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Screening of Mungbean Germplasms against Major Insect Pests in Changing Climate Scenario

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ABSTRACT

A total number of 42 mungbean germplasm including two checks (one susceptible and one resistant) were sown in augmented block design for evaluation against major insect pests under field condition. The experiment was carried out at GPB Farm of Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya during *kharif* 2019. The weekly observation on major insect pests of mungbean starting from 7 days after sowing to till harvesting was recorded. Minimum population of white fly was recorded in KMP-4 (1.4 white fly/cage) followed by KMP-21 (1.6 white fly/cage) and KMP-23 (1.7 white fly/cage). Minimum jassid population was observed in NDM 1 (resistant check) (1.8 jassid/cage) followed by KMP-36 (1.9 jassid/cage) and KMP-29 (2.0 jassid/cage). Minimum thrips population recorded in KMP-4, KMP-6, KMP-13, KMP -19-36-2, KMP-20, KMP-21and KMP-33 (0.0 thrips/plant) followed by NDM 1(resistant check) (1.6thrips/plant), KMP-19-31-2 (1.7 thrips/plant) and KMP-12 (1.8 thrips/plant) and minimum population of pod borers was observed in KMP-27 (0.0%) followed by KMP-7 (0.9%), KMP-19-7-11 (1.0%) and KMP-16 (1.2%).

Keywords Screening, Mungbean, Germplasm, Insect pests.

INTRODUCTION

Mungbean or green gram is one of the important edible pulse crops cultivated in India. It belongs to family Papilionaceae. In India, mungbean crop is cultivated in about 3.83mha with production of 1.60 million tonnes with an average productivity of 418 kg ha^{-1}. InUttar Pradesh, green gram is being cultivated on 97000 hectares that produce 44000 tonnes with an average productivity of 454 kg ha^{-1} (Anonymous 2017). On an average, 2.5 to 3.0 million tonnes (about 30%) of pulses are lost annually due to pest problems in black gram and green gram. Insect pest play major role in low production in green gram in India. The green gram is attacked by various insect-pests such as whitefly (*Bemisia tabaci*), jassid (*Empoasca* spp.), green leaf hopper (*Nephotettix* spp.) and flower

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thrips (*Caliothrips* spp.) appeared a sucking insect pests. Grasshopper (*Atractomorpha* spp.), tobacco caterpillar (*Spodoptera litura*), bihar hairy caterpillar (*Spilosoma obliqua*) and gram pod borer (*Helicoverpa armigera*) appeared as foliage feeders. Among the insect pests, pod borers (*Etiella zinckenella* and *Helicoverpa armigera*) is a serious pest of mungbean. Host plant resistance play a crucial role in insect pest management of grain legumes and resistance to insect pest has been a major criterion in the development and release of new varieties (Soundararajan *et al*. 2013). Apart from evaluation of tolerance against whitefly in relation to yellow mosaic virus disease in mungbean, there were little attempts have been made on resistance against pod borers. In this study 40 mungbean germplasm were screened against pod borer complex under field condition and evaluated their level of resistance.

MATERIALS AND METHODS

Experiment was conducted at GPB Farm during *kharif*, 2019. A total number of 42 mungbean germplasm including two checks (one susceptible and one resistant) was sown in augmented block design for evaluation against major insect pest sunder field condition. Each genotype assigned 2 rows of 4 m length at 30 cm spacing. Susceptible and resistant checks was sown after every 10 germplasm. The crop was regularly monitored in the morning hours and data was recorded on the population of the major insect pest at weekly intervals from germination to the harvest. Whitefly and jassid population were recorded with the help of rectangular cage 45 cm long, 30 cm wide and 90 cm high according to the growth stage of plant. Observation was taken at 7 days interval starting from 20 days after sowing up to the crop maturity on randomly selected 5 places in each plot. The data obtained were subjected to statistical analysis. Thrips population was recorded at weekly intervals on 5 randomly selected plants starting with 50% flowering till harvest in terms of number/plant. Larval population of pod borer complex was recorded at weekly intervals on 5 randomly selected plants starting with 50% flowering till harvest. Population of other arthropods will be recorded on 5 randomly selected plants starting with crop establishment to harvest.

RESULTS AND DISCUSSION

In the field screening of 42 mungbean germplasm, the white fly population ranged from 1.4- 14.3 white fly/cage (Table 1). Further, data revealed that the maximum white fly population was recorded

Table 1. Field evaluation of germplasms against major insect pests of mungbean during *kharif* 2019.

Sl. No.	Entry	White fly population /cage	Jassid population /cage	No. of thrips /plant	% Pod borer damage
1	KMP-1	4.7	6.3	9.0	8.6
2	KMP-3	3.3	11.2	4.5	2.1
3	KMP-4	1.4	4.0	0.0	3.9
4	KMP-5	9.3	9.5	6.5	3.3
5	KMP-6	4.5	5.6	0.0	2.8
6	KMP-7	6.0	9.6	4.5	0.9
7	KMP-8	10.1	10.0	2.1	5.4
8	KMP-9	2.4	6.6	3.7	3.2
9	KMP-10	4.0	2.3	5.1	2.4
10	KMP-11	6.2	8.7	2.9	6.8
11	KMP-12	5.7	6.0	1.8	5.9
12	KMP-13	9.0	3.4	0.0	3.4
13	KMP-14	11.2	4.5	3.5	4.6
14	KMP-15	4.1	7.8	8.7	3.5
15	KMP-16	10.7	6.0	8.9	1.2
16	KMP-17	9.4	7.8	2.3	6.7
17	KMP-18	11.7	4.0	3.5	4.0
18	KMP-19	6.0	2.5	4.1	7.3
19	KMP-19-7-11	4.3	6.7	3.2	1.0
20	KMP-19-22-2	7.8	2.9	2.1	4.8
21	KMP-19-31-2	11.3	9.0	1.7	2.4
22	KMP-19-36-2	12.0	3.7	0.0	6.3
23	KMP-20	6.3	5.6	0.0	4.3
24	KMP-21	1.6	5.0	0.0	8.9
25	KMP-22	10.6	3.0	7.3	8.0
26	KMP-23	1.7	7.8	1.9	8.6
27	KMP-25	5.1	3.5	5.7	2.9
28	KMP-25-2	5.9	3.6	3.6	5.6
29	KMP-26	11.9	5.0	7.4	2.9
30	KMP-27	13.3	3.9	4.9	0.0
31	KMP-28	5.5	4.3	7.0	3.3
32	KMP-29	9.6	2.0	5.5	5.9
33	KMP-30	9.9	3.8	3.7	5.2
34	KMP-31	11.3	4.1	5.8	4.1
35	KMP-32	4.7	5.3	4.9	3.1
36	KMP-33	10.8	4.9	0.0	3.4
37	KMP-34	8.9	5.0	3.3	3.0
38	KMP-35	2.5	5.0	2.0	4.7
39	KMP-36	3.7	1.9	7.0	3.9
40	KMP-38	5.3	3.3	5.5	3.1
41	T-44 (Susceptible check)	14.3	7.0	4.0	7.5
42	NDM1 (Resistance check)	3.1	1.8	1.6	1.7

in germplasm T-44 (S check) (14.3 white fly/cage) followed by KMP-27 (13.3 white fly/cage), KMP-19-36-2(12.0 white fly/cage), KMP-26 (11.9 white fly/cage) and KMP-18 (11.7 white fly/cage). However, the minimum population was recorded in KMP-4 (1.4 white fly/cage) followed by KMP-21 (1.6 white fly/cage) and KMP-23 (1.7 white fly/cage). Similarly, population of jassid was varied from1.8–11.2 Jassid/cage. The maximum jassid population was recorded in germplasm KMP-3 (11.2 jassid/cage) followed by KMP-8 (10.0jassid/cage), KMP-7 (9.6 jassid/cage), KMP-5 (9.5 jassid/cage) and KMP-19-31-2 (9.0 jassid/cage). While, the minimum population was observed in NDM 1(resistant check) (1.8 jassid/cage) followed by KMP-36 (1.9 jassid/cage) and KMP-29 (2.0 jassid/cage). Thrips population in all the mungbean germplasm was range from 0.0 to 9.0 thrips/plant. The maximum population of thrips was recorded in KMP-1 (9.0 thrips / plant) followed by KMP-16 (8.9 thrips/plant), KMP-15 (8.7thrips/plant), KMP-26 (7.4 thrips/plant) and KMP-22 (7.3thrips/plant). However, the minimum population of thrips recorded in KMP-4, KMP-6, KMP-13, KMP-19-36-2, KMP-20, KMP-21 and KMP-33(0.0thrips/plant) followed by NDM 1 (resistant check) (1.6 thrips/plant), KMP-19-31-2 (1.7 thrips/plant) and KMP-12 (1.8 thrips/plant).The maximum pod damage was recorded in KMP-21 (8.9%) followed by KMP-23 and KMP-1 (8.6%) and KMP-22 (8.0%) and minimum in KMP-27 (0.0%) followed by KMP-7 (0.9%), KMP-19-7-11 (1.0%) and KMP-16 (1.2%). The present findings are close accordance with the (Sandhya Rani *et al*. 2014) reported the varietal preference of spotted pod borer, *M. vitrata* to 110 different genotypes including 10 released varieties as check was monitored under field condition during summer seasons. No genotype was found as resistant to *M. vitrata* with infestation. The five genotypes, KM-9-128(3.5%), KM-9-136 (5.8%), RMG-492 (8.34%), LGG-527 (9.5%) and LGG-538(10.0%) were found as tolerant and twenty-one genotypes showed susceptibility with a range from 12.59 (MGG-332) to 20.0 (IPM-02-03 and LGG-522) percent and 13 genotypes were highly susceptible with a range from 43.25 (KM-8-662) to 68.39% (KM-173) pod damage. (Umbarkar *et al*. 2011) also screened ten genotypes/cultivars of green gram for their reactions to gram pod borer, *H. armigera*, GM-2K-5, GM-9926 and GM2K-3 har bouring 1.48, 2.20 and 2.30 larvae per plant, respectively were found comparatively less susceptible than genotypes GM-02-13 and GM-04-04, the highly susceptible ones with 4.65 and 4.09 larvae per plant, respectively. These observations are in partial agreement with three lines finding of (Rani *et al*. 2008) who conducted field screening of 12 entries of green gram was taken up for their tolerance to thrips (*T. palmi*) and pod borer (*Maruca vitrata*). The results showed that two entries MGG–362 and MGG–365 from the observation trial recorded significantly a smaller number of thrips infestation in *kharif* and *rabi* 2004 and in *kharif* 2005 and 2006 compared to the promising check MGG–295. The genotype MGG–366 was the most tolerant to pod borer damage. It recorded significantly a smaller number of webs per plant, larvae per web and the percentage of pod damage in *kharif* and *rabi* seasons compared to the moderately susceptible check MGG–295.The genotypes MGG–358. MGG –359, MGG–360, MGG–364 and MGG–367 were also tolerant to the pod borer. This reaction was not consistent in different seasons.

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