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EVALUATION OF MUNGBEAN GENOTYPES AGAINST MAJOR INSECT PESTS

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ABSTRACT

Field experiment was conducted to screen thirteen genotypes of mungbean against major sucking and lepidopteran pests. The incidence of pests was assessed at 15 DAS (Days after sowing) and continued till maturity at weekly intervals. The results revealed that least mean whitefly *Bemisia tabaci* (Genn.) incidence/ plant was observed in genotype Virat (5.17), TM-37 (5.31) and Shikha (5.40). Similarly, the least aphid *Aphis craccivora* Koch incidence was on Virat (2.73), Shikha (2.77), TM-37 (2.89) and PDM-139 (2.91). The genotypes, Virat (1.26), Shikha (1.26), PDM-139 (1.30) and TM-37 (1.31) were with lowest leaf hopper *Empoasca kerri* Pruthi counts; and the least larval counts of tobacco caterpillar *Spodoptera litura* (F.) was in Shikha (0.22), Virat (0.24), PDM-139 (0.25), TM-37 (0.28) and TJM-196 (0.31). Similarly, least incidence of blue butterfly *Lampides boeticus* L., larva was observed on Virat (0.21), Shikha (0.23) and PDM-139 (0.26) genotypes. Thus, the genotypes viz., Virat, TM-37, PDM-139 and Shikha were found to be tolerant against the major sucking and lepidopteran insect pests.

Key words: Mungbean, *Bemisia tabaci, Aphis craccivora, Empoasca kerri, Spodoptera litura, Lampides boeticus*, host plant resistance

Mungbean [*Vigna radiata* (L.) Wilczek] is widely grown in the subtropical countries of South and Southeast Asia. The low productivity of mungbean in India may be attributed to ravage by insect pests. In India, 64 species of insect pests are known to infest mungbean (Lal, 2008), and annual yield loss due to the insect pests is about 27.03 to 38.06% (Duraimurugan and Tyagi, 2014). The major sucking insect pests that inflict serious economic loss are aphid *Aphis craccivora* Koch, leafhopper *Empoasca kerri* Pruthi, and whitefly *Bemisia tabaci* (Gennadius). These pests not only reduce the vigour of the plant by sucking the sap, but also transmit diseases (Asawalam and Anumelechi, 2014). Lepidopteran pests include: tobacco caterpillar *Spodoptera litura* (F.), a polyphagous pest (Zhou et al., 2010) and the other one, the blue butterfly, *Lampides boeticus* L. which is a common one as pod borer. The yield losses caused by pod borer complex in mungbean is about 36.41% (Umbarkar et al., 2011). To manage these, many insecticides are used causing many adverse effects. The concept of host plant resistance can play a vital role in IPM as an ecofriendly measure with development and release of tolerant/ resistance varieties (Soundararajan et al., 2013). This study evaluates 13 genotypes of mungbean against major sucking and lepidopteran insect pests under field condition.

MATERIALS AND METHODS

The experiment was carried out at the breeder seed production unit, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India. Randomized block design (RBD) with three replications was used. The 13 genotypes include- TM-37, TJM-160, TJM-196, Shikha, Virat, TJM-140, PDM-139, TM-115, TJM-141, TJM-136, TJM-111, TJM-155 and TJM-137 during kharif, 2018. The row to row and plant to plant spacing was 30 x 10 cm. The observations were made at 15 DAS (days after sowing) and continued till maturity of the crop at weekly intervals on randomly selected 10 plants from each genotype. *Aphis craccivora* and *E. kerri* were observed on 10 randomly selected plants/ plot, while *B. tabaci* was observed using cage method on 10 randomly selected plants/ plot; the lepidopterans *S. litura* and *L. boeticus* were counted as no. of larvae/ 10 randomly selected plant. The data were transformed into square-root values before subjecting to statistical analysis for ANOVA.

RESULTS AND DISCUSSION

The results revealed significant differences among the evaluated genotypes (Table 1, 2); the sucking pests

Table 1. Response of genotypes of mungbean to sucking insect pests

S. no.	Genotype	Mean incidence of *B. tabaci*/ plant at stages of plant growth (DAS)							Mean incidence of *A. craccivora*/ plant at stages of plant growths (DAS)							Mean incidence of *E. kerri*/ plant at stages of plant growth (DAS)						
		15	22	29	36	43	50	57	15	22	29	36	43	50	57	15	22	29	36	43	50	57
1	TM-37	1.00	3.13	5.20	7.13	9.90	6.73	4.10	0.80	1.77	2.83	3.90	5.10	4.27	1.57	0.50	0.87	1.23	1.80	2.20	1.87	0.73
		(1.22)	(1.91)	(2.39)	(2.76)	(3.22)	(2.69)	(2.14)	(1.14)	(1.51)	(1.83)	(2.10)	(2.37)	(2.18)	(1.44)	(1.00)	(1.17)	(1.32)	(1.52)	(1.64)	(1.54)	(1.11)
2	TJM-160	1.83	3.87	6.10	9.33	12.63	8.67	4.97	0.90	2.17	2.97	4.60	5.37	4.70	1.73	0.57	1.20	1.50	2.13	2.57	2.27	0.83
		(1.53)	(2.09)	(2.57)	(3.14)	(3.62)	(3.03)	(2.34)	(1.18)	(1.63)	(1.86)	(2.26)	(2.42)	(2.28)	(1.49)	(1.03)	(1.30)	(1.41)	(1.62)	(1.75)	(1.66)	(1.15)
3	TJM-196	1.70	3.73	6.03	9.43	12.87	8.60	4.93	0.97	1.97	3.00	4.63	5.83	5.03	2.13	0.67	1.00	1.50	2.10	2.63	2.17	0.87
		(1.48)	(2.06)	(2.56)	(3.15)	(3.66)	(3.02)	(2.33)	(1.21)	(1.57)	(1.87)	(2.27)	2.52)	(2.35)	(1.62)	(1.08)	(1.22)	(1.41)	(1.61)	(1.77)	(1.63)	(1.17)
4	SHIKHA	1.10	3.20	5.30	7.43	10.10	6.43	4.20	0.87	1.63	2.50	3.77	5.07	4.20	1.37	0.47	0.90	1.30	1.73	2.07	1.70	0.63
		(1.26)	(1.92)	(2.41)	(2.82)	(3.26)	(2.63)	(2.17)	(1.17)	(1.46)	(1.73)	(2.07)	(2.36)	(2.17)	(1.37)	(0.98)	(1.18)	(1.34)	(1.49)	(1.60)	(1.48)	(1.06)
5	VIRAT	1.07	3.07	5.07	7.23	9.70	6.07	3.97	0.73	1.67	2.37	3.87	4.97	4.07	1.40	0.40	0.77	1.33	1.70	2.17	1.73	0.70
		(1.25)	(1.89)	(2.36)	(2.78)	(3.19)	(2.56)	(2.11)	(1.11)	(1.47)	(1.69)	(2.09)	(2.34)	(2.14)	(1.38)	(0.95)	(1.13)	(1.35)	(1.48)	(1.63)	(1.49)	(1.09)
6	TJM-140	1.87	3.93	6.03	9.43	13.07	8.27	4.90	1.10	2.17	3.03	4.57	5.87	5.17	1.77	0.70	1.20	1.60	2.10	2.53	2.00	0.97
		(1.54)	(2.11)	(2.56)	(3.15)	(3.68)	(2.96)	(2.32)	(1.26)	(1.63)	(1.88)	(2.25)	(2.52)	(2.38)	(1.51)	(1.09)	(1.30)	(1.45)	(1.61)	(1.74)	(1.58)	(1.21)
7	PDM-139	1.13	3.10	5.37	7.80	9.87	6.17	4.20	0.70	1.83	2.70	3.93	5.57	4.20	1.47	0.47	0.90	1.13	1.87	2.30	1.73	0.67
		(1.28)	(1.90)	(2.42)	(2.88)	(3.22)	(2.58)	(2.17)	(1.09)	(1.53)	(1.79)	(2.11)	(2.46)	(2.17)	(1.40)	(0.98)	(1.18)	(1.28)	(1.54)	(1.67)	(1.49)	(1.08)
8	TM-115	1.70	4.07	6.13	9.83	12.47	8.47	4.93	1.07	2.17	3.13	4.77	5.80	4.83	1.70	0.70	1.23	1.77	2.37	2.60	2.20	0.90
		(1.48)	(2.14)	(2.58)	(3.21)	(3.60)	(2.99)	(2.33)	(1.25)	(1.63)	(1.91)	(2.29)	(2.51)	(2.31)	(1.48)	(1.10)	(1.31)	(1.51)	(1.69)	(1.76)	(1.64)	(1.18)
9	TJM-141	1.77	4.03	6.27	9.50	12.73	8.37	4.97	0.77	2.13	3.03	4.80	6.27	4.97	1.53	0.53	1.07	1.60	2.13	2.77	2.53	0.80
		(1.51)	(2.13)	(2.60)	(3.16)	(3.64)	(2.98)	(2.34)	(1.12)	(1.62)	(1.88)	(2.30)	(2.60)	(2.34)	(1.43)	(1.02)	(1.25)	(1.45)	(1.62)	(1.81)	(1.74)	(1.14)
10	TJM-136	1.70	3.90	7.10	9.43	12.53	8.30	5.03	0.83	2.23	3.13	4.80	5.73	4.93	1.90	0.53	1.47	1.67	2.20	2.60	2.30	0.87
		(1.48)	(2.10)	(2.76)	(3.15)	(3.61)	(2.97)	(2.35)	(1.15)	(1.65)	(1.91)	(2.30)	(2.50)	(2.33)	(1.55)	(1.02)	(1.40)	(1.47)	(1.64)	(1.76)	(1.67)	(1.17)
11	TJM-111	1.90	4.23	6.17	9.80	12.57	8.37	5.47	1.37	2.40	3.27	4.80	5.90	5.33	1.83	0.73	1.13	1.57	2.17	2.57	2.17	0.80
		(1.55)	(2.18)	(2.58)	(3.21)	(3.61)	(2.98)	(2.44)	(1.37)	(1.70)	(1.94)	(2.30)	(2.53)	(2.42)	(1.53)	(1.11)	(1.27)	(1.44)	(1.63)	(1.75)	(1.63)	(1.14)
12	TJM-155	1.77	4.07	6.27	9.53	12.77	8.40	5.13	1.17	2.77	3.17	5.40	5.97	5.10	1.80	0.87	1.27	1.57	2.10	2.50	2.17	0.83
		(1.51)	(2.14)	(2.60)	(3.17)	(3.64)	(2.98)	(2.37)	(1.29)	(1.81)	(1.91)	(2.43)	(2.54)	(2.37)	(1.52)	(1.17)	(1.33)	(1.44)	(1.61)	(1.73)	(1.63)	(1.15)
13	TJM-137	2.03	4.57	7.27	10.80	13.87	9.60	5.10	1.13	2.50	3.07	5.10	5.97	4.93	1.87	0.67	1.17	1.50	2.10	2.60	2.13	0.83
		(1.59)	(2.25)	(2.79)	(3.36)	(3.79)	(3.18)	(2.37)	(1.28)	(1.73)	(1.89)	(2.37)	(2.54)	(2.33)	(1.54)	(1.08)	(1.29)	(1.41)	(1.61)	(1.76)	(1.62)	(1.15)
	SEm±	0.13	0.12	0.13	0.19	0.21	0.20	0.11	0.08	0.11	0.08	0.12	0.09	0.10	0.08	0.06	0.09	0.07	0.07	0.06	0.08	0.05
	CD at 5%	0.41	0.38	0.41	0.60	0.65	0.61	0.33	0.26	0.33	0.24	0.36	0.27	0.30	0.24	0.20	0.26	0.21	0.20	0.20	0.25	0.16

DAS: Days after sowing; Values mean of three replications; Values parentheses square root transformed values.

Table 2. Response of genotypes of mungbean to lepidopteran insect pests

S. no	Genotype	Mean larval incidence- *S. litura/* plant at stage of plant growth (DAS)				Mean larval incidence- *L. boeticus/* plant at stage of plant growth (DAS)				
		36	43	50	57	29	36	43	50	57
1	TM-37	0.20	0.40	0.30	0.20	0.13	0.33	0.60	0.40	0.20
		(0.84)	(0.95)	(0.89)	(0.84)	(0.80)	(0.91)	(1.05)	(0.95)	(0.84)
2	TJM-160	0.23	0.47	0.37	0.23	0.17	0.33	0.57	0.43	0.30
		(0.86)	(0.98)	(0.93)	(0.86)	(0.82)	(0.91)	(1.03)	(0.97)	(0.89)
3	TJM-196	0.23	0.43	0.33	0.23	0.17	0.37	0.57	0.47	0.20
		(0.86)	(0.97)	(0.91)	(0.86)	(0.82)	(0.93)	(1.03)	(0.98)	(0.84)
4	SHIKHA	0.13	0.37	0.23	0.13	0.07	0.20	0.40	0.33	0.17
		(0.80)	(0.93)	(0.86)	(0.80)	(0.75)	(0.84)	(0.95)	(0.91)	(0.82)
5	VIRAT	0.17	0.33	0.27	0.20	0.03	0.17	0.37	0.30	0.20
		(0.82)	(0.91)	(0.88)	(0.84)	(0.73)	(0.82)	(0.93)	(0.89)	(0.84)
6	TJM-140	0.30	0.50	0.37	0.23	0.10	0.33	0.63	0.47	0.23
		(0.89)	(1.00)	(0.93)	(0.86)	(0.77)	(0.91)	(1.06)	(0.98)	(0.86)
7	PDM-139	0.17	0.37	0.27	0.17	0.07	0.23	0.43	0.37	0.20
		(0.82)	(0.93)	(0.88)	(0.82)	(0.75)	(0.86)	(0.97)	(0.93)	(0.84)
8	TM-115	0.23	0.47	0.47	0.23	0.13	0.37	0.60	0.47	0.23
		(0.86)	(0.98)	(0.98)	(0.86)	(0.80)	(0.93)	(1.05)	(0.98)	(0.86)
9	TJM-141	0.33	0.57	0.37	0.23	0.20	0.37	0.60	0.43	0.13
		(0.91)	(1.03)	(0.93)	(0.86)	(0.84)	(0.93)	(1.05)	(0.96)	(0.80)
10	TJM-136	0.27	0.47	0.30	0.20	0.13	0.33	0.53	0.53	0.20
		(0.88)	(0.98)	(0.89)	(0.84)	(0.80)	(0.91)	(1.02)	(1.02)	(0.84)
11	TJM-111	0.27	0.40	0.27	0.30	0.17	0.37	0.50	0.40	0.27
		(0.88)	(0.95)	(0.88)	(0.89)	(0.82)	(0.93)	(1.00)	(0.95)	(0.87)
12	TJM-155	0.23	0.50	0.33	0.20	0.13	0.43	0.53	0.40	0.20
		(0.86)	(1.00)	(0.91)	(0.84)	(0.80)	(0.97)	(1.02)	(0.95)	(0.84)
13	TJM-137	0.27	0.47	0.37	0.20	0.23	0.37	0.63	0.43	0.23
		(0.88)	(0.98)	(0.93)	(0.84)	(0.86)	(0.93)	(1.06)	(0.97)	(0.86)
	SEm±	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.04	0.03
	CD at 5%	0.12	0.12	0.13	0.10	0.13	0.15	0.15	0.12	0.10

DAS: Days after sowing; Values mean of three replications; Values parentheses square root transformed values

started occurring from 15 days old crop and prevailed till maturity; incidence of blue butterfly and tobacco caterpillar was observed from 29- and 36-days old crop, respectively and these prevailed till maturity. The least incidence of whitefly/ plant (5.17) was observed with Virat genotype followed by TM-37 (5.31), PDM-139 (5.38) and Shikha (5.40), the maximum was in TJM-137 (7.60) and TJM-111 (6.17); least aphid incidence was again with Virat (2.73), while maximum was on TJM-155 (3.63); leaf hopper incidence was again less with Virat (1.26) and also Shikha (1.26), while it was maximum with TM-115 (1.68). These results are in conformity with those of Yadav and Dahiya (2000). Rahad et al. (2018) on whitefly and aphid; Singh and Singh (2014) on leafhopper; and Singh et al. (2019) on whitefly and leafhopper. The lepidopterans *S. litura* was at its minimum on Shikha (0.22) and maximum with TJM-141 (0.38); and *L. boeticus* was at its least on Virat (0.21) and maximum on TJM-137 (0.38). Mandal (2005) with 18 cultivars on *Maruca testulalis* and *L. boeticus* observed that PDM 219, RMG 175, RMG 202, Pusa 8974, Pusa Baisakhi and K-851 were resistant. Thus, in the present study Virat, PDM-139, Shikha and TM-37 were found with tolerance (low incidence) and these can be explored in the resistance breeding programme of mungbean.

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