

Reaction of different finger millet [*Eleusine coracana* (L.) Gaertn.,] genotypes against earhead caterpillar incidence

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Received 28 Apr 2022; Accepted 21 Jun 2022; Published 13 Jul 2022

Abstract

The experiment was conducted during *kharif* 2018 at Zonal Agricultural Research Station, Vishweshwaraiah Canal Farm, Mandya (Karnataka), to study the response of different finger millet genotypes against incidence earhead caterpillars during dough stage of the crop. The experiment comprising three different dates of sowing *viz.*, 30th June, 2018, 17th of July, 2018 and 31st of July, 2018 with eight promising genotypes of finger millets *viz.*, Indaf-5 X IE2936, IE9500 X MR-6, L-5 X IE2924, Indaf-5 X IE2712, Indaf-5 X GE1409, L-5 X IE2656, PR202 X GE1409 and Udaru mallige.. The experiment was laid out in a randomized block design with three replications. The entries *viz.*, Indaf-5 X IE2936 (1.07 & 31.5%), Indaf-5 X GE1409 (1.32 & 31.1%), IE9500 X MR-6 (1.34 & 31.9%) and PR202 X GE1409 (1.60 & 51.9%) were recorded significantly lowest larval mean values and per cent of earhead caterpillar incidence compared to the susceptible check Udaru mallige (2.90 & 71.3 %), these varieties possess semi compact and compact type of earheads, The fingers loosely held each other, harboured fewer pest individuals and the entries *viz.*, L-5 X IE2924 (3.06 & 64.1%), Indaf-5 X IE2712 (3.21 & 71.1%) and L-5 X IE2656 (3.03 & 64.4%) were recorded significantly highest mean larval values and per cent of earhead caterpillar incidence and were on par with the susceptible check Udaru mallige (2.90 & 71.3%), these entries possess fist type of earheads and the larval mean values and per cent of earhead caterpillar incidence was in increasing trend from early *kharif* to mid *kharif* to late *kharif*, it was found that highest incidence earhead caterpillar was noticed at later dates of sowing of the crop.

Keywords: Finger millet, *Eleusine coracana*, seasonal incidence and earhead caterpillars

Introduction

Finger millet (*Eleusine coracana* L. Gaertn.) is a major food crop of the semiarid tropics of Asia and Africa and has been an indispensable component of dry farming system. It has wide range of seasonal adaptation and is grown in varying soil and temperature condition. It can be grown throughout the year if the moisture is adequate and the temperatures are above 15 °C. It has adapted to conditions prevailing from sea level to an altitude of 3000 m. Finger millet is commonly known as 'Ragi' is one of the important food crops and largely grown in Southern States of India. In Karnataka, finger millet occupy an area of 1.02 million hectare with a production of 1.875 million tonnes, accounting for 53.95 per cent area and 44.94 per cent production and its cultivation is concentrated mostly in the districts of Bangalore, Kolar, Tumkur, Chitradurga, Hassan, Mysore, Mandya and Chamaraajanagara. The decrease in yields of finger millet have been attributed to number of biotic and abiotic factors, among them, insects are becoming major constraints in production of finger millet. The crop is being attacked by over 57 insect species (Sharma and Davies 1988) ^[1], of which shoot fly (*Atherigona miliaceae* Malloch), stem borer (*Sesamia inferens* Wlk.), flea beetle (*Chaetocnema* sp), Oriental armyworm (*Mythimna separata* Walk.), red headed hairy caterpillar (*Amsacta albistriga* Walk.), Bihar hairy caterpillar (*Spilarctia obliqua* Walk.), aphids, *Hysteronura setariae*, ragi root aphid, *Tetraneura nigriabdominalis* and

head caterpillars *viz.*, *Cryptoblabes* sp., *Helicoverpa armigera* (Hub.), *Eublemma silicula* (Walk.), and *Sitotroga cerealella* (Oliv.) are the most important. Among various insect pests, the earhead caterpillars are posing threat to finger millet production, especially southern parts of India (Krishnamurthi and Usman, 1952) ^[2] and recorded huge number of earhead caterpillar on finger millet earheads (Chikkarugi and Vijaykumar, 2022) ^[3]. In southern parts of Karnataka, the farmers are facing severe problem of finger millet earhead caterpillars since from decades (Chikkarugi *et al.*, 2021) ^[4] especially in both *kharif* and *rabi* seasons regularly. Keeping this in view, the present studies were carried out at Zonal Agricultural Research Station, V. C. Farm, Mandya.

Material and Methods

The present study was based on response/reaction of different finger millet pre-released genotypes against earhead caterpillars. The genotypes were *viz.*, Indaf-5 x IE2936, IE9500 x MR-6, L-5 x IE2924, Indaf-5 x IE2712, Indaf-5 x GE1409, L-5 x IE2656, PR202 x GE1409 and Udaru Mallige (check). The experiment was carried out during early, mid & late *Kharif* season of 2018 at Zonal Agricultural Research Station, Vishweshwaraiah Canal Farm, Mandya (Karnataka) in a randomized block design (RBD) with three replications under irrigated situations with spacing of 22.5 X 10 cm, between rows and plants, respectively. For each replication, a plot size of 3.0

X 3.0 m was maintained. To study the reaction of different finger millet genotypes against incidence of earhead caterpillars in different dates of sowing and the observation on morphological traits viz., earhead shape and color were recorded in selected genotypes of finger millet with larval mean values and per cent of earhead caterpillar incidence. The observations were recorded during dough stage of the crop. The shape of earhead was observed at dough stage of the crop and color of the earhead was recorded by visual observation in eight selected genotypes with check variety Udaru Mallige. The observation on mean larval value were worked out by selecting five randomly selected plants and square root transformed, counted number of larvae per earhead and the mean were calculated and per cent of earhead was observed on thirty randomly selected earheads and taken the number of earheads infested by caterpillars, per cent of earhead was calculated and pooled data were subjected to statistical analysis (Gomez and Gomez, 1984)^[5] and values are arcsin transformed.

Results and Discussion

Among the eight genotypes screened against earhead caterpillar incidence at different dates of sowing during *kharif* season. The study revealed that, during early dates of sowing significantly lowest larval mean values and per cent of earhead caterpillar incidence were recorded on entries viz., Indaf-5 X IE2936 (0.79 & 27.8 %), Indaf-5 X GE1409 (0.93 & 26.7 %), IE9500 X MR-6 (0.97 & 26.7 %) and PR202 X GE1409 (1.23 & 44.4%) as compared to the check variety Udaru mallige (2.73 & 68.9 %) (Table 1). The entries viz., L-5 X IE2924 (2.40 & 58.9%), I-5 X IE2712 (2.70 & 66.7%) and L-5 X IE2656 (2.45 & 61.1%) were recorded higher mean larval values and per cent of earhead caterpillar incidence and were on par with the susceptible check Udaru mallige (2.73 & 68.9%) (Table 1). Similar trend was noticed with respect to mid and late *kharif* seasons of sowing during dough stage of the crop with respect to larval mean values and per cent of earhead caterpillar incidence, during mid *kharif* sowing, the entries viz., Indaf-5 X IE2936 (1.04 & 32.2%), Indaf-5 X GE1409 (1.21 & 31.1%) and IE9500 X MR-6 (1.37 & 31.1%) were recorded significantly lower level of larval mean values and per cent of earhead caterpillar incidence compare to the susceptible check variety Udaru mallige (2.87 & 71.6%) followed by PR202 X GE1409 (1.47 & 53.3%). The entries viz., L-5 X IE2924 (3.08 & 64.4%), Indaf-5 X IE2712 (3.10 & 71.1%) and L-5 X IE2656 (3.07 & 65.6%) were recorded higher mean larval values and per cent of earhead caterpillar incidence and were on par with the susceptible check Udaru mallige (2.87 & 71.6 %) (Table 2). Further, during late *kharif* season the entries viz., IE9500 X MR-6 (1.67 & 37.8 %), Indaf-5 X GE1409 (1.81 & 35.6 %)

and Indaf-5 X IE2936 (1.40 & 34.4 %) were recorded significantly lower mean larval values and per cent of earhead caterpillar incidence compare to the susceptible check Udaru mallige (3.10 & 73.3 %). The entries viz., PR202 X GE1409 (2.09 & 57.8 %), Indaf-5 X IE2712 (3.83 & 75.6 %), L-5 X IE2656 (3.57 & 66.7%) recorded higher mean larval values and per cent of earhead caterpillar incidence and were on par with the susceptible check Udaru mallige (3.10 & 73.3%) (Table 2). Thus overall study of three seasons data indicated that, the larval mean values and per cent of earhead caterpillar incidence was in increasing trend from early *kharif* to mid *kharif* to late *kharif*, it was found that highest incidence earhead caterpillar was noticed at later dates of sowing of the crop (late *kharif*), the pooled data of three seasons revealed that, the entries viz., Indaf-5 X IE2936 (1.07 & 31.5%), Indaf-5 X GE1409 (1.32 & 31.1%), IE9500 X MR-6 (1.34 & 31.9%) and PR202 X GE1409 (1.60 & 51.9%) were recorded significantly lowest larval mean values and per cent of earhead caterpillar incidence compared to the susceptible check Udaru mallige (2.90 & 71.3 %), these varieties possesses semi compact (tops of fingers curved) and compact type (fingers incurved) of earheads, The fingers loosely held each other, harboured fewer pest individuals and the entries viz., L-5 X IE2924 (3.06 & 64.1%), Indaf-5 X IE2712 (3.21 & 71.1%) and L-5 X IE2656 (3.03 & 64.4%) were recorded significantly highest mean larval values and per cent of earhead caterpillar incidence and were on par with the susceptible check Udaru mallige (2.90 & 71.3%) (fig 1), these entries possesses fist type of earheads (fingers very incurved and tightly held). These studies are in confirmation with findings of Musthak Ali *et al.* (1987)^[6], reported that, lax and open types of earhead shapes in finger millet, lower infestation level, while compact and fist types showed a higher proportion in 30.0 and 40.0 percent level of infestation, respectively. Likewise, mean value also showed marked variation with lax and open types having a lower infestation of 10.15 and 21.63 percent respectively, in contrast, compact and fist types had higher values of 41.93 and 48.61 percent respectively. Balasubramanian *et al.* (1979)^[7] reported that, varieties Chencholan, SPV-130, SPV-69 and SPV-9 with loose earheads supported only small populations of the above insect pests. Similarly, Sharma *et al.* (1998)^[8]; Gour (2003);^[9] and Chikkarugi *et al.*, 2020^[10] reported that compact-panicked genotypes suffered greater damage than those having loose/separate fingers against *Helicoverpa* incidence and seasonal incidence of earhead caterpillars (Raveendra *et al.*, 2018)^[11].

Table 1: Response of finger millet genotypes against earhead caterpillars incidence in early *kharif* sowing

Sl. No	Genotypes	Earhead shape	Earhead color	Larval Mean Values	% of earhead caterpillar incidence
1	Indaf-5 X IE2936	Semi Compact	Purple	0.79 (1.34)	27.8 (31.7)
2	IE9500 X MR-6	Semi Compact	Light Green	0.97 (1.40)	26.7 (30.9)
3	L-5 X IE2924	Fist	Light Purple	2.40 (1.84)	58.9 (50.5)
4	Indaf -5 X IE2712	Fist (Cox Comb)	Dark Green	2.70 (1.92)	66.7 (55.1)
5	Indaf -5 X GE1409	Semi Compact	Light Green	0.93 (1.39)	26.7 (31.0)
6	L-5 X IE2656	Fist	Dark Green	2.45 (1.84)	61.1 (51.6)
7	PR202 X GE1409	Compact	Light Green	1.23 (1.49)	44.4 (41.7)
8	Udaru Mallige (SC)	Fist	Green	2.73 (1.93)	68.9 (56.6)
	SE.m ±			0.08	2.7

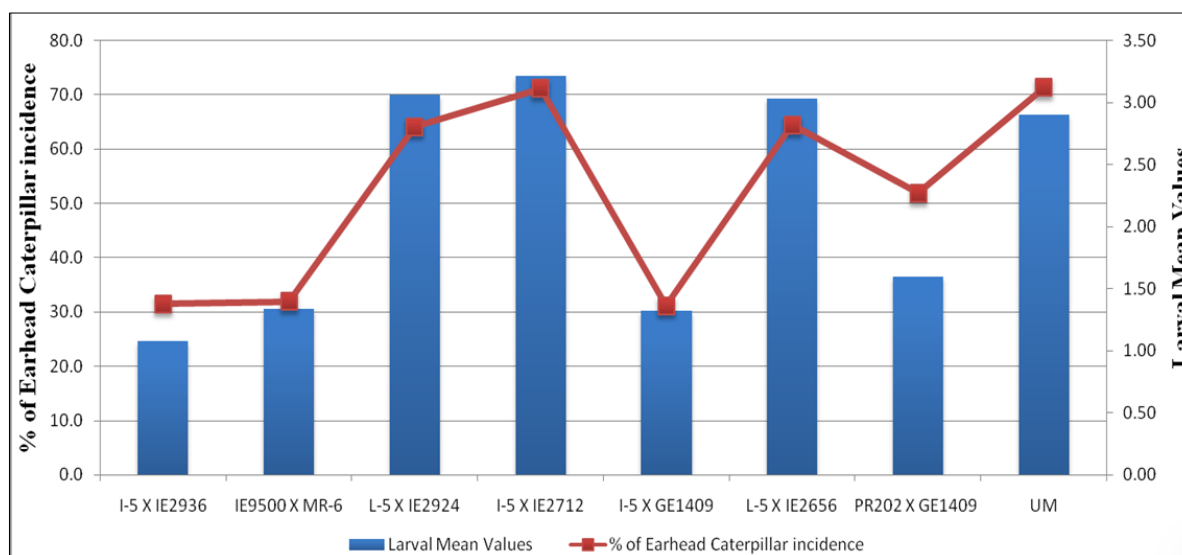
	C.D			0.25	8.2
	C.V			8.68	10.61

*Figures in parentheses of larval mean values are square root transformed and per cent of earhead caterpillar incidence are arc sin transformed, SC= Susceptible check

Table 2: Response of finger millet genotypes against earhead caterpillars incidence in mid and late *kharif* sowing

Sl. No	Genotypes	Mid <i>kharif</i>		late <i>kharif</i>	
		Larval Mean Values	% of earhead caterpillar incidence	Larval Mean Values	% of earhead caterpillar incidence
1	I-5 X IE2936	1.04 (1.43)	32.2 (34.4)	1.40 (1.55)	34.4 (35.9)
2	IE9500 X MR-6	1.37 (1.54)	31.1 (33.7)	1.67 (1.62)	37.8 (37.8)
3	L-5 X IE2924	3.08 (2.01)	64.4 (53.9)	3.70 (2.16)	68.9 (56.1)
4	I-5 X IE2712	3.10 (2.02)	71.1 (58.4)	3.83 (2.19)	75.6 (61.0)
5	I-5 X GE1409	1.21 (1.48)	31.1 (33.8)	1.81 (1.68)	35.6 (36.6)
6	L-5 X IE2656	3.07 (2.02)	65.6 (54.1)	3.57 (2.13)	66.7 (54.7)
7	PR202 X GE1409	1.47 (1.56)	53.3 (47.0)	2.09 (1.75)	57.8 (49.6)
8	Udaru Mallige (SC)	2.87 (1.96)	71.6 (57.5)	3.10 (2.02)	73.3 (58.9)
	SE.m \pm	0.07	3.10	0.11	3.4
	C.D	0.23	9.5	0.35	10.4
	C.V	7.21	11.5	10.45	12.0

*Figures in parentheses of larval mean values are square root transformed and per cent of earhead caterpillar incidence are arc sin transformed, SC= Susceptible check



UM= Udaru mallige, I-5= Indaf-5

Fig 1: Reaction of different Finger millet genotypes against incidence of earhead caterpillars

Conclusion

It could be concluded from the above investigation that the varieties/lines such as Indaf-5 X IE2936, Indaf-5 X GE1409 and IE9500 X MR-6 were recorded significantly lowest larval mean values and per cent of earhead caterpillar incidence, these varieties possess semi compact (tops of fingers curved) and compact type (fingers incurved) of earheads, The fingers loosely held each other, harboured fewer pest individuals. Resulted these varieties/ lines can be utilized for further breeding programme to develop resistant varieties against earhead caterpillars in early, mid and late *kharif* seasons.

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