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Screening of Early Maturing Varieties of Sugarcane (*Saccharum officinarum* L.) Against Different Borer Pests

Kumbhar C. R.*, A. K. Rai and Ingle D. S.

Division of Entomology, Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur) 848125

*Corresponding Author E-mail: ckagrico@gmail.com

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ABSTRACT

In the present study the seven early maturing varieties of sugarcane viz., CoP 08436, BO 153, BO 130, CoSe 09452, CoSe 95422, UP 09453 and CoSe 09451 were screened against early shoot borer (Chilo infuscatellus), root borer (Emmalocera depressella), top borer (Scirpophaga nivella), plassey borer (Chilo tumidicostalis) and pink borer (Sesamia inferens) at Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur (formerly Rajendra Agricultura University). Bihar during 2012-13 and 2013-14 in each year. The varieties were planted in RBD design with four replications. The experimental results showed that, the minimum (12.35%) and maximum (19.55%) infestation of dead hearts of early shoot borer in crop plant voracities CoSe 95422 and CoSe 09451, respectively while minimum (2.25% and 14.85%) and maximum (6.45% and 20.64%) infestation of root borer and top borer were recorded in different varieties, CoP 08436 and CoSe 09451 respectively. Plassey borer infestation was found minimum (1.18%) and maximum (7.26%) found in varieties UP 09453 and CoSe 09451, respectively while pink borer was observed infestation minimum (1.31%) and maximum (5.82%) found in varieties CoP 08436 and CoSe 09451 respectively in both cropping seasons.

Key words: *Sugarcane, Screening, Borer Pests.*

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the important cash crops grown in all tropical and subtropical countries of world and it is the world's most efficient living collector of solar energy, storing this energy in a huge quantity of biomass in the form of fiber and fermentable sugars. This crop is of great importance in general economy of many of the tropical developing countries. India occupies an important position among the sugarcane producing countries and has a neck to neck race with Brazil for the first position. It also forms essential item for industries like sugar, chip board, paper, confectionery, uses in chemicals, plastics, paints, synthetics, fiber, insecticides and detergents[8]. In India, it was cultivated on an about 5.06 m/ha along with production and productivity were 350 mt and 69.17 t/ha (Anonymous, 2015). The poor yield of sugarcane is attributed to different problems *i.e.* the attack of pests and diseases, inadequate irrigation facilities,

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Short supply of manures and fertilizers, lack of high yielding varieties, resistant varieties, lack of knowledge of the actual time of incidence of pests and multi-ratooning. Mohyuddin *et al.*[9] stated that sugarcane borers are hidden pests, therefore the approach of pesticides and limited use of biological agents were found less effective. Borers' resistant varieties provide the additional control needed in the IPM program[3]. Recorded 32 insect pests as major pests of sugarcane crop. Keerio tested different varieties of sugarcane against borers and reported that variety (Thatta-10) was infested significantly more than Q-88 or BL-4 varieties. Jan *et al.*[5] tested 16 promising varieties of sugarcane eight each of early and mid maturing groups against different stem borer i.*e*. gurdaspur and root borers at Sugar Crops Research Institute, Mardan. They reported that varieties S.82.US.631, CP.65/357 and CP.72/356 in early maturing group while CPF.145 and S.82.US.630 among mid maturing group had a lowest infestation of borers compared other varieties. The top borer, *Scirpophaga excerptalis* is a major pest in north India, especially in the states of Bihar, Uttar Pradesh, Haryana, and Punjab. Pandya *et al.*[10,] estimated the losses caused by this borer were 25.24, 22.8 and 96.32 per cent in terms of cane weight, length and sugar recovery respectively. Taking the above view into consideration, the present investigation of screening of better varieties in the context of borers pests scenarios.

MATERIAL AND METHODS

Seven early maturing varieties namely Cop 08436, BO 153, BO 130, CoSe 09452, CoSe 95422, UP 09453 and CoSe 09451 were planted in randomized block design during crop season 2012-13 and 2013-14 at Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur (formerly Rajendra Agricultura University). The planting materials were taken from the breeder of Sugarcane Research Institute, Pusa. There were altogether seven entries of different varieties including check. These varieties were planted with four replications. Each plot measures 10×5.4 m^2 having eight rows of 90 cm apart with the spacing of 1 m between and 0.5 m treatments. All standard agronomical practices were done during the cropping seasons to raise the crop. No any plant protection measures were adopted in experimental plots. The observation and counting of injury were done on the basis of symptoms appeared by all borers continuously from March to till maturity of the crop. The screening assessment was done by counting the injury symtom and its percentage. Among the several insect pests infesting sugarcane, borers continued to be an important group. In this group, root borer, shoot borer, top borer, stalk borer and plassey borer are very much destructive and cause a great loss in cane yield, and in sugar recovery in Bihar. Taking into consideration, the importance of borer pests in sugarcane cultivation and their screening against different varieties in north Bihar conditions the present investigation was undertaken.

RESULTS AND DISCUSSION

Statistically analyzed data presented in the table revealed that per cent infestation of early shoot borer, root borer, top borer, Plassey borer and pink borer and their pulled mean differ significantly. Minimum infestation of early shoot borer was recorded in the variety CoSe 95422 (12.35%) than the check (12.75%). The variety, CoP 08436 (13.10%) infestation was found at par with the check. But rest of the varieties *viz.,* CoSe 09452(16.45%), UP 09453 (17.65%), BO 153 (18.31%), and CoSe 09451(19.55%) (Table 1 & Fig. 1) showed significantly lower the check. A number of workers conducted screening study of sugarcane varieties/ germplasms against early shoot borer at different place. Among them, the recent works were of Kumar *et al.*[7], Singh *et al.*[12], Bhoopathi and Karnataka[2] and Choudhary and Jaipal[4]. They had rated their varieties as resistant, moderately resistant, susceptible and highly susceptible and also as tolerant, moderately tolerant and susceptible. Among the early maturing varieties the infestation

performance could be recorded as increasing trend of infestation i.e. CoSe 95422> BO 130 (check) > CoP 08436> CoSe 09452> UP 09453 > BO 153> and > CoSe 09451against early shoot borer. The infestation of root borer was lowest (2.25%) in variety CoP 08436 followed by 3.35, 4.15, 4.60, 4.65, 5.65 and 6.45 % infestation in CoSe 95422, BO 130, CoSe 09452, UP 094523, BO 153 and CoSe 09451 respectively. Highest infestation (6.45%) was recorded in germplasm CoSe 09451 among all screened varieties. Least infestation was found in Variety CoSe 95422 (3.35%) than the check BO 130 (4.15%) and while other varieties CoSe 09452 and BO 153 were found at par with the check (Table 1 & fig.1). The other varieties UP 09453 and CoSe 09451were found significantly inferior than the check. Some of the recent workers of screening different germplasms and varieties against root borer were rated their results as moderately resistant to highly susceptible or moderately tolerant to highly susceptible[12].

Among the early maturing varieties the performance against root borer could be recorded as increasing trend of infestation *i.e*. CoP 08436> CoSe 95422> BO 130 (check) > CoSe 09452 > UP 09453> BO 153 and CoSe 09451.The screening results plooed in table 1 that the top borer infestation were significantly lowest (14.85 %) infestation in the variety CoP 08436 while variety CoSe 09452 (17.35%) found at par than the check BO 130 (17.05%) but significantly higher infestation 18.22 and 18.3 % in the varieties BO 153 and CoSe 95422 respectively. The varieties, UP 09453 (19.25%) and CoSe 09451(20.64%) infestation were found significantly inferior than the check (Table 1 & fig.1). The recent findings reported by Bhatti *et al*.[1], Sharma *et al.*[11] and Kazi *et al*.[6] revealed that infestation at different levels caused due to top borer in the screening trials. They categorized their screened materials as moderately resistant to moderately susceptible or resistant to less resistant. In these early maturing varieties the performance of top borer infestation could be described as increasing trend i.e. CoP 08436> BO 130 (check)> CoSe 09452> BO 153 > CoSe 95422> UP 09453 and >CoSe 09451.

Minimum infestation of plassey borer ware recorded in the varieties UP 09453 (1.80%) and BO 153 (2.55%) than the check BO 130 (2.95%). The varieties CoSe 95422 (4.16%) and CoP 08436 (4.55%) infestation was found at par with the check. But rest of the varieties *viz*., CoSe 09452(6.35%) and CoSe 09451(7.26%) infestation were found significantly lower than the check while the least infestation of pink borer ware recorded in the varieties CoP 08436 (1.31%) and BO 153 (1.85%) than the check BO 130 (2.15%). The varieties CoSe 95422 (2.43%) and CoSe 09452 (3.57%) infestation was found at par with the check. But rest of the varieties *viz*., UP 09453 (4.91%) and CoSe 09451(5.82%) infestation were found significantly lower then the check (Table 1 & fig.1). It was revealed in Table 1 that the plassey and pink borer infestation was found as sporadic which caused very less degree of infestation. This could be happened due to unfavorable weather conditions preraled during the experimentation.

Table 1: Screening of Early maturing sugarcane varieties against different borer pests during 2012-13 and 2013-14

Varieties	Borer Pests																	
	Early shoot borer			Root borer			Top borer						Plassey borer			Pink borer		
	Dead hearts infestation (%)			Dead hearts infestation (%)			Dead hearts infestation (%)			Bunchy top (%)			Plant infestation (%)			Plant infestation (%)		
	2012-2013	2013-2014	Pooled	2012-2013	2013-2014	Pooled	2012-2013	2013-2014	Pooled	2012-2013	2013-2014	Pooled	2012-2013	2013-2014	Pooled	2012-2013	2013-2014	Pooled
CoP 08436	13.06	13.16	13.10	2.16	2.37	**2.25**	14.17	15.44	**14.85**	6.53	7.34	6.93	4.87	4.26	4.55	1.10	1.53	**1.31**
BO 153	18.46	18.16	18.31	4.76	4.77	4.65	18.5	17.94	18.22	8.20	6.37	7.28	2.5	2.53	2.55	1.71	1.90	1.85
BO 130	12.53	13.00	**12.75**	4.05	4.3	4.15	17.16	16.93	17.05	6.87	8.57	7.72	2.53	2.06	2.95	2.10	2.27	2.15
CoSe 09452	16.4	16.57	16.45	4.54	4.66	4.60	17.96	16.67	17.35	9.17	8.67	8.92	6.34	6.36	6.35	3.67	3.47	3.57
CoSe 95422	12.13	12.64	**12.35**	3.27	3.34	3.35	18.47	18.14	18.35	6.60	5.77	**6.18**	4.23	4.10	4.16	2.30	2.56	2.43
UP 09453	17.30	18.00	17.65	5.44	5.93	5.65	19.57	18.93	19.25	9.70	8.80	9.25	1.80	1.80	**1.80**	4.86	4.96	4.91
CoSe 09451	19.40	19.7	**19.55**	6.37	6.44	**6.45**	20.34	20.94	**20.64**	11.50	9.34	**10.42**	7.07	7.46	**7.26**	5.8	5.84	**5.82**
CD at 5 %	0.58	0.85	**0.715**	0.67	1.08	**0.85**	1.36	1.72	**1.54**	0.95	0.9	**0.92**	0.92	0.61	**0.76**	0.87	0.57	**0.72**
SE±(mean)	0.25	0.27	**0.26**	0.22	0.34	**0.28**	0.45	0.56	**0.55**	0.33	0.28	**0.30**	0.29	0.19	**0.24**	0.28	0.18	**0.23**
CV (%)	1.97	2.94	**2.45**	8.15	13.23	**10.69**	4.28	5.35	**4.85**	6.28	6.38	**6.33**	12.24	8.4	**10.32**	15.77	9.92	**12.85**

Plant Infestation –Damaged plants (Plassey borer and Pink borer)

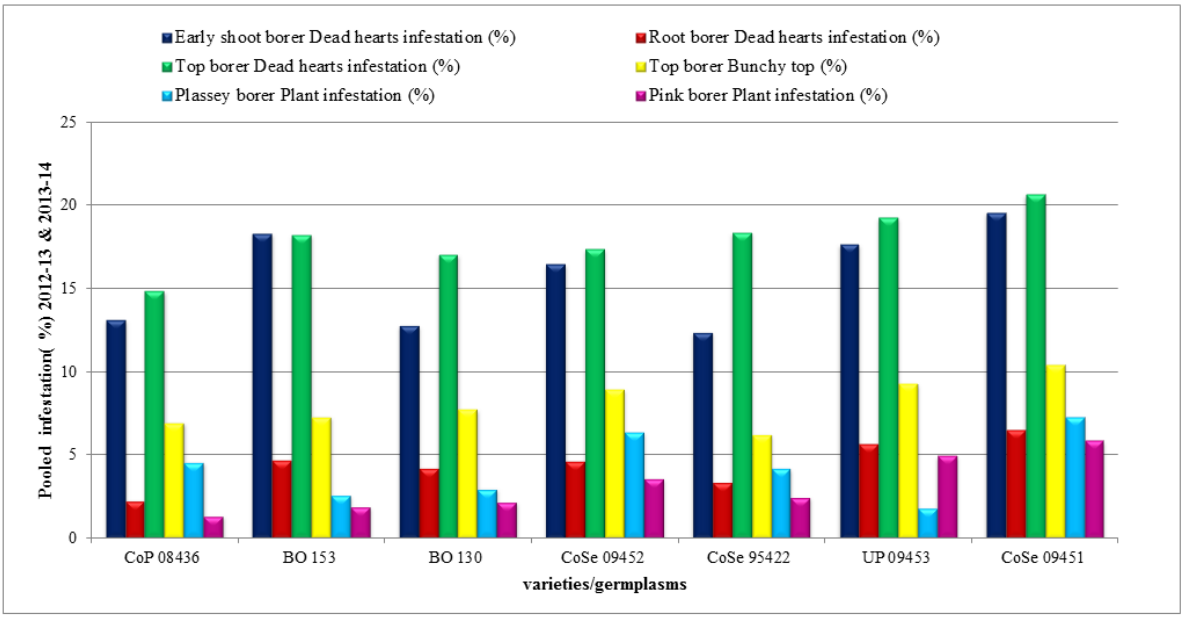

Fig. 1: Different borer infestation of early maturing varieties/germplasms during 2011-12 and 2013-14

CONCLUSION

The overall performance of the variety CoSe 95422 against all the borers infestation was found least affected by the early shoot and root borer. Among all early maturing germplasms, CoSe 08436 was found least affected by the major borers the area, *viz*., early shoot and root and top borers. But germplasm, CoSe 09451was found most vulnerable to all borers while varieties, UP 09453 and BO 153 ware also found vulnerable to early shoot borer and top borer and root borers.

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