



PREFERENCE OF WHITE FLY *BEMISIA TABACI* (GENNADIUS) AND BIHAR HAIRY CATERPILLAR *SPILOSOMA OBLIQUA* (WALKER) TO BLACK GRAM CULTIVARS

KRISHNA PATEL*, M.A. ALAM, AKHILESH KUMAR AND SACHIN KUMAR JAISWAL**

Department of Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya,
Jabalpur, College of Agriculture, Rewa 48600, Madhya Pradesh

**Department of Entomology, College of Agriculture,
Indira Gandhi Krishi Vishwavidyalaya, Raipur 492012

*Email: ketupatel8871@gmail.com (corresponding author)

ABSTRACT

Field experiment was carried out during *Kharif* 2017-18 at the Instructional unit of JNKVV-College of Agriculture Rewa (M.P) studies include the evaluation of black gram cultivars for preference to the whitefly *Bemisia tabaci* (Gennadius) and Bihar hairy caterpillar *Spilosoma obliqua* (Walker).

Key words: Black gram, cultivars, *Bemisia tabaci*, *Spilosoma obliqua*, incidence, trichome density, leaf area, branches, leaves

Black gram *Vigna mungo* (L.) or urd bean is an important short duration *kharif* pulse crop, and in this crop biotic stresses, mainly insect pests are the limiting factor causing 7-35% yield loss (Justin et al., 2015). The crop is infested by several insect pests from sowing to harvest (Lal and Sachan, 1987). The most common ones are the whitefly (*Bemisia tabaci*), jassid (*Empoasca* spp.) and green leaf hopper (*Nephotettix* spp.), grasshopper (*Atractomorpha* spp.), leaf webber (*Grapholita critica*), grey weevil (*Myloccerus* spp.), tobacco caterpillar (*Spodoptera litura*), hairy caterpillar (*Spilosoma obliqua* and epilachna beetle (*Epilachna* spp.). Flower thrips (*Caliothrips* sp.) and leaf miner (*Chromatomyia horticola*) are recognized as a pollen feeder and tissue damaging insects, respectively (Kumar et al., 2007). In Rewa district, severe yield loss is caused by the whitefly as these also transmit yellow mosaic disease, while the other important pest is Bihar hairy caterpillar (Kumar et al., 2017; Rajawat et al., 2017). One of the best approaches to manage these is the use of resistant cultivars. The objective of the present study is to evaluate the morphological characters of some cultivars of black gram, like trichome density, leaf area, number of branches, number of leaves towards preference of these by these pests.

MATERIALS AND METHODS

A field experiment was conducted at the Entomology Instructional Farm, JNKVV, College of Agriculture Rewa (M.P.) during *kharif* 2017-18 on 15 cultivars. The experiment was laid out in Complete Randomized

Block Design and all agronomic practices were followed as per recommendations. The population of whitefly (nymph and adults) was observed on five randomly selected plants (on upper, middle and lower leaves) from two rows of each cultivar. Bihar hairy caterpillar larvae were observed on ten randomly selected plants from two rows of each cultivar. These observations were made at weekly intervals up to harvest. The yield parameters viz., number of pods/ plants, and grains/ pod, length of pods and yield/ plot were observed at 30, 45, and 60 days after germination. The plant characters viz., plant height, number of branches and leaves/ plant, leaf area index, and trichome density/ unit area were also observed.

RESULTS AND DISCUSSION

The data given in Table 1) indicate that the *B. tabaci* infestation started on cultivars during the 33rd SW (2nd week after germination). The maximum population (6.89 nymphs and adults/ plant) was observed in KPU 564-24, and there was no infestation in TU 94-2, SHEKAR-3, Mash-1008, KUG-725, SHEKAR-2. On 34th SW, the maximum of 21.02 nymph and adults / plant was in KPU-564-24 and minimum in TU-94-2; and on 35th SW, maximum of 37.82 nymph and adults /plant was observed in the check, T-9 while minimum of 13.46 nymph and adults /plant was in TU-94-2. On 36th SW, maximum of 42.03 nymph and adults /plant was in T-9 while minimum of 15.22 nymph and adults /plant was in TU 94-2. Similar trend was observed in 37th and 38th standard weeks. The cultivar T-9 was found relatively susceptible, while TU- 94-2 appeared to be less preferred. Similar findings had been reported by Kumar et al. (2004), and T-9 was found susceptible.

Table 1. Incidence of *B. tabaci* (no/plant) in blackgram cultivars of Black gram

S.No.	Cultivar	Standard weeks								Mean
		1	2	3	4	5	6	7	8	
1	PU-35	0	5.65 (2.47)	14.43 (3.86)	27.96 (5.33)	33.09 (5.79)	42.24 (6.53)	36.02 (6.04)	32.00 (5.70)	23.92 (4.94)
2	PU-30	0	3.93 (2.10)	11.00 (3.39)	23.67 (4.91)	29.17 (5.44)	37.85 (6.19)	32.53 (5.74)	27.39 (5.28)	20.69 (4.60)
3	SHEKAR-2	0	0 (0.70)	11.43 (3.45)	25.43 (5.09)	31.25 (5.63)	37.47 (6.16)	31.0 (5.61)	28.87 (5.41)	20.69 (4.60)
4	TU 94-2	0	0 (0.70)	6.28 (2.60)	13.46 (3.73)	15.22 (3.96)	18.11 (4.31)	16.09 (4.07)	14.07 (3.81)	10.40 (3.30)
5	RUG-10	0	4.98 (2.34)	15.32 (3.97)	23.36 (4.88)	29.11 (5.44)	34.17 (5.88)	30.06 (5.52)	26.31 (5.17)	20.41 (4.57)
6	SHEKAR-3	0	0 (0.70)	9.05 (3.09)	19.03 (4.41)	22.17 (4.76)	25.90 (5.13)	23.53 (4.90)	19.17 (4.43)	14.85 (3.91)
7	JU-3	0	4.02 (2.12)	12.79 (3.64)	21.65 (4.70)	27.55 (5.29)	33.62 (5.84)	27.14 (5.25)	24.58 (5.00)	18.91 (4.40)
8	JU-86	0	4.92 (2.32)	16.13 (4.07)	32.38 (5.73)	37.14 (6.13)	45.11 (6.75)	36.96 (6.12)	32.97 (5.78)	25.70 (5.11)
9	Mash- 1008	0	0 (0.70)	8.01 (2.91)	18.97 (4.41)	22.62 (4.80)	27.45 (5.28)	22.89 (4.83)	19.01 (4.41)	14.86 (3.91)
10	IPU 54-2	0	2.96 (1.86)	15.84 (4.04)	29.11 (5.44)	34.99 (5.95)	41.17 (6.45)	34.88 (5.94)	29.37 (5.46)	23.54 (4.90)
11	KPU 564-24	0	6.89 (2.71)	21.02 (4.63)	36.09 (6.04)	41.96 (6.51)	47.62 (6.93)	41.00 (6.44)	33.03 (5.79)	28.45 (5.38)
12	LBG- 752	0	4.01 (2.12)	14.51 (3.87)	24.19 (4.96)	30.09 (5.53)	37.53 (6.16)	31.89 (5.69)	27.09 (5.25)	21.16 (4.65)
13	KUG-725	0	0 (0.70)	7.60 (2.84)	17.55 (4.24)	31.26 (5.63)	24.49 (4.99)	31.41 (5.64)	17.75 (4.27)	16.25 (4.09)
14	LBG-623	0	5.89 (2.52)	17.95 (4.29)	31.82 (5.68)	35.97 (6.03)	42.79 (6.57)	23.44 (4.89)	31.07 (5.61)	23.61 (4.91)
15	T-9 (Check)	0	5.88 (2.52)	15.97 (4.05)	37.82 (6.19)	42.03 (6.52)	48.87 (7.02)	44.03 (6.67)	42.96 (6.59)	29.69 (5.49)
	SEM		0.01	0.02	0.02	0.01	0.07	0.01	0.01	
	CD (p=0.05)		0.05	0.07	0.06	0.05	0.20	0.04	0.05	

* Figure in parentheses square root transformed values $\sqrt{X + 0.5} / \sqrt{X + 0.5}$

The *S. obliqua* infestation started in the 34th SW with the maximum (1.90 larva/10 plants) incidence being in the cultivar KPU-564-24 while no population was observed on PU-30, RUG-10, TU-94-2, SHEKAR-3 and Mash-1008. The infestation started increasing with 35th SW with a maximum of 2.87 larva/10 plants in the cultivar KPU-564-24 and the least of 1.59 larva/10 plants in Mash-1008. Thereafter it remained static. KPU-564-24 appeared to be the most preferred (8.36larva/10 plants) but on par with T-9, JU-86, KUG-725, RUG-10, LBG-752, JU-3, PU-35 and LBG-623. Present observations derive support from those of Yadav et al. (1978). Yadav et al. (1992) had observed that its infestation period was from August to October.

The results on the interaction of plant characters with infestation as regards the plant height, number of

branches and leaves, leaf area, trichome density/ unit area are given in Figs. 1,2. These reveal that the plant height showed a negative correlation ($r=-0.44$; -0.49 ; -0.18), and these relationships were very weak as regards *B. tabaci*. Similar observations had been earlier shown (Khalil, 2015). On the other hand, number of branches revealed a positive correlation ($r=0.20$; 0.08 ; and 0.26 , as observed by Javed et al. (2011) in brinjal. Likewise, number of leaves and leaf area too had a positive correlation. Similar finding as regards leaf area was observed by Naqvi et al. (2008) in brinjal. The trichome density exhibited a significant negative correlation ($r = -0.94$; -0.93 ; and -0.08) during various stages of plant growth with significant variations in the cultivars evaluated. Similar findings were reported by Taggar and Gill (2012).

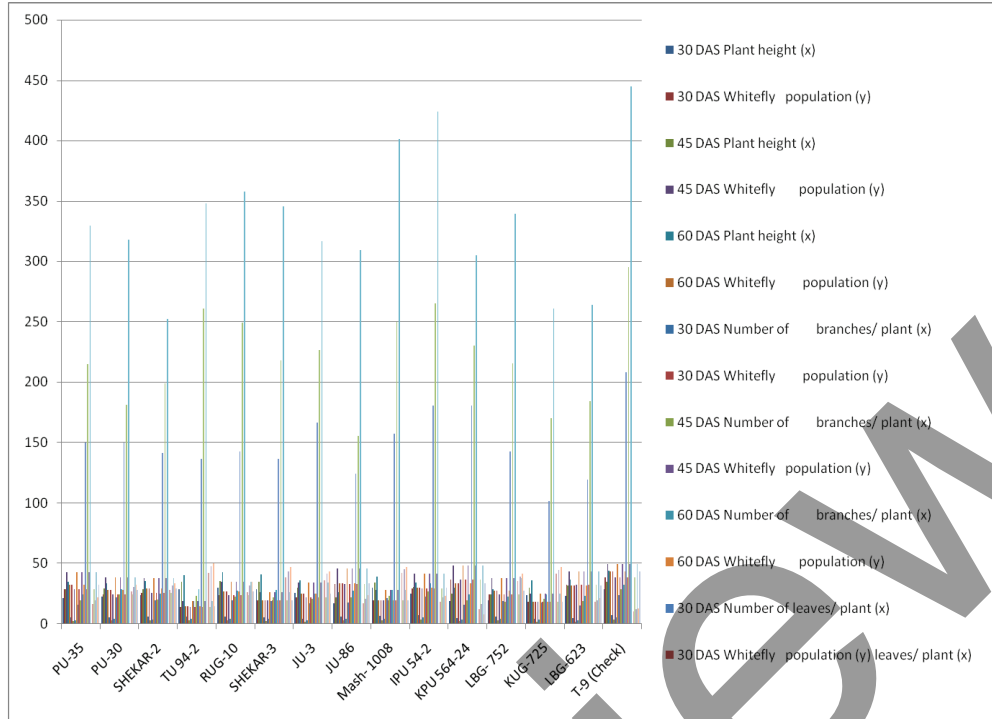


Fig. 1. Correlation- plant height and whitefly population at 30 ,45 and 60 DAS, Correlation between number of leaves/plant and whitefly population at 30 , 45 and 60 DAS

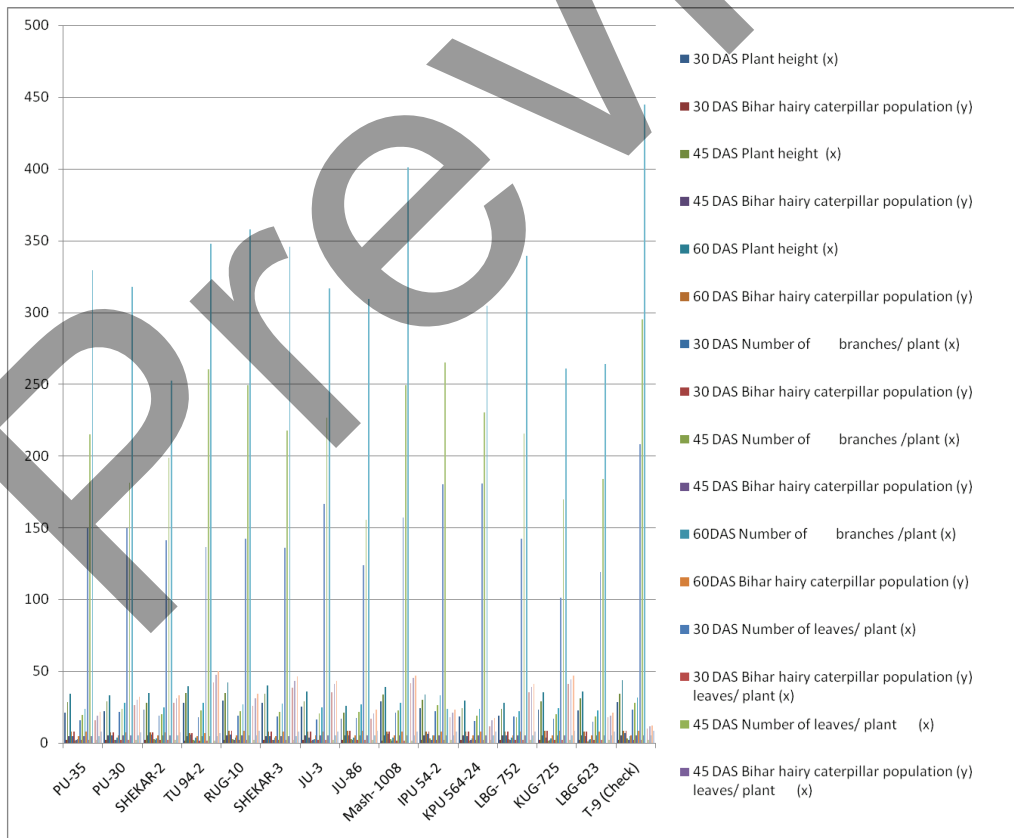


Fig. 2. Correlation between plant height and Bihar hairy caterpillar population at 30 ,45 and 60 DAS, Correlation between number of branches/plant and Bihar hairy caterpillar population at 30 ,45 and 60 DAS

Table 2. Incidence of *S. obliqua* (No. of larva/ 10 plants) in cultivars of black gram

S. No.	Cultivar	Standard weeks								Mean
		1	2	3	4	5	6	7	8	
1	PU-35	0	0	0.91 (1.18)	2.10 (1.61)	3.23 (1.93)	4.99 (2.34)	5.70 (2.48)	8.05 (2.92)	3.12 (1.90)
2	PU-30	0	0	0.00 (0.87)	1.88 (1.54)	2.52 (1.73)	5.07 (2.36)	5.51 (2.45)	7.22 (2.77)	2.77 (1.80)
3	SHEKAR-2	0	0	1.00 (1.22)	2.13 (1.62)	2.93 (1.85)	5.07 (2.36)	5.85 (2.51)	7.24 (2.78)	3.02 (1.87)
4	TU 94-2	0	0	0.00 (0.87)	1.64 (1.46)	3.33 (1.95)	4.96 (2.33)	5.33 (2.41)	7.07 (2.75)	2.79 (1.81)
5	RUG-10	0	0	0.00 (0.87)	1.99 (1.57)	2.30 (1.67)	5.22 (2.39)	6.35 (2.61)	8.17 (2.94)	3.00 (1.87)
6	SHEKAR-3	0	0	0.00 (0.87)	1.90 (1.54)	3.18 (1.91)	4.95 (2.33)	5.80 (2.50)	7.85 (2.88)	2.96 (1.86)
7	JU-3	0	0	1.50 (1.40)	2.10 (1.61)	3.79 (2.07)	5.14 (2.37)	6.14 (2.57)	8.09 (2.93)	3.34 (1.95)
8	JU-86	0	0	0.33 (1.05)	2.25 (1.65)	3.12 (1.90)	5.25 (2.39)	7.11 (2.75)	8.22 (2.95)	3.28 (1.94)
9	Mash- 1008	0	0	0.00 (0.87)	1.59 (1.44)	2.39 (1.70)	3.11 (1.90)	3.23 (1.93)	4.83 (2.30)	1.89 (1.54)
10	IPU 54-2	0	0	1.46 (1.39)	2.18 (1.63)	3.47 (1.99)	5.06 (2.35)	5.77 (2.50)	7.66 (2.85)	3.20 (1.92)
11	KPU 564-24	0	0	1.90 (1.54)	2.87 (1.83)	4.41 (2.21)	5.83 (2.51)	8.12 (3.57)	8.36 (2.97)	3.68 (2.04)
12	LBG- 752	0	0	0.66 (1.05)	1.87 (1.53)	3.73 (2.05)	5.11 (2.36)	6.86 (2.71)	8.15 (2.94)	3.29 (1.94)
13	KUG-725	0	0	1.23 (1.31)	2.19 (1.64)	3.57 (2.01)	5.25 (2.39)	7.33 (2.79)	8.22 (2.95)	3.47 (1.99)
14	LBG-623	0	0	0.66 (1.05)	2.08 (1.60)	3.11 (1.89)	5.07 (2.36)	6.53 (2.65)	8.00 (2.91)	3.18 (1.91)
15	T-9 (Check)	0	0	0.66 (1.05)	2.18 (1.63)	3.19 (1.92)	5.11 (2.36)	6.05 (2.55)	8.33 (2.96)	3.18 (1.91)
	SEM	0	0	0.13	0.005	0.03	0.01	0.02	0.01	
	CD at 5%	0	0	0.40	0.01	0.09	0.03	0.07	0.03	

* Figure in parentheses square root transformed values $\sqrt{X + 0.5}\sqrt{X + 0.5}$

As regards, *S. obliqua*, a negative correlation existed between the plant height and pest population. The plant height was maximum 29.40 cm/plant in RUG-10 and minimum 16.78 cm/plant in JU-86 at 30 DAS, and at 60 DAS was found maximum 43.57 cm/plant in T-9 while minimum 25.98 cm/plant in JU-86. The 'r' value was found to be -0.08 at 60 DAS which was not significant. Similar findings were reported by Nautiyal et al. (2015) reported that the plant height, number of primary branches, nodes and pods were found to be non significant. It was concluded that varieties SL 979, RVS 2001-18, JS 2071 are comparatively less preferred having less infestation, while MACS 1340, MACS 1394 was more preferred. The number of branches had a positive correlation with the pest population, and number of branches was found maximum (3.16

branches/plant) in T-9 while minimum 1.28 branches/plant in JU-3 at 45 DAS. Similar findings had been reported by Nautiyal et al. (2015).

The number of leaves had a negative correlation with *S. obliqua*, it was maximum 23.37 leaves/plant in T-9 while minimum 14.68 leaves/plant was observed in LBG-623 at 30 DAS. Overall, a negative correlation was observed with observations at all stages. Contrasting finding was reported by Rahman (2011) in jute. Interaction of leaf area exhibited a positive correlation with variations- it was maximum 208.23 cm²/plant in T-9 while minimum 101.08 cm²/plant in KUG-725 at 30 DAS. Overall, a weak positive correlation existed as regards leaf area. Trichome density revealed a negative correlation, it was maximum of 41.90 in fixed area in

TU-94-2 while minimum 9.83 in fixed area in T-9 at 30 DAS. Overall, a negative correlation was observed between the trichome density at all stages. Similar findings were reported by Nautiyal et al. (2015) in soybean against *Spodoptera litura*) and *S. obliqua*.

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