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PLANT PROTECTION

Evaluation of Certain Mungbean [*Vigna radiata* (L.) Wilczek] Genotypes for Resistance Against Major Sucking Insect Pests

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ABSTRACT

A field experiment was conducted at Agricultural Research Farm of Banaras Hindu University, Varanasi to investigate the resistance of mungbean genotypes against major sucking insect pests during *kharif* 2015. Results revealed that the mungbean genotype VGG 10-008 (4.98 whitefly/split cage) showed minimum infestation of whitefly and genotype MH 921 (8.77 whitefly/split cage) maximum infestation. In the case of jassid, maximum infestation was recorded on genotype LGG 460 (6.31 jassid/ split cage) and minimum jassid infestation was recorded on genotype DGG 6 (3.31 jassid/split cage). Genotype LGG 460 (2.93 thrips/10 flowers) showed maximum infestation of flower thrips and minimum in genotype DGG 6 (1.28 thrips/10 flowers). Genotype PM 10-18 (7.73 q/ha) produced maximum yield and genotype LGG 460 produced minimum yield (2.47 q/ha).

Highlights

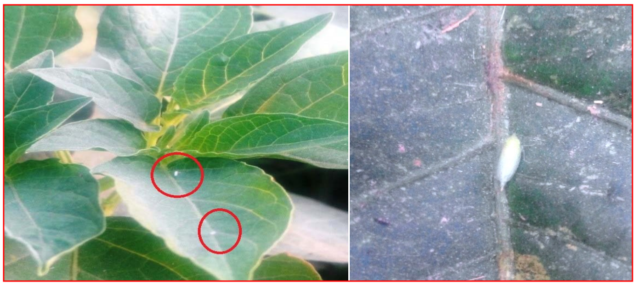
- Genotype VGG 10-008 showed resistant and MH 921 showed susceptible reaction for whitefly.
- Genotype LGG 460 showed susceptible and DGG 6 showed resistant reaction against Jassid and flower thrips.
- Genotype PM 10-18 produced maximum yield and LGG 460 produced minimum yield.

Keywords: Whitefly, Jassid, Thrips, Sucking insect pests

Mungbean [*Vigna radiata* (L.) Wilczek] popularly known as ‘ green gram’ is one of the most important pulse crop widely grown in India and it occupies third place after chickpea and pigeon pea (Ved *et al.* 2008). Mungbean is grown in summer and *Kharif* season in northern parts of India. In southern India, it is also grown in winter season. The insect pests adversely affect its production and sucking insect pests contribute heavily towards losses in yield. The most serious insect pests problems include the whitefly (*Bemisia tabaci*), bean thrips (*Megaleurothrips distalis*), gram pod borer (*Helicoverpa armigera*) and legume pod borer (*Maruca vitrata*) (Kooner *et al.* 2006; Singh and Singh, 2015 and Kharel *et al.* 2016). Khattak *et al.* 2004 reported that sucking insect pests whitefly, jassids and thrips are of the major importance in mungbean. Cultivation of resistance or tolerant varieties is the easiest way to protect mungbean crop from damage caused by insect pests. For managing these insect pests chemical insecticides are used indiscriminately, which cause various adverse effects on environment as well as animal and human health including beneficial organism. To fulfil this objective the investigation was carried out during *Kharif* season of 2015 at Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (U.P.).

MATERIALS AND METHODS

The experiment was carried out during *Kharif* season of 2015 to identify resistant/tolerant sources against major sucking insect pests *i.e.*, whitefly (*Bemisia tabaci*), jassid (*Empoasca kerri*) and flower thrips (*Caliothrips indicus*) of mungbean under field conditions at Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. Twenty genotypes including one local check HUM 12 were grown in Randomized Block Design (RBD) with 3 replications. The row to row and plant to plant distance maintained as 30×10 cm. The unit plot size was 40×0.60 m. For recording the infestation of insect pests five plants were randomly selected from each genotypes and each plot. Mature and immature stages of major sucking insect pests present on them were counted with the help of rectangular split cage at 15 days intervals. The Number of nymphs and adults counted from all the three replications for all the genotypes were averaged separately.



(a) Whitefly *(b) Jassid*

Fig. 1: Infestation of sucking insect pests on mungbean

RESULTS AND DISCUSSION

The cumulative data of mean population of whitefly was recorded at 15, 30, 45 and 60 days after sowing (DAS) was presented in Table 1.

Table 1: Performance of certain mungbean genotypes against whitefly under field conditions during *Kharif* season of 2015

Genotype	Mean whitefly population/split cage				
	15 DAS	30 DAS	45 DAS	60 DAS	Mean
SML 1811	2.50 (1.73)*	6.67 (2.66)	10.3 (3.29)	4.73 (2.28)	6.06 (2.50)
ML 613	2.93 (1.85)	7.50 (2.83)	11.3 (3.44)	5.27 (2.40)	6.76 (2.63)
ML 2037	3.23 (1.93)	7.40 (2.81)	11.4 (3.44)	5.47 (2.44)	6.87 (2.66)
KME 7	3.40 (1.96)	7.83 (2.88)	11.9 (3.52)	6.13 (2.57)	7.33 (2.74)
ML 2312	3.90 (2.10)	7.57 (2.83)	11.7 (3.48)	6.70 (2.68)	7.46 (2.78)
ML 2056	3.07 (1.88)	7.67 (2.85)	10.9 (3.37)	5.93 (2.54)	6.89 (2.66)
IPM 02-14	3.43 (1.98)	7.33 (2.74)	11.6 (3.47)	6.20 (2.58)	7.14 (2.71)
DGG 1	3.73 (2.06)	7.20 (2.76)	11.2 (3.42)	6.33 (2.60)	7.13 (2.72)
DGG 6	3.57 (2.02)	4.63 (2.25)	11.0 (3.39)	4.53 (2.23)	5.93 (2.48)
ML 818	3.27 (1.94)	5.73 (2.48)	10.7 (3.35)	5.77 (2.49)	6.37 (2.57)
LGG 460	3.63 (2.03)	6.40 (2.62)	12.1 (3.55)	6.23 (2.59)	7.10 (2.70)
MH 921	3.97 (2.11)	8.97 (3.06)	14.6 (3.88)	7.53 (2.83)	8.77 (2.98)
MH 729 A	4.10 (2.14)	8.93 (3.06)	12.2 (3.55)	7.13 (2.76)	8.08 (2.88)
ML 2410	3.77 (2.06)	8.20 (2.91)	11.3 (3.43)	5.50 (2.42)	7.18 (2.72)
ML 2412	3.47 (1.99)	7.50 (2.82)	10.6 (3.33)	6.29 (2.59)	6.96 (2.69)
PM 12-2	4.07 (2.14)	9.13 (3.10)	13.7 (3.76)	7.17 (2.77)	8.52 (2.94)
PM 10-18	3.83 (2.08)	5.50 (2.44)	12.8 (3.64)	6.17 (2.57)	7.07 (2.69)
VGG 10-008	2.23 (1.65)	4.57 (2.25)	9.8 (3.21)	3.33 (1.95)	4.98 (2.27)
COGG 11-02	3.43 (1.98)	8.20 (2.94)	11.3 (3.44)	5.93 (2.51)	7.23 (2.73)
HUM 12	3.67 (2.00)	8.93 (3.05)	11.5 (3.46)	5.67 (2.47)	7.44 (2.76)
S.Em.±	0.09	0.16	0.10	0.15	0.13
C.D. at 5 %	0.27	0.50	0.30	0.42	0.37

**Figures in parenthesis are $\sqrt{x + 0.5}$ transformed values.*

The genotype MH 921 (8.77 whitefly/ split cage) had maximum infestation of whitefly followed by genotype PM 12-2 (8.52 whitefly/ split cage) and minimum in genotype VGG 10-008 (4.98 whitefly/ split cage).

The data recorded on jassid infestation on different genotypes revealed that mean population of jassid recorded at 15, 30, 45 and 60 DAS observed was highest in the genotype LGG 460 (6.31 jassids/ split cage) followed by genotype ML 818 (5.98 jassids / split cage) and the lowest population of jassid was recorded on genotype DGG 6 (3.31 jassid/ split cage) Table 2.

The mean population of flower thrips was observed highest in the genotype LGG 460 (2.93 flower thrips/10 flower) followed by HUM 12 (2.88 flower thrips/10 flowers). The lowest population of flower thrips was recorded on geneotype DGG 6 (1.28 flower thrips/10 flower) followed SML 1811 (1.96 flower thrips/ 10 flowers) Table 3.

Table 2: Performance of certain mungbean genotypes against jassid under field conditions during *Kharif* season of 2015

Genotype	Mean jassid population/split cage				
	15 DAS	**30 DAS**	**45 DAS**	**60 DAS**	**Mean**
SML 1811	2.27	4.17	5.83	3.50	3.94
	(1.64)*	(2.16)	(2.51)	(2.00)	(2.09)
ML 613	2.38	4.77	5.93	3.57	4.16
	(1.68)	(2.29)	(2.54)	(2.01)	(2.14)
ML 2037	2.67	4.73	6.67	3.73	4.45
	(1.77)	(2.29)	(2.67)	(2.05)	(2.20)
KME 7	2.32	4.33	6.60	3.85	4.28
	(1.66)	(2.20)	(2.66)	(2.08)	(2.16)
ML 2312	3.43	5.60	7.43	4.57	5.26
	(1.98)	(2.47)	(2.81)	(2.25)	(2.38)
ML 2056	2.84	4.67	6.27	4.46	4.56
	(1.82)	(2.27)	(2.59)	(2.22)	(2.23)
IPM 02-14	3.53	5.13	6.83	5.00	5.12
	(2.01)	(2.37)	(2.71)	(2.34)	(2.36)
DGG 1	2.17	4.10	6.47	3.93	4.17
	(1.62)	(2.14)	(2.64)	(2.11)	(2.13)
DGG 6	1.97	3.73	4.23	3.30	3.31
	(1.54)	(2.05)	(2.17)	(1.92)	(1.94)
ML 818	4.34	6.30	7.97	5.30	5.98
	(2.20)	(2.61)	(2.91)	(2.41)	(2.53)
LGG 460	4.41	6.87	8.23	5.73	6.31
	(2.21)	(2.71)	(2.95)	(2.49)	(2.60)
MH 921	3.11	5.67	6.43	5.00	5.05
	(1.90)	(2.48)	(2.63)	(2.34)	(2.34)
MH 729 A	3.08	5.27	7.27	5.00	5.15
	(1.89)	(2.40)	(2.79)	(2.34)	(2.36)
ML 2410	2.36	4.13	7.57	5.60	4.91
	(1.67)	(2.15)	(2.84)	(2.47)	(2.29)
ML 2412	3.35	6.10	7.37	5.30	5.53
	(1.96)	(2.57)	(2.80)	(2.40)	(2.44)
PM 12-2	2.81	5.00	6.73	5.37	4.98
	(1.82)	(2.34)	(2.68)	(2.42)	(2.32)
PM 10-18	2.37	4.50	6.93	4.27	4.52
	(1.67)	(2.23)	(2.72)	(2.18)	(2.21)
VGG 10-008	2.26	4.27	5.90	3.07	3.87
	(1.66)	(2.18)	(2.52)	(1.88)	(2.07)
COGG 11-02	2.96	5.17	6.37	3.84	4.58
	(1.85)	(2.38)	(2.62)	(2.08)	(2.24)
HUM 12	3.13	6.03	7.60	5.23	5.50
	(1.90)	(2.55)	(2.84)	(2.39)	(2.43)
S.Em.±	0.04	0.07	0.09	0.11	0.06
C.D. at 5 %	0.11	0.20	0.25	0.32	0.22

**Figures in parenthesis are* $\sqrt{x + 0.5}$ *transformed values.*

Table 3: Performance of certain mungbean genotypes against thrips under field conditions during *Kharif* season of 2015

Genotype	Mean flower thrips population / 10 flowers			
	40 DAS	**50 DAS**	**60 DAS**	**Mean**
SML 1811	2.30	3.70	0.93	1.73
	(1.66)*	(2.05)	(1.19)	(1.41)
ML 613	2.40	4.33	0.87	1.90
	(1.70)	(2.19)	(1.17)	(1.44)
ML 2037	2.67	3.90	1.10	1.92
	(1.78)	(2.10)	(1.26)	(1.46)
KME 7	2.60	3.50	0.93	1.76
	(1.75)	(1.99)	(1.19)	(1.42)
ML 2312	3.07	4.87	1.43	2.34
	(1.89)	(2.31)	(1.39)	(1.58)
ML 2056	3.00	4.43	1.23	2.17
	(1.87)	(2.22)	(1.31)	(1.53)
IPM 02-14	3.13	4.23	1.47	2.21
	(1.90)	(2.16)	(1.39)	(1.55)
DGG 1	2.27	3.50	0.93	1.68
	(1.64)	(2.00)	(1.19)	(1.39)
DGG 6	1.37	3.17	0.57	1.28
	(1.36)	(1.91)	(1.02)	(1.26)
ML 818	3.60	5.13	1.97	2.68
	(2.02)	(1.37)	(1.56)	(1.67)
LGG 460	3.87	5.17	2.67	2.93
	(2.09)	(2.38)	(1.78)	(1.74)
MH 921	2.37	4.37	1.13	1.97
	(1.67)	(2.20)	(1.27)	(1.47)
MH 729 A	2.47	4.87	2.13	2.37
	(1.72)	(2.31)	(1.62)	(1.59)
ML 2410	3.47	5.33	2.57	2.84
	(1.99)	(2.42)	(1.75)	(1.72)
ML 2412	3.33	4.83	1.80	2.49
	(1.95)	(2.30)	(1.49)	(1.62)
PM 12-2	2.60	4.10	2.10	2.20
	(1.75)	(2.13)	(1.60)	(1.56)
PM 10-18	1.97	3.70	1.53	1.80
	(1.57)	(2.05)	(1.42)	(1.44)
VGG 10-008	2.67	3.70	0.70	1.77
	(1.76)	(2.04)	(1.09)	(1.41)

COGG 11-02	2.80	4.30	1.17	2.07
	(1.81)	(2.19)	(1.29)	(1.50)
HUM 12	3.73	5.27	2.50	2.88
	(2.06)	(2.40)	(1.73)	(1.72)
S.Em.±	0.11	0.10	0.10	0.08
C.D. at 5 %	0.32	0.29	0.28	0.22

Figures in parenthesis are $\sqrt{x+0.5}$ transformed values.

Table 4: Yield of certain mungbean genotypes during *Kharif* season of 2015

Genotype	Yield (q/ha)
SML 1811	5.10
ML 613	5.94
ML 2037	2.97
KME 7	6.03
ML 2312	4.41
ML 2056	7.63
IPM 02-14	4.78
DGG 1	4.96
DGG 6	5.08
ML 818	4.41
LGG 460	2.47
MH 921	5.81
MH 729 A	7.00
ML 2410	5.85
ML 2412	5.89
PM 12-2	6.00
PM 10-18	7.73
VGG 10-008	4.56
COGG 11-02	4.04
HUM 12	7.09
S.Em.±	**0.10**
CD at 5 %	**0.28**

On the basis of yield obtained from the different genotypes showed that genotype PM 10-18 (7.73 q/ha) produced maximum yield followed by ML 2056 (7.63 q/ha), MH 729 A (7.00 q/ha) and ML 613 (5.94 q/ha) and genotype LGG 460 produced minimum yield (2.47 q/ha) followed by COGG 11-02 (4.04) Table 3. Kumar *et al.* (2006) also reported that the population of whitefly on various test entries fluctuated between 1.84 and 6.25 per plant compared to 6.30 whitefly recorded on T 44. Nadeem *et al.* (2014) was reported that the green gram jassid per leaf population of 1.2 and 3.3, the highest and the lowest in MH 3153 and AZRI 2006 and flower thrips population per leaf the lowest (4±1.00) and the highest (12.3±0.67) in cultivar MH 3153 and 34143. Chhabra *et al.* (1993), Chhabra and Cheema (2007) and Singh and Singh (2014) in their experiments obtained identical results to results of present study although, they used different mungbean varieties.

CONCLUSION

On the basis of present study conducted on mungbean, it may be concluded that the genotypes showed some resistance against major sucking pests (Whitefly, Jassid and Thrips) utilized for breeding programmes while developing and evaluating new varieties in insect pests prone areas.

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