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SCREENING IN CHILLI AGAINST *HELICOVERPA ARMIGERA* HUBNER.

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A field investigation was carried out in chilli to screen the 30 F_1 hybrids (developed using six cytoplasmic genic male sterile lines and five testers) and their parents against fruit borer *Helicoverpa armigera* Hubner. incidence under natural epiphytotic condition. Among the parents the per cent fruit borer incidence ranged from 2.60 (PMR-5-34) to 16.40 (Arka Lohith) with six parents exhibiting the resistant reaction. The per cent borer infestation among the crosses varied from 0.00 (MSY-3A x Anagi) to 33.32 (MSP-5A x Arka Lohith) with 50 per cent of the crosses registering resistant reaction.

Keywords: Chilli; Fruit borer; *Helicoverpa armigera* Hubner.; Resistant.

Chilli (*Capsicum annuum* L.) is an important vegetable as well as spice crop grown in almost all parts of our country. India ranks first in the world in both area and production with an area of 0.92 million hectares with a production of 1.01 million tonnes of dry chilli annually. The data support Kallupurackal and Ravindran[1]. Over 80 per cent of the total production in India come from four states *viz.*, Andhra Pradesh, Karnataka, Maharashtra and Tamil Nadu. Karnataka is the second largest producing state covering an area of 0.17 million hectares with an annual production of 0.14 million tonnes of dry chilli. The data support Anon[2]. Though, India is the largest producer, the average yield of chilli is very low (1.11 t/ha dry chilli) as compared to developed countries like USA, China, South Korea, Taiwan etc. where the average yield ranged from three to four tonnes per hectare. Low productivity in chilli is mainly attributed to lack of high yielding, pest and disease resistant varieties/hybrids. This is as per the earlier report[3].

India being the largest chilli producer has the vast potential to increase the productivity in order to promote export, besides meeting the domestic requirements. But a major bottleneck in the production of chilli is damage caused by the insect pests. A total of 293 insects and mite species are known to attack chilli in field and storage, all over the world as reported by Anon[4]. Mayeux and Wene[5] reported the occurrence of *Helicoverpa armigera* Hubner. on chilli for the first time. Katagihallimath[6] reported the complete destruction of the fruit contents by *H. armigera* Hubner. larvae in chilli infested upto 92 per cent of plants and caused upto 77 per cent fruit damage. Butani[7] reported a total of 21 species of pests including *H. armigera* Hubner. infesting chilli in India. The *H. armigera* Hubner. and *Spodoptera litura* Fab. caused fruit damage from 15 to 30 per cent in chilli in Andhra Pradesh as per the report of Murthy and Lakshminaryan[8]. Reddy and Puttaswamy[9] encountered two species of fruit borers *viz.*, *H. armigera* Hubner. and *Spodoptera litura* Fab. in chili and observed differences in nature of damage. *H. armigera* Hubner. bored fruits at the base near the stalk, while *Spodoptera litura* Fab. bored fruits irregularly. Rao and Ahmed[10] reported that the chilli pod borer alone accounted for 61.2 per cent damage in the absence of chemical spray.

H. armigera Hubner. has become a serious pest of chilli in Dharwad and Belgaum districts of Karnataka since 1992-93 due to increase in area under chilli, change in area of other hosts/pesticide pressure/fluctuations of ecofactors, etc. This is in agreement with the reports of Shivaramu[11]. Though the pest has been studied at greater depth on other crops like cotton, red gram, chickpea etc., on chilli it is very meager. In view of its recent important status, the screening study was undertaken in 30 F_1 hybrids along with their parents against *Helicoverpa armigera* Hubner.

A field investigation was undertaken to screen the hybrids and their parents under natural epiphytotic condition, where no control measures were taken. The investigation was conducted in the experimental blocks of Olericulture unit, Kittur Rani Channamma College of Horticulture, Arabhavi (Karnataka) during *rabi* 2003-04. A total of 30 F_1 hybrids (developed using six cytoplasmic genic male sterile lines and five testers) and their parents were raised in randomized block design with three replications. Each entry was represented by 10 plants spaced at 75 x 45 cm. All the recommended agronomic practices (except pest control measures) were taken to raise the good crop. The plants were scored for the fruit borer incidence using the following formula:

$$\text{Per cent bored fruits} = \frac{\text{Number of bored fruits}}{\text{Total number of fruits}} \times 100$$

The scale adopted by Shivaramu[11] for fruit borer

Table 1. Reaction of parents and crosses to fruit borer (*Helicoverpa armigera* Hubner.) infestation in chilli.

Sl. No.	Parents / crosses	Fruit borer	
		Score	Reaction
	Lines		
1.	MSY-1A	16.20	Moderately Resistant
2.	MSY-2A	14.20	Moderately Resistant
3.	MSY-3A	13.60	Moderately Resistant
4.	MSP-4A	3.84	Resistant
5.	MSP-5A	3.44	Resistant
6.	MSC-6A	4.24	Resistant
	Testers		
7.	Arka Lohith	16.40	Moderately Resistant
8.	PMR-5-34	2.60	Resistant
9.	Hisar Shakthi	3.81	Resistant
10.	Anagi	12.68	Moderately Resistant
11.	Pant C1	3.38	Resistant
	Crosses		
12.	MSY-1A x Arka Lohith	10.80	Moderately Resistant
13.	MSY-1A x PMR-5-34	4.76	Resistant
14.	MSY-1A x Hisar Shakthi	2.80	Resistant
15.	MSY-1A x Anagi	12.60	Moderately Resistant
16.	MSY-1A x Pant C1	6.88	Moderately Resistant
17.	MSY-2A x Arka Lohith	8.28	Moderately Resistant
18.	MSY-2A x PMR-5-34	4.30	Resistant
19.	MSY-2A x Hisar Shakthi	3.20	Resistant
20.	MSY-2A x Anagi	6.06	Moderately Resistant
21.	MSY-2A x Pant C1	1.24	Resistant
22.	MSY-3A x Arka Lohith	6.60	Moderately Resistant
23.	MSY-3A x PMR-5-34	1.69	Resistant
24.	MSY-3A x Hisar Shakthi	0.32	Resistant
25.	MSY-3A x Anagi	0.00	Resistant
26.	MSY-3A x Pant C1	26.40	Susceptible
27.	MSP-4A x Arka Lohith	6.81	Moderately Resistant
28.	MSP-4A x PMR-5-34	4.46	Resistant
29.	MSP-4A x Hisar Shakthi	4.10	Resistant
30.	MSP-4A x Anagi	21.69	Susceptible
31.	MSP-4A x Pant C1	3.45	Resistant
32.	MSP-5A x Arka Lohith	33.32	Susceptible
33.	MSP-5A x PMR-5-34	2.46	Resistant
34.	MSP-5A x Hisar Shakthi	1.32	Resistant
35.	MSP-5A x Anagi	0.96	Resistant
36.	MSP-5A x Pant C1	6.82	Moderately Resistant
37.	MSC-6A x Arka Lohith	12.68	Moderately Resistant
38.	MSC-6A x PMR-5-34	6.20	Moderately Resistant
39.	MSC-6A x Hisar Shakthi	2.26	Resistant
40.	MSC-6A x Anagi	15.76	Moderately Resistant
41.	MSC-6A x Pant C1	8.00	Moderately Resistant

Table 2. Grouping of parents and crosses based on per cent fruit borer incidence (PDI) in chilli

Reaction	Number of entries	Parents / crosses
Resistant (0 – 5%)	21	Parents: - MSP-4A, MSP-5A, MSC-6A, PMR-5-34, Hisar Shakthi, Pant Cl Crosses: - MSY-1A x PMR-5-34, MSY-1A x Hisar Shakthi, MSY-2A x PMR-5-34, MSY-2A x Hisar Shakthi, MSY-2A x Pant C1, MSY-3A x PMR-5-34, MSY-3A x Hisar Shakthi, MSY-3A x Anagi, MSP-4A x PMR-5-34, MSP-4A x Hisar Shakthi, MSP-4A x Pant C1, MSP-5A x PMR-5-34, MSP-5A x Hisar Shakthi, MSP-5A x Anagi, MSC-6A x Hisar Shakthi
Moderately resistant (6 – 20%)	17	Parents: - MSY-1A, MSY-2A, MSY-3A, Arka Lohith, Anagi Crosses: - MSY-1A x Arka Lohith, MSY-1A x Anagi, MSY-1A x Pant C1, MSY-2A x Arka Lohith, MSY-2A x Anagi, MSY-3A x Arka Lohith, MSP-4A x Arka Lohith, MSP-5A x Pant C1, MSC-6A x Arka Lohith, MSC-6A x PMR-5-34, MSC-6A x Anagi, MSC-6A x Pant C1
Susceptible (21 – 40%)	03	Parents: - - Crosses: - MSY-3A x Pant C1, MSP-4A x Anagi, MSP-5A x Arka Lohith
Highly susceptible (>40%)	00	-

was employed for grouping the entries into different categories as under:

Per cent bored fruits: 0-5%- Resistant (R); 6-20%- Moderately Resistant (MR); 21-40%- Susceptible (S) and >40%- Highly Susceptible (HS).

The reaction of parents and crosses for fruit borer infestation and their grouping is presented in the Table 1 and 2 respectively. The per cent incidence of fruit borer infestation ranged from 2.60 in PMR-5-34 to 16.40 in Arka Lohith among parents. Among the eleven parents six parents *viz.*, MSP-4A, MSP-5A, MSC-6A, PMR-5-34, Hisar Shakti and Pant C1 were found to be resistant, while rest of the parents were moderately resistant to fruit borer infestation. However, none of the parents were highly susceptible to the fruit borer infestation. Ukkund[12] screened 80 chilli genotypes against *Helicoverpa armigera* Hubner. also reported that PMR-5-34, Hisar Shakti and Pant C1 as resistant and Arka Lohith and Anagi as moderately resistant to fruit borer. In contrast Shivaramu[11] grouped Arka Lohith and Hisar Shakti under resistant and moderately resistant category, respectively.

Among the crosses the per cent fruit borer incidence ranged from 0.00 (MSY-3A x Anagi) to 33.32 (MSP-5A x Arka Lohith). Out of the 30 F_1 hybrids developed 50 per cent were found resistant, 12 moderately resistant and three susceptible, while none of the crosses were highly susceptible to the fruit borer infestation.

The crosses resistant to fruit borer were found to be promising but needs further evaluation trials for yield, stability tests over seasons and different environment for fruit borer infestation. Further, more genetic studies are also needed in order to understand the genetics of inheritance of resistance to fruit borer and to employ them successfully in resistance breeding programme against *Helicoverpa armigera* Hubner.

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