

SCREENING OF CASTOR CULTIVARS AGAINST CAPSULE BORER, *Dichocrocis punctiferalis* GUENEE

PATEL, R. D., BORAD*, P. K. AND JILU, V. S.

DEPARTMENT OF AGRICULTURAL ENTOMOLOGY
B. A. COLLEGE OF AGRICULTURE, ANAND AGRICULTURAL UNIVERSITY
ANAND - 388 110, GUJARAT, INDIA

*E-mail: pkb5458@yahoo.com

ABSTRACT

An experiment to screen 10 different castor cultivars against *Dichocrocis punctiferalis* was conducted during *kharif* season of 2011-12. On the basis of capsule damage at reproductive phase, GCH 2 (6.03%), GAUC 1 (7.08%), GCH 7 (9.16%), GC 3 (10.25%) and GCH 5 (11.00%) categorized into group of resistant, while GCH 6 (14.63%), GC 2 (15.85%) and ANDCI 8 (16.57%) were grouped into less susceptible categories. GAUCH 1 (20.43%) and GCH 4 (22.29%) were categorized into moderately susceptible group. Similarly, on the basis of damaged capsules at harvest, cultivars GCH 2 (8.55%), GAUC 1 (8.88%), GCH 7 (13.22%), GC 3 (16.65%), GCH 5 (17.32 %) and GCH 6 (18.59%) were categorized into resistant. GC 2 and ANDCI 8 recorded capsule damage of 21.22 per cent and 22.55 per cent, respectively were grouped into less susceptible. GAUCH 1 (27.97 %) and ANDCI 8 (22.55 %) were grouped into moderately susceptible. None of the cultivar characterized in to highly susceptible group on the basis of capsule damage at reproductive stage and at harvesting stage. Significantly highest (2943.41 kg/ha) seed yield of castor was registered in GCH 7 than all the tested cultivars. GCH 5 (2579.47 kg/ha) was the next best cultivar recorded significantly higher seed yield than rest of cultivars.

KEY WORDS: Castor, capsule borer, *Dichocrocis punctiferalis*

INTRODUCTION

Castor (*Ricinus communis* L.) belongs to family Euphorbiaceae, is one of the most important and valuable non-edible oilseed crop. India contributes 65 per cent of the world's production and ranks first (Anon., 2010a). Gujarat is the largest castor growing state, where the area under castor was 4.25 lac hectare with production of 7.79 lakh tonnes and productivity of 1833 kg/ha (Anon., 2010b). This important crop attacked more than 63 species of insect and mite pests (Rai, 1976). Kapadia (1996) reported that seed damage in infested capsules and weight loss of damaged seeds was 42.3 and 63.0 per cent, respectively in GCH 4 hybrid due to capsule borer. *Dichocrocis punctiferalis* is a serious pest of castor from reproductive stage. The newly hatched larvae fed on greenish coat of the capsule and enter the capsule. Considering the importance and economics of the pest, an experiment was carried out at Departmet of Agricultural Entomology,

B. A. College of Agriculture, Anand Agricultural University, Anand to screen the cultivars of castor against this important pest.

MATERIALS AND METHODS

Field experiment was conducted during *kharif* season of 2011-12 in a Randomized Block Design with three replications. Ten different castor cultivars were sown with a spacing of 120 cm between two rows and 60 cm within the rows in an plot area of 4.2 x 2.4 m during first fortnight of August, 2011. The experiment was kept free from any insecticidal application. For recording observations, five plants were selected randomly from each plot. At reproductive phase, a total and infected capsule was counted from three branches of each randomly selected plant at weekly interval. The capsule damaged by *D. punctiferalis* was recorded by counting the total and damaged capsules from randomly collected 50 capsules at the time of harvest. The seed yield was recorded at harvest from each net plot area. For characterizing evaluated castor cultivars into resistance (R), less susceptible (LS), moderately susceptible (MS) and highly susceptible (HS) to *D. punctiferalis*, mean value of individual cultivars ($\bar{x}$) was compared with capsule borer incidence data of all cultivars ($\bar{x}$) and standard deviation (SD) following the scale adopted by Patel *et al.* (2002).

RESULTS AND DISCUSSION

Capsule damage

The results of capsule damage at reproductive stage revealed that out of ten cultivars screened, significantly least (6.03%) capsule damage was caused by *D. punctiferalis* on GCH 2 than all the cultivars (Table 1). The castor capsule was damaged 7.08 per cent in GAUC 1 and proved significantly superior to the rest of the cultivars. GCH 7, GC 3 and GCH 5 registered capsule damage between 9.16 per cent and 11.00 per cent and they were significantly less damaged than remaining cultivars. Cultivars GCH 6 and GC 2 noted 14.63 per cent and 15.85 per cent capsule damage, respectively. ANDCI 8 (16.57 %) was found equally susceptible to GC 2. GCH 4 was found highly (22.29%) susceptible against *D. punctiferalis* followed by GAUCH 1 (20.43 %) and ANDCI 8 (16.57 %).

The results of capsule damage at harvest evident that cultivar GCH 2 had minimum (8.55 %) damaged capsules and it was at par with GAUC 1 (8.88%) (Table 1). Cultivars GCH 7 (13.22 %), GC 3 (16.65 %) and GCH 5 (17.32 %) were statistically at par with respect to capsule damage due to *D. punctiferalis* at harvest. The capsule damage was noticed by 18.59 per cent, 21.22 per cent and 22.55 per cent in GCH 6, GC 2 and ANDCI 8, respectively and they were at par with each other. GCH 4 (33.90%) was found highly susceptible against *D. punctiferalis* followed by GAUCH 1 (27.97 %) and ANDCI 8 (22.55 %).

Seed yield

Significantly highest (2943.41 kg/ha) seed yield of castor was registered in GCH 7 than all the tested cultivars (Table 1). GCH 5 (2579.47 kg/ha) was the next best cultivar recorded

significantly higher seed yield than rest of cultivars. GCH 6 and GC 3 produced seed yield of 2235.23 kg/ha and 2050.28 kg/ha, respectively. Castor seed yield harvested in between 1818.55 kg/ha and 1630.16 kg/ha by GCH 4, GC 2, ANDCI 8 and GCH 2 and they were at par with each other. The lowest yield was harvested from GAUCH 1 (1216.33 kg/ha) and it was at par with GAUC 1 (1302.87 kg/ha).

Categorization of cultivars

On the basis of capsule damage at reproductive phase, GCH 2 (6.03%), GAUC 1 (7.08%), GCH 7 (9.16%), GC 3 (10.25%) and GCH 5 (11.00%) categorized into group of resistant as the capsule damage was less than 13.33 per cent. GCH 6 (14.63%), GC 2 (15.85%) and ANDCI 8 (16.57%) were recorded capsule damage less than 18.85 and more than 13.33 per cent were grouped into less susceptible categories. GAUCH 1 (20.43%) and GCH 4 (22.29%) recorded capsule damage less than 24.36 and more than 18.85 per cent were categorized into moderately susceptible group. None of the cultivar categorized into highly susceptible group (Table 2).

On the basis of damaged capsules at harvest, cultivars GCH 2 (8.55%), GAUC 1 (8.88%), GCH 7 (13.22%), GC 3 (16.65%), GCH 5 (17.32 %) and GCH 6 (18.59%) were categorized into resistant, as capsule damage was less than 18.89 per cent (Table 2). Cultivars GC 2 and ANDCI 8 recorded capsule damage of 21.22 per cent and 22.55 per cent, respectively and hence, they were grouped into less susceptible. Cultivars GAUCH 1 (27.97 %) and ANDCI 8 (22.55 %) recorded capsule damage at harvest less than 34.85 and more than 26.87 per cent and they were grouped into moderately susceptible. None of the cultivar categorized into highly susceptible group.

The above results are in line with those reported by some earlier research workers. Patel *et al.* (1987a) proved the susceptibility of castor cv. GAUCH 1 (15.50%) against *D. punctiferalis*. Patel *et al.* (1987b) noted 19.4 per cent capsule damage by *D. punctiferalis* on GAUCH 1. Hegde *et al.* (2009) screened different castor genotypes/varieties against capsule borer and noticed that the GCH 4 was moderately susceptible to capsule damage (29.60%).

CONCLUSION

Based on capsule damage at reproductive phase, castor cultivars GCH 2, GAUC 1, GCH 7, GC 3 and GCH 5 found resistant against *D. punctiferalis*, while GCH 6, GC 2 and ANDCI 8 were found less susceptible and GAUCH 1 and GCH 4 were moderately susceptible. Based on per cent damage capsule at harvest, GCH 2, GAUC 1, GCH 7, GC 3, GCH 5 and GCH 6 found resistant, whereas GC 2 and ANDCI 8 found less susceptible and GAUCH 1 and GCH 4 were moderately susceptible. None of the cultivar characterized in to highly susceptible group on the basis of capsule damage at reproductive stage and at harvesting stage.

REFERENCES

- Anonymous (2010a). CRN India, Castor and its derivatives. (<http://www.crnindia.com/commodity/castor.html>).
- Anonymous (2010b). Annual progress report castor. AICRP on castor, Directorate of Oilseeds Research, Rajendranagar, Hyderabad.
- Hegde, J. N., Chakravarthy, A. K. and Ganigar, P. C. (2009). Screening castor germplasm against leafminer, *Liriomyza trifolii*, semilooper, *Achaea janata* and shoot and capsule borer, *Conogethes punctiferalis* in South Karnataka. *Curr. Biotica*, **3** (3) : 386-396.
- Kapadia, M. N. (1996). Estimation of losses due to pod borers in oilseed crops. *J. Oilseeds Res.*, **13** (1) : 139-140.
- Patel, I. S., Prajapati, B. G., Patel, G. M. and Pathak, A. R. (2002). Response of castor genotypes to castor semilooper, *Achaea janata* Fab. *J. Oilseed Res.*, **19** (1): 153.
- Patel, M. M., Naik, M. M., Fatteh, U. G. and Vyas, H. N. (1987a). Comparative susceptibility of some released and promising cultivars/germplasms against castor capsule borer. *Agric. Sci. Digest*, **7** (3) : 165-166.
- Patel, S. M., Salmon, S. C. and Ortman, G. K. (1987b). Varietal screening of castor genotypes to shoot and capsule borer. *J. Econ. Ent.*, **51** : 634-635.
- Rai, B. K. (1976). Pests of oilseed crops in India and their control. ICAR, New Delhi, pp. 47-69.

Table 1: Infestation of *D. punctiferalis* in castor cultivars and seed yield

Cultivars	Capsule Damage (%)		Seed Yield (kg/ha)
	*Reproductive Phase	At harvest	
GAUCH 1	26.87(20.43)	31.93(27.97)	1216.33
GCH 2	14.22(6.03)	17.00(8.55)	1630.16
GCH 4	28.17(22.29)	35.61(33.90)	1818.55
GCH 5	19.37(11.00)	24.59(17.32)	2579.47
GCH 6	22.49(14.63)	25.54(18.59)	2235.23
GAUC 1	15.43(7.08)	17.34(8.88)	1302.87
GC 2	23.46(15.85)	27.43(21.22)	1769.63
GC 3	18.67(10.25)	24.08(16.65)	2050.28
ANDCI 8	24.02(16.57)	28.35(22.55)	1709.33
GCH 7	17.62(9.16)	21.32(13.22)	2943.41
Mean	21.03(12.88)	25.32(18.29)	1952.49
ANOVA			
S.Em.± Cultivars (C)	0.41	1.12	114.71
Period (P)	0.40		
C x P	1.25		
C.D.at 5% Cultivars (C)	1.12	3.33	340.84
Period (P)	1.09		
C x P	3.47		
C. V. %	10.32	7.67	10.31

Figures in parentheses are retransformed values; those outside are arcsine transformed value

* Pooled over 24 periods

Table 2: Categorization of castor cultivars for their susceptibility to capsule borer, *D. punctiferalis*

Category of resistant	Scale	Cultivars $\bar{X}_i$	
Based on capsule damage (%) at reproductive phase: $\bar{X}$ = 13.33 and SD = 5.52			
Resistant	$\bar{X}_i < 13.33$	GCH-2	(6.03)
		GAUC-1	(7.08)
		GCH-7	(9.16)
		GC-3	(10.25)
		GCH-5	(11.00)
Less susceptible	$\bar{X}_i > 13.33 < 18.85$	GCH-6	(14.63)
		GC-2	(15.85)
		ANDCI-8	(16.57)
Moderately susceptible	$\bar{X}_i > 18.85 < 24.36$	GAUCH-1	(20.43)
		GCH-4	(22.29)
Highly susceptible	$\bar{X}_i > 24.36$	-	-
Based on capsule damage (%) at harvest : $\bar{X}$ = 18.89 and SD = 7.98			
Resistant	$\bar{X}_i < 18.89$	GCH-2	(8.55)
		GAUC-1	(8.88)
		GCH-7	(13.22)
		GC-3	(16.65)
		GCH-5	(17.32)
		GCH-6	(18.59)
Less susceptible	$\bar{X}_i > 18.89 < 26.87$	GC-2	(21.22)
		ANDCI-8	(22.55)
Moderately susceptible	$\bar{X}_i > 26.67 < 34.85$	GAUCH-1	(27.97)
		GCH-4	(33.90)
Highly susceptible	$\bar{X}_i > 34.85$	-	-

Figures in parentheses are per cent damage of the pest

[MS received: July 28, 2012]

[MS accepted: August 31, 2012]