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SCREENING OF CASTOR GERMPLASM AGAINST TOBACCO CATERPILLAR *SPODOPTERA LITURA* F AND CASTOR SEMILOOPER *ACHAEA JANATA* L

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ABSTRACT

Twenty three castor genotypes screened against two important pests viz., *Spodoptera litura* (F) and *Achaea janata* (L). The results revealed that none of the genotypes were resistant. Based on the defoliation scale nine genotypes viz., GC-3 (9.86% defoliation), ICS-164 (10.13%), DCH-519 (10.48%), YTP-1 (10.92%), DCS-107 (11.78%), DCS-8g (12.70%), DCS-9 (12.72%), 48-1 (13.63%) and GC-2 (14.33%) were categorised as tolerant to *S. litura* and *A. janata.* Three genotypes viz., Haritha (21.58%), SKI-215 (23.81%) and SKI-291 (24.07%) were categorised as moderately tolerant. In these genotypes, the minimum larval incidence range was 0.31 to 0.51 larvae plant^{-1} in case of *S. litura*, whereas the minimum larval incidence range was 0.49 to 0.64 larvae plant^{-1} in case of *A. janata.*

Key words: *Spodoptera litura, Achaea janata,* genotypes, GC-3, ICS-164, defoliation, defoliation scale, resistant, moderately resistant, minimum, larval incidence, larvae plant-1

Castor *Ricinus communis* (L) is mostly cultivated in the semi-arid and arid regions in India as a non-edible oilseed crop. Insect pests, particularly the lepidopteran defoliators play a major role in the yield losses of castor which contributes for 35-40% yield loss. Out of which, Tobacco caterpillar, *Spodoptera litura* (F) and Castor semilooper, *Achaea janata* (L) can cause complete defoliation leading to yield losses up to 80% (Sarma et al., 2006). The use of resistant/tolerant cultivars is the economic approach in IPM, during the long run. Incorporating resistant plant genotypes into an integrated pest management system reduces the frequency of insecticide applications, lowers plant protection costs, and conserves natural enemies while ensuring environmental safety. Hence, the present study is conducted to screen castor germplasm against *S. litura* and *A. janata.*

MATERIALS AND METHODS

The experiment was carried out at the dry land farm, S V Agricultural College, Tirupati during rabi, 2021-22 with twenty three genotypes laid out in a Randomized Block Design (RBD) with two replications. The size of the plots was 10 m x 5 m with inter-row spacing of 90 cm and intra-row spacing of 45 cm. All the recommended package of practices of ANGRAU were followed to maintain good plant stand, except for management of pests. The twenty three castor genotypes tested against *S. litura* and *A. janata* are viz., YTP-1, ICS-164, SH-72,VI-9, GC-3, GC-2, 48-1, DCS-107, DCS-94, DCS-8g, DCS-78, DCS-9, JI-449, JI-35, SKI-423, SKI-404, SKI-336, SKI-291, SKI-215, DCH-519, TCH-66, Pragathi (Check), Haritha (Check).

From each plot, five plants were selected and tagged at random to observe the incidence of *S. litura* and *A. janata* starting from 30 days after sowing (DAS) at 15 days interval during entire crop growth period. To study the varietal susceptibility or resistance to tobacco caterpillar and castor semilooper the larval counts were made on selected five plants of each line. The data on total number of leaves and defoliated leaves were recorded. Significant differences in mean larval population of defoliators were calculated among the different genotypes later the defoliation was converted into percentage. The genotypes was categorized based on the scoring scale given by Hegde and Chakravarthy (2009). The data regarding larval incidence was subjected to square root transformations and the data regarding % defoliation subjected to arc sine transformations and ANOVA prescribed for randomized block design carried out with SPSS statistical package (SPSS, 2020).

RESULTS AND DISCUSSION

The data on mean larval population of *S. litura* and *A. janata* on different castor genotypes indicated that none of the tested genotypes of castor were free from attack of pests. The minimum larval incidence of *S. litura* was observed in the genotypes viz., DCS-107 (0.31 larvae plant^{-1}), GC-2 (0.34 larvae plant^{-1}) and DCH-519 (0.36 larvae plant^{-1}). The maximum larval incidence was observed in the genotype VI-9 which has recorded 2.23 larvae plant^{-1} (Table 1). The minimum larval incidence of *A. janata* was observed in the genotypes viz., DCS-107 (0.49 larvae plant^{-1}), GC-3 (0.53 larvae plant^{-1}), SKI-291 (0.53 larvae plant^{-1}), DCS-9 (0.55 larvae plant^{-1}) and DCH-519 (0.56 larvae plant^{-1}). The maximum larval incidence was observed in the genotypes VI-9 (2.45 larvae plant^{-1}), SKI-423 (2.30 larvae plant^{-1}), SH-72 (2.18 larvae plant^{-1}), TCH-66 (2.17 larvae plant^{-1}), SKI-404 (2.13 larvae plant^{-1}) and JI-35 (2.00 larvae plant^{-1}) (Table 1). The genotypes were grouped into different categories based on the per cent defoliation scoring scale as given by Hegde and Chakravarthy, (2009). Nine genotypes viz., Chakravarthy GC-3 (9.86% defoliation), ICS-164 (10.13%), DCH-519 (10.48%), YTP-1 (10.92%), DCS-107 (11.78%), DCS-8g (12.70%), DCS-9 (12.72%) 48-1 (13.63%) and GC-2 (14.33%) were categorised as tolerant. Three genotypes viz., Haritha (21.58%), SKI-215 (23.81%) and SKI-291 (24.07%) were categorised as moderately tolerant (Table 1).

The results are in confirmity with the findings of Puneet et al. (2020) who concluded that the minimum mean larval population was observed in the genotype DCH 519 (2.44 larvae/ plant). Manjunatha et al. (2018) reported genotype 48-1 as a tolerant genotype

Table 1. Castor genotypes and incidence of *S. litura* and *A. janata* (rabi 2021-22)

Genotypes	*S. litura* (larvae plant^{-1})	*A. janata* (larvae plant^{-1})	% defoliation plant^{-1}	Grade
YTP-1	0.46 (1.68)^{ab}	0.60 (1.77)^{ab}	10.92(20.30)	Tolerant
ICS-164	0.59 (1.77)^{ab}	0.64 (1.79)^{ab}	10.13(19.56)	Tolerant
SH-72	1.97 (2.40)^{ef}	2.18 (2.47)^{e}	43.60(42.32)	Susceptible
VI-9	2.23 (2.49)^{g}	2.45 (2.57)^{ef}	46.25(43.85)	Susceptible
GC-3	0.51 (1.72)^{ab}	0.53 (1.73)^{a}	9.86(19.30)	Tolerant
GC-2	0.34 (1.58)^{a}	0.63 (1.80)^{ab}	14.33(23.24)	Tolerant
48-1	0.42 (1.64)^{ab}	0.59 (1.76)^{ab}	13.63(22.67)	Tolerant
DCS-107	0.31 (1.56)^{a}	0.49 (1.70)^{a}	11.78(21.07)	Tolerant
DCS-94	1.24 (2.11)^{d}	1.17 (2.08)^{cd}	31.74(35.29)	Moderately susceptible
DCS-8g	0.65 (1.81)^{b}	0.59 (1.76)^{ab}	12.70(21.88)	Tolerant
DCS-78	0.93 (1.96)^{bc}	0.86 (1.92)^{c}	30.94(34.80)	Moderately susceptible
DCS-9	0.40 (1.63)^{ab}	0.55 (1.73)^{a}	12.72(21.89)	Tolerant
JI-449	0.88 (1.93)^{bc}	1.05 (2.01)^{c}	33.30(36.24)	Moderately susceptible
JI-35	1.31 (2.15)^{d}	2.00 (2.42)^{e}	41.10(40.87)	Susceptible
SKI-423	2.01 (2.42)^{ef}	2.30 (2.51)^{ef}	42.65(41.77)	Susceptible
SKI-404	1.98 (2.41)^{ef}	2.13 (2.46)^{e}	40.85(40.73)	Susceptible
SKI-336	0.92 (1.96)^{bc}	1.22 (2.10)^{cd}	33.78(36.54)	Moderately susceptible
SKI-291	0.39 (1.62)^{ab}	0.53 (1.72)^{a}	24.07(30.38)	Moderately tolerant
SKI-215	0.67 (1.82)^{b}	0.95 (1.79)^{c}	23.81(30.21)	Moderately tolerant
DCH-519	0.36 (1.60)^{a}	0.56 (1.74)^{a}	10.48(19.89)	Tolerant
TCH-66	1.93 (2.39)^{e}	2.17 (2.47)^{e}	40.26(40.38)	Susceptible
Pragathi (check)	1.20 (2.09)^{d}	1.03 (2.02)^{c}	32.00(35.45)	Moderately susceptible
Haritha (check)	0.75 (1.87)^{bc}	1.02 (2.01)^{c}	21.58(28.68)	Moderately tolerant
SEm±	0.12	0.11	2.34	
CD (P=0.05)	0.29	0.26	6.54	
CV%			9.72	

Figures in parentheses $\sqrt{X + 1}$ square root transformed values; CD (p=0.05) = Critical difference; SEm± = Standard error of mean; DAS=Days after sowing against semilooper and tobacco caterpillar with 5.00% and 7.80% defoliation respectively. Shilpakala and Krishna (2016) who reported that genotype 48-1 as a tolerant genotype against semilooper with a mean larval population of 1.09 larvae plant^{-1}. Infestation of defoliators was more in the genotypes with large sized leaves viz., VI-9, JI-35, SH-72, SKI-423 and SKI-423. The reason for more defoliation may be due to the availability of more feeding site for the larvae. Similar results were also recorded by Lakshminarayana (2005) who reported that castor genotypes with large sized leaves were preferred by *S. litura* when compared with the genotypes having small sized leaves. Thanki et al. (2001) reported that VI-9 and SH-72 were found susceptible against *S. litura* with mean larval population of 4.15 and 4.30 larvae plant^{-1}. Literature pertaining to the remaining entries against lepidopteran defoliators is unavailable.

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AUTHOR CONTRIBUTION STATEMENT

KB conducted the experiment and wrote the manuscript. CMSV designed the research. RP provided the seed material for conducting the experiment. LKP helped in statistical analysis of data. All the authors read and approved the manuscript.

CONFLICT OF INTEREST

No conflict of interest.

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