceptible

## 3. RESULTS AND DISCUSSION

Out of ten clones three clones viz., 2014R11, 2010R854 and 83R23 showed resistant reaction. The clone 97R129 has recorded moderately resistant reaction with 10 per cent infection. Four clones viz., 2013R76, 2013R81, 2015R33 and COC671 showed susceptible reaction with 10.1 to 20 per cent infection. Two clones viz., 2014R50 and 2015R21 have recorded highly susceptible reaction with >20 per cent infection (Table 1). The clones which showed resistant reaction against Pokkahboeng disease may be used as a source of resistance for further breeding programmes to develop resistant varieties. Wang et al. [8] also evaluated several varieties which showed resistant and moderately resistant reaction against the disease. Pokkahboeng disease symptoms occurs in three

phases/ types; chlorotic phase (I & II), acute phase or top-rot phase [9]. and knife-cut phase (associate with top rot phase) [10]. In the present study, chlorotic phase of pokkahboeng was

noticed during 2<sup>nd</sup> fortnight of June initiated by appearance of chlorotic yellow leaves. In some clones wrinkling, twisting and shortening of leaves were also recorded.

**Table 1. Evaluation of promising sugarcane clones against pokkahboeng disease**

S.No	Entry	Mean	Disease Reaction
1	2013 R 76	17.5 (24.66)	Susceptible
2	2013 R 81	20.0 (26.55)	Susceptible
3	2014 R 50	27.5 (31.59)	Highly susceptible
4	2014 R 11	0.0 (0.00)	Resistant
5	97 R 129	10.0 (17.84)	Moderately susceptible
6	2010 R 854	0.0 (0.00)	Resistant
7	2015 R 21	25.0 (29.87)	Highly susceptible
8	2015 R 33	20.0 (26.55)	Susceptible
9	COC 671	20.0 (26.38)	Susceptible
10	83 R 23	0.0 (0.00)	Resistant
	C.D	7.45	
	SE(m)	2.33	
	SE(d)	3.30	
	C.V.	17.99	



**Fig. 1. Chlorotic phase of pokkah boeng disease**



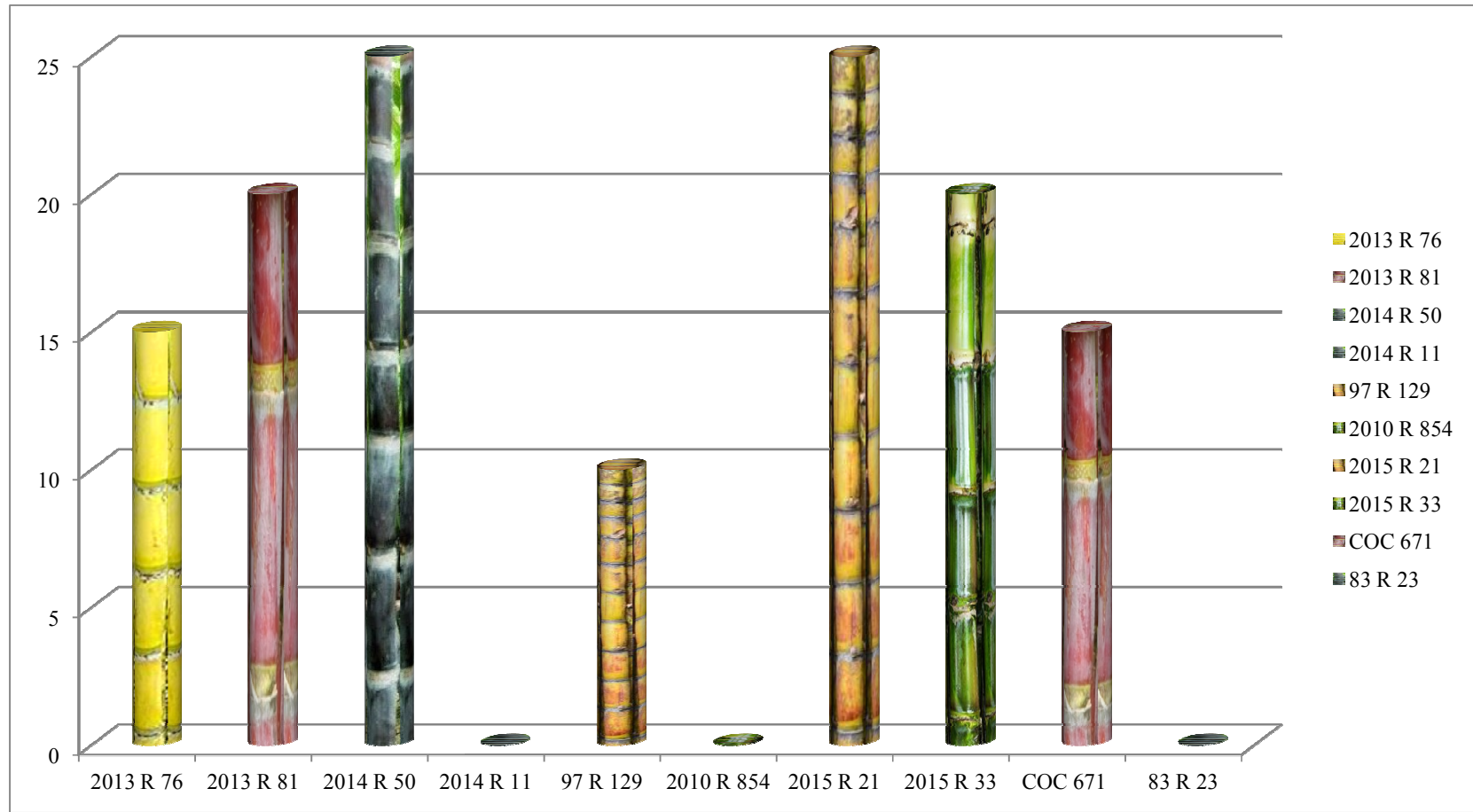
**Fig. 2. Wrinkling and twisting of leaves due to pokkah boeng disease**



**Figs. 3 & 4. 2014R50 and 2015R11 recorded highly susceptible reaction**



**Figs. 5 & 6. 2013R76 and 2015R33 recorded susceptible reaction**



**Fig. 7. Graphical representation of per cent infection of sugarcane clones against pokkahboeng disease**

#### 4. CONCLUSION

Among the ten promising sugarcane clones evaluated in plant cane against Pokkah boeng disease three clones viz., 2014R11, 2010R854 and 83R23 showed resistant reaction. The resistant lines can be used as donors in future breeding programmes.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Mehareb EM, Osman MAM, Fahmy AM. Screening sugarcane genotypes for the lesser sugarcane borer, *Chilo gamemnobels*, and four main diseases resistance in Egypt. *Egypt Journal of Plant Breeding*. 2018;22(4):659–683.
2. Rao GP, Singh M, Singh HN. Alternative host of sugarcane diseases. *Sugarcane*. 1990;8-26.
3. Goswami D, Handique PJ, Deka S. Rhamnolipid bio surfactant against *Fusarium sacchari* the causal organism of Pokkah boeng disease of sugarcane. *Journal of Basic Microbiology*. 2013;54(6): 1-10.
4. Karupaiyan R, Bakshi R, Ramdiya S, Masawwar A, Meena MR. The incidence of Pokkah boeng in indigenous and exotic sugarcane (*Saccharum officinarum*) clones. *Indian Journal of Agricultural Science*. 2015;85(4):596-601.
5. Duttamajumder SK. Bacterial diseases of sugarcane in India: A bird's eye view. In: *Sugarcane pathology: bacterial and nematodes diseases*, Rao, G.P., Sauntally, A. S., Rott, P. (eds.). Science Publishers. 2004;15-50.
6. Anonymous. Package of Practices for Crops of Punjab - Kharif. Punjab Agricultural University, Ludhiana. 2018;55-71.
7. Anonymous. Technical programme: Plant Pathology. All India Coordinated Research Project on Sugarcane, IISR, Lucknow. 2017;10-11.
8. Wang ZP, Sun HJ, Guo Q, Xu SQ, Wang JH, Lin SH. Artificial inoculation method of pokkah boeng disease of sugarcane and screening of resistant germplasm resources in subtropical china. *Sugar Technology*. 2017;19(3):283–292.
9. Patil AS, Hapase D. Studies on pokkah boeng disease in Maharashtra. *Indian Phytopathology*. 1987;40:290.
10. Patil AS. Studies on pokkah boeng and pine apple disease of sugarcane in Maharashtra with their economic losses in yield and quality of sugarcane. Final Project Report, ICAR, VSI, Pune. 1995;1-570.

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Peer-review history:

The peer review history for this paper can be accessed here:  
<http://www.sdiarticle4.com/review-history/58062>