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ISSN: 2320 – 7051
Int. J. Pure App. Biosci. SPI: **6 (3):** 441-446 (2018)

Research Article

Evaluation of Urdbean Cultivars for Resistance or Tolerance against White Fly (*Bemisia tabaci* Gennadius) and Bihar Hairy Caterpillar (*Spilosoma oblique* walker)

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Received: 10.07.2018 | Revised: 22.08.2018 | Accepted: 1.09.2018

ABSTRACT

Field experiment were carried out during Kharif, 2017 at instructional unit of JNKVV, college of Agriculture Rewa (M.P) studies include the evaluation of urdbean cultivars for resistance or tolerance interaction against White fly (Bemisia tabaci Gennadius) and Bihar hairy caterpillar (Spilosoma oblique walker) and Exploration of physical characters of the genotypes, responsible for the low infestation of the mentioned insects. The study concerning with the evaluation of urdbean cultivars for resistance or tolerance interaction against White fly had indicated that whitefly infestation on different cultivars started in the 2nd week of August 2017. In the fourth week after germination (35th SW); the highest population of 37.82 N&A /plant was recorded in check T-9 while minimum; 13.46 N&A /plant in TU 94-2. The check T-9 was found susceptible to whitefly while TU 94-2 appeared to be least infested genotype. The population of Nymph and Adult of whitefly was least 14.07/plant in TU 94-2 which was at par with Mash-1008, LBG-623, SHEKHAR-3, JU-3, SHEKAR-2, IPU 54-2, While check T-9 had indicated highest infestation of whitefly (42.96 N&A /plant). While Bihar hairy caterpillar infestation started in the third week after germination (34th SW); The highest population (8.36 larva / 10 plants) of Bihar hairy caterpillar was recorded in the eighth week after germination in genotype KPU 564-24 and the lowest (4.83 /10 plants) on Mash-1008. On the basis of overall response of different genotypes of urdbean: Mash-1008 appeared to be the least susceptible (4.83 larva /10 plants) genotype. Of course, it was at par with TU 94-2, PU-30 SHEKAR-2, IPU 54-2 and SHEKHAR-3. The genotype KPU 564-24 appeared as a susceptible genotype with infestation level of (8.33 larva /10 plants).

Key words: *Urdbean, White fly, Bihar hairy caterpillar, Resistance*

INTRODUCTION

Blackgram, *Vigna mungo* (L.) or urdbean is an important short duration *Kharif* pulse crop, usually cultivated on marginal and sub-marginal lands which is being cultivated in an area of 35.31 lac ha in The country with an annual production of 2.89 million tones and productivity of 566 kg/ha. Madhya Pradesh occupy about 9.32 lac ha area with the average productivity of 553 kg/ha.

Cite this article: Patel, K., Alam, M. A., Jaiswal, S. K., Rajawat, I. S. and Singh, A., Evaluation of Urdbean Cultivars for Resistance or Tolerance against White Fly (*Bemisia tabaci* Gennadius) and Bihar Hairy Caterpillar (*Spilosoma oblique* walker), *Int. J. Pure App. Biosci.* SPI: **6(3):** 441-446 (2018).

In Rewa district about1.6 lac ha area is under the cultivation of urdbean and average productivity is about 434 kg/ha, which is quite low in comparison to state & national level productivity[1]. There are several reasons for the low yield of this crop in the region, but biotic stresses mainly Insect pests have been recognized as a major limiting factor and responsible for 7-35 % yield loss[2]. The crop is infested by several insect pests from sowing to harvest in field as well as in storage.The most common insect pests are Whitefly (*Bemisia tabaci*), jassid (*Empoasca* spp.) and green leaf hopper (*Nephotettix* spp.) as a plant sap sucking insects, while Grasshopper (*Atractomorpha* spp.), leaf webber (*Grapholita critica*), grey weevil (*Myllocerus* spp.), tobacco caterpillar (*Spodoptera litura*), hairy caterpillar (*Spilosoma obliqua* [*Spilarctia obliqua*]) and epilachna beetle (*Epilachna* spp.) as a defoliating pests, Flower thrip (*Caliothrips* sp.) & leaf miner (*Chromatomyia horticola*) are recognized as a pollen feeder and tissue borer insects respectively[3].These insect pests have also been recognized as an Important pests, In Rewa district and inflict sever yield loss every year and need their management by eco-friendly means. Whitefly whose nymphs & adults suck the plant sap from leaves & tender parts of the plants besides secreting honeydew, on which sooty mold develops, resulting in reduction in plant vigour due to poor photosynthesis activity of the plant and transmission of yellow mosaic disease of course, the management of these pests can be done through insecticides but the crop being susceptible to virus infection, their control be initiated at the initial stage of infestation which often goes unnoticed, Hence the best approach to manage this menace is through resistant cultivar/genotype which is not only eco-friendly but economical & had a wider adoptability. Infest the morphological characters of the plants like trichome density, leaf area, number of branches, number of leaves *etc*. are considered to play an important role in plant defense mechanisms and reducing the infestation level of the pests.

MATERIAL AND METHODS

A field experiment was conducted at Entomology Instructional Farm, JNKVV, college of Agriculture Rewa (M.P.) during *kharif* 2017-18 on 15 cultivars of Urdbean. The experiment was laid out in Complete Randomized Block Design and all agronomic practices followed as per recommendations. - The population of whitefly (Nymph & adults) was recorded on five randomly selected plants from two rows of each entries and the observation was recorded at weekly interval upto harvest of the crop. The population of whitefly was recorded on upper, middle and lower leaves of selected plants. Whereas larval population of Bihar hairy caterpillar was recorded on ten randomly selected plants from two rows of each entries. The observation was recorded at weekly interval upto harvest of the crop. Number of pods/plant, Number of grains/pod, Length of pods and Yield/plot were also recorded. The pest population on each entries were counted on five randomly selected plants at 30, 45, and 60 days old crop after germination and their association with the following parameters of the plant were studied. Which is Plant height, Number of branches per plant, Number of leaves per plant, Leaf area index, Trichome density (per unit area)?

RESULTS AND DISCUSSION

The present finding on evaluation of urdbean cultivars for resistance or tolerance against White fly (Table-1 and Fig 1) indicated that at the beginning of whitefly infestation on different cultivars in the 33rd SW or 2nd week of August (2nd week after germination). The maximum whitefly population (6.89 N&A/plant) was recorded in KPU 564-24 genotype while almost no population of whitefly was recorded in other cultivars. TU 94-2, SHEKAR-3, Mash-1008, KUG-725, SHEKAR-2. In third week after the germination (34th SW). The highest population of 21.02 N&A /plant. was noted in genotype KPU-564-24 and minimum 6.28 N&A /plant in TU 94-2. In the fourth week after germination (35th SW); the highest population

of 37.82 N&A /plant was recorded in check T-9 while minimum; 13.46 N&A /plant in TU 94-2. In the fifth week after germination (36th SW); the highest population of whitefly i.e. 42.03 N&A /plant was recorded in T-9 while minimum 15.22 N&A /plant in TU 94-2. Similar trend of infestation level was recorded in the sixth week and seventh week after germination which occurred in 37th & 38th standard week, respectively, of course, lower intensity of whitefly was noted in 38th standard week. The variety T-9 was found to be susceptible to whitefly while TU 94-2 appeared to be resistance cultivar. The final observation was recorded in the aforesaid genotype had shown the same pattern of infestation , on the basis of response of different genotypes; TU 94-2 was the least susceptible genotype (14.07 N&A /plant) but was of found at par with, Mash-1008, LBG-623, SHEKHAR-3, JU-3, SHEKAR-2, IPU 54-2, While check T-9 had indicated highest infestation of whitefly (42.96 N&A /plant) and were at par with cultivars/genotypes KPU 564-24, JU-86, PU-30, KUG-725, RUG-10, LBG-752, ,PU-35 during the *Kharif* 2017. Similar findings were reported by Kumar *et al.*[4], which in inconformity with present findings .They reported the check T-9 was a susceptible variety.

Bihar hairy caterpillar

The beginning of Bihar hairy caterpillar infestation started in the third week after germination (34th SW); The highest population (1.90 larva/10plants) was noted on genotype KPU 564-24 while nil on PU-30, RUG-10, TU 94-2, SHEKAR-3 and Mash-1008 cultivars, the Bihar hairy caterpillar infestation started increasing in the fourth week after germination (35th SW); (Table 2 and Fig 2) The highest population (2.87 larva/10 plants) was indicated by genotype KPU 564-24 and the lowest (1.59 larva/10 plants) by Mash-1008. Similar trend were observed In the fifth, sixth seventh and eight week after germination The highest population of Bihar hairy caterpillar was recorded in the eight week was (8.36 larva/10 plants) in genotype KPU 564-24 and the lowest (4.83larvae/10 plants) on Mash-1008. On the basis of overall response of different cultivars or genotypes of urdbean genotype Mash-1008 appeared to be least susceptible (4.83 larva/10plants) genotype. Of course, it was at par with TU 94-2, PU-30 SHEKAR-2, IPU 54-2 and SHEKHAR-3. The genotype KPU 564-24 appeared to be a susceptible with infestation level of 8.36larva/10 plants. Of course, it was not significantly associated with T-9, JU-86, KUG-725, RUG-10, LBG-752, JU-3, PU-35 and LBG-623 *Kharif* 2017**.** Present study get support from the study of Yadava *et al* (1978) who studied the response of Bihar hairy caterpillar on 15 varieties of black gram. Yadav *et al*.[5], also reported the infestation period August to October on Black gram. Which extended support the present finding on the infestation period of this on black gram.

Table1:-Average weekly population of whitefly/plant in various cultivars / genotypes of urdbean:

S. No.	Name of cultivars	Population of whitefly in different 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 at 5%		0.05	0.07	0.06	0.05	0.20	0.04	0.05	

Note:- * Figure in parenthesis are square root transformed values $\sqrt{X + 0.5}$

Table2.:- Average weekly population of Bihar hairy caterpillar/10 plant plant in various cultivars / genotypes of urdbean:

S.N.	Name of cultivars/ entries	Population of Bihar hairy caterpillar in various 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	**Tk)**	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	

Note- * Figure in parenthesis are square root transformed values $\sqrt{X + 0.5}$

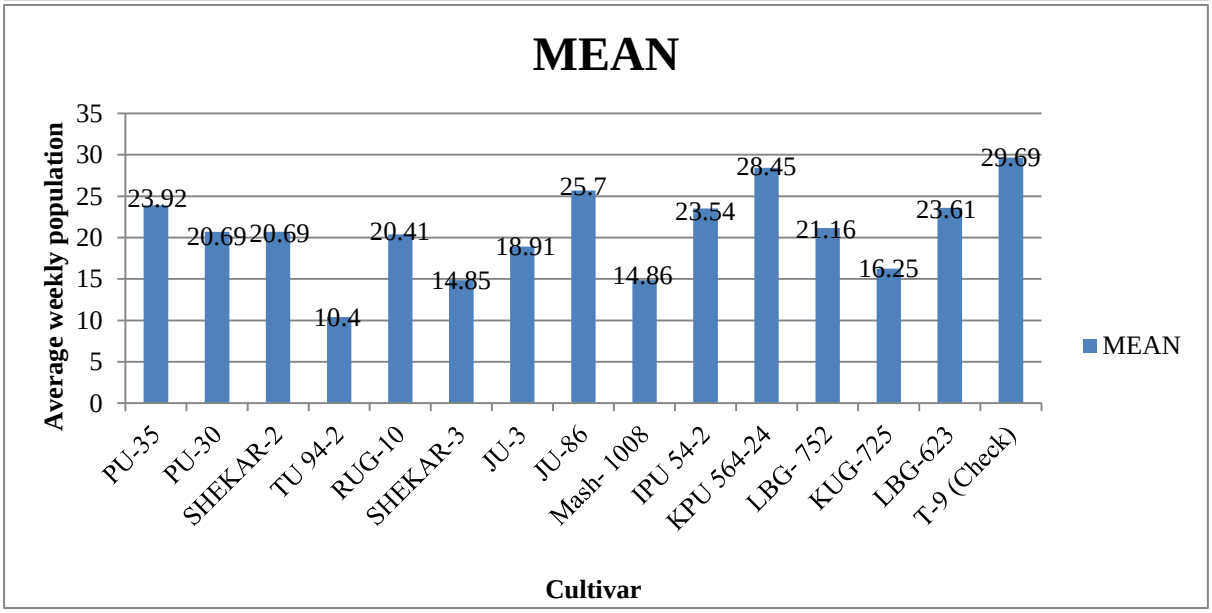

Fig. 1:- Average weekly population of whitefly/plant in various cultivars / genotypes of urdbean

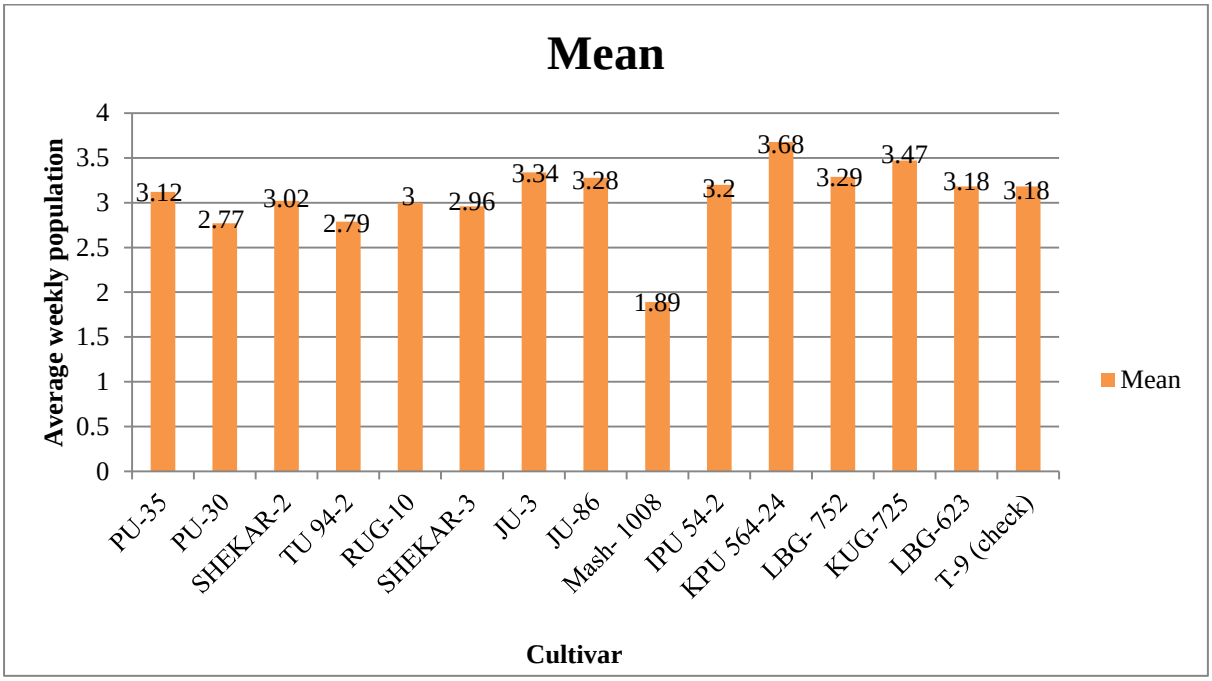

Fig. 2.:- Average weekly population of Bihar hairy caterpillar/ ten plants in various cultivars / genotypes of urbean

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