The Andhra Agric. J 56(2):201-205, 2009

Screening of Blackgram Genotypes against Thrips *(Scirtothrips Dorsalis)* and Spotted Pod Borer *[Maruca Vitrata* (Geyer)].

C Sandhya Rani, K B Eswari and A.Sudarshanam
Agricultural Research Station, Madhira -507 203, Khammam district, Andhra Pradesh.

ABSTRACT

Blackgram entries (16) in Preliminary Varietal Trial were screened for three years, 2004, 2005 & 2006 in rabi season to evaluate their reaction against *Scirtothrips dorsalis* and *Maruca vitrata* (Geyer) at Agricultural Research Station, Madhira, Khammam district. Pooled results of thrips incidence and percent pod damage due to *Maruca* over three years were computed. Based on their performance, the entries, MBG 223 (7.97%) & MBG 222 (10.26%) were found to be resistant and MBG 225 (22.54 %) was susceptible and remaining entries were moderately susceptible to *Maruca* damage. The entries, MBG 221, MBG 223 & MBG 217 recorded higher yields 782, 755 & 705 Kg ha^{-1} respectively, whereas the entry MBG 229 (467) recorded poor yield compared to the check varieties LBG 623 (614) & LBG 20 (668 Kg ha^{-1}).

Key words : Blackgram, Genotypes,*Maruca,*Screening, Thrips.

Blackgram is an important pulse crop grown in India and in A.P and widely cultivated in *kharif, rabi* and rice-fallows (Nov - March). The crop is vulnerable to a number of pests, among which sucking pests like thrips, a vector of Peanut bud necrosis virus (Sreekanth, 2002) was considered to be a major threat causing 40 % yield loss (Nene, 1972). *Maruca vitrata* (Geyer) is also serious pest of blackgram (Taylor, 1978) and it is basically a hidden pest, competes its larval development inside the web formed by rolling & tying together leaves, flowers, buds and pods. A thresh hold of 40% larval infestation in flowers has been established by Ogunwolu, 1990. The reduction in grain yield by *Maruca* is estimated to be 9 - 84% (Patel and Singh, 1977; Vishakanthaiah and Jagadeesh babu, 1980). It attacks the crop right from the pre flowering stage to pod maturity stage causing yield losses to the tune of 2.0 -60% (Singh and Allen,1980).

MATERIAL AND METHODS

Three field experiments with 16 blackgram entries and two released varieties as checks were conducted at Agricultural Research Station., Madhira, Khammam district during rabi season of 2004, 2005 & 2006. Experiments were laid out in randomized block design with three replications. Each entry was sown in a plot of two rows of 4m length, with an inter row spacing of 30 cm and intra row spacing of plants kept at 10 cm. Observations were recorded on five randomly selected plants for each entry in each replication from 10 days after germination of the crop. Thrips population / plant was counted from two terminal leaves of each plant by taping on white chart, from two leaf stage to harvest of the crop at weekly intervals. *Maruca* incidence was observed from flowering to pod maturity stage, for number of webs/plant & larvae / web, pod damage and pod damage at the time of harvest & converted to percent. Based on 1-9 scale, entries were categorized as tolerant / susceptible to *Maruca*.

Scale	Pest incidence	Reaction
1	No damage	Resistant
3	< 10% Pod damage	Moderately Resistant
5	11 - 20% Pod damage	Tolerant
7	21 - 40% Pod damage	Moderately Susceptible
9	> 40 % Pod damage	Highly Susceptible

The grain yield in Kg ha^{-1} data from both unprotected & protected experiments was recorded. Recommended package of practices were followed except plant protection measures. The data was subjected to the statistical analyses. All the 18 genotypes were separated into different groups according to their relative susceptibility and resistance to thrips & *Maruca*. The mean and Standard deviation (S.D) of mean thrips, *Maruca* webs, larval population & percent pod damage was computed. A preliminary classification of genotypes was done considering the mean values as suggested

by Shivalingaswami and Balasubramanian (1992), which are as follows:

1. Promising /resistant entries with values less than mean – SD
2. Susceptible entries with the values between mean – SD and mean + SD
3. Highly susceptible entries with the values more than mean + SD

RESULTS AND DISCUSSION

Pooled data recorded over three years on mean number of thrips/2 terminal leaves, *Maruca* webs/plant, larvae / web and percent pod damage are presented in the table 1.

Thrips :

Thrips incidence was noticed from two leaf stage and population increased upto 45 days after sowing and then declined sharply and minimum thrips population of 2 – 39 / 15 terminal leaves was observed by Raja Kumar *et al.,* (2007). Pooled data of thrips population revealed that, there was a significant difference among the entries and it ranged from 6.42 – 9.42 / two leaves. The lowest population was recorded in the entries, MBG 227 (6.42), MBG 223 (7.03) and MBG 219 (7.06), whereas more population was recorded in the entry MBG 217 (9.42) when compared to the check varieties LBG 623 (9.11) and LBG 20 (8.93). Kooner and Malhi (2004) screened 30 summer mungbean genotypes and found SML 189, SML 346 and MG 414 as least susceptible to thrips. Thrips are the vectors of economic viral diseases in blackgram. Chhabra and Kooner (1998) reported that mungbean genotypes PIMS 2, PIMS 3, 12-333 at Badnapur, Co 3 at Coimbattore, ML 5, ML 337 at Durgapura are resistant to thrips. It was further investigated that low content of free amino acids, total phenols, total mineral, total sugars, non reducing sugars, calcium, potassium and high content of carbohydrates were responsible for contributing resistance. Non preference, resistant entries did not support thrips multiplication.

Maruca:

The incidence of *Maruca* increased progressively from flowering to advanced pod formation stage and then gradually decreased towards the pod maturity and crop maturity stages. The infestation started from pre-flowering stage and maximum infestation was observed at maximum pod formation stage. These observations coincided with the findings of Krishna *et al.,* 2006. All the entries showed significant difference in respect of *Maruca* incidence and the number of webs/plant, larvae / web and percent pod damage were ranged from 0.58-1.18,0.67-1.91 7.97-22.54 % respectively (Table.1).

The least infestation of *Maruca* larvae /web was recorded in the entries MBG 223 (0.71) & MBG 222 (0.77), whereas entries MBG 225 (1.2), 217 (1.09) & MBG 224 (1.03) recorded more infestation when compared to the check varieties LBG 623 (0.99) and LBG 20 (1.28). Regarding pod damage, entries MBG 223 (7.97%) and MBG 222 (10.26) recorded lesser percent pod damage, whereas the entry MBG 225 (22.54%) found to be susceptible as it recorded highest pod damage when compared to the check varieties LBG 623 (21.44) and LBG 20 (21.74%). An infestation level of two *Maruca* larvae per plant was enough to detect differences in flower & pod damage, grain yield between infested and uninfected plants (Echendu and Akingbohung, 1989).

Yield Performance:

There was significant difference among the entries tested when compared to check varieties and yield ranged from 467 – 782 Kg ha^{-1}. The entries MBG 221(782), MBG 223(755) and MBG 217 (709) recorded highest yield and entries MBG 229 (467), MBG 216 (487) recorded lower yields under unprotected condition. Grain yield was significantly higher under protected conditions and ranged from 571-885 Kg ha^{-1} and the highest yield was recorded in MBG 227 (885), followed by MBG 223 (879) and MBG 230 (860). The entry MBG 223 recorded the highest yield both under protected & unprotected conditions with 14% unavoidable losses when compared to check varieties LBG 623 (768) & LBG 20 (829 Kg ha^{-1}), which recorded 20 & 19.4% avoidable losses. The resistant entry MBG 221 (8.7%) recorded lowest avoidable losses and susceptible entries MBG 216 (32.9%) and MBG 219 (30%) recorded highest avoidable losses.

By grouping of PVT entries was taken based on Mean $\pm$ S.D values, the entries were grouped resistant / promising and highly susceptible. Results revealed that, the entry MBG 223 is promising against thrips & *Maruca* and high yielder, though entry MBG 221 recorded high yield, it showed susceptibility to both the pests (Table 2). Dreyer *et al* (1994) observed low seed damage despite heavy flower infestation. Entries MBG 222 & MBG 216 was found to be tolerant to both pests but poor yielders. Low productivity of blackgram in India (0.425 t ha^{-1}) could be attributed to biotic stresses including viruses which are transmitted by sucking pests like thrips. The reason for higher yields of susceptible

Table1. Reaction of Blackgram entries to thrips and Yield performance.

S.No.	Entry	Thrips No.	Maruca infestation			Yield (kg/ha)		Unavoidable Loss %	Score (1-9) scale)	Reaction
			Webs/ Pl	Larvae/ web	% Pod damage	Unprotected	Protected			
1.	MBG 215	8.33	0.96	0.87	13.09	655	790	17.1	5	S
2.	MBG 216	7.15	0.78	0.67	12.61	487	718	32.9	5	S
3.	MBG 217	9.42	0.92	1.09	17.68	709	798	11.1	5	S
4.	MBG 218	8.51	1.03	0.97	11.59	687	828	17.0	5	S
5.	MBG 219	7.06	0.97	0.98	18.69	533	764	30.0	5	S
6.	MBG 220	7.77	0.93	0.81	14.60	626	730	14.2	5	S
7.	MBG 221	8.42	1.05	0.83	14.63	782	857	8.7	5	S
8.	MBG 222	8.44	0.98	0.77	10.26	520	650	20.0	3	MR
9.	MBG 223	7.03	0.89	0.71	7.97	755	879	14.0	3	MR
10.	MBG 224	8.27	0.89	1.03	10.28	621	755	17.7	3	MR
11.	MBG 225	7.19	0.92	1.20	22.54	596	668	10.8	7	MS
12.	MBG 226	7.95	0.90	0.99	12.22	644	762	15.5	5	S
13.	MBG 227	6.42	0.66	0.91	18.96	703	885	20.6	5	S
14.	MBG 228	7.64	0.58	0.86	13.68	677	748	9.5	5	S
15.	MBG 229	8.33	1.17	0.91	11.73	467	571	18.2	5	S
16.	MBG 230	7.69	1.18	0.86	18.37	667	860	22.4	5	S
17.	LBG 623©	9.11	1.00	0.99	21.44	614	768	20.0	7	MS
18.	LBG 20 ©	8.93	1.00	1.28	21.74	668	829	19.4	7	MS
	SEM +/-	0.60	0.11	0.07	1.79	60.5				
	CD @ 5%*	1.67	0.30	0.19	4.96	16.8				
	CV%	9.90	15.00	16.00	23.00	13.0				

* Significant S- Susceptible MR- Moderately Resistant MS- Moderately Susceptible

Table 2.Grouping of entries based on Mean ± S.D values for thrips, *Maruca vitrata* infestation

	Mean	S.D	Mean - S.D	Mean + S.D	Promising Entries	Highly Susceptible Entries
Thrips	7.98	0.79	7.19	8.77	MBG 223, MBG 227, MBG 219, MBG 216	MBG 217, LBG 20, LBG 623
Maruca Webs/Pl	0.93	0.14	0.79	1.07	MBG 228, MBG 227, MBG 216	MBG 229, MBG 230
Maruca larvae/Pl	0.93	0.15	0.78	1.08	MBG 216, MBG 223 MBG 222	MBG217, MBG 225, LBG 20
Percent Pod damage	15.45	4.10	11.35	19.55	MBG 223, 222	MBG 225, LBG 20, LBG 623
Yield (Kg ha^{-1})	634	82.67	551	717	MBG 221, MBG 223 (High Yielders)	MBG 229,MBG 216, MBG 222, MBG 219

entries might be the preference of pod borers for feeding the flowers & pods of plants having high protein content (Hardwick, 1965). Sahoo and Patnaik, 2003 found that there was significant positive correlation with the total sugars, amino acid and protein content but inverse relationship with phenol content of seeds & pod coat of susceptible redgram varieties. Phenolics in a fairly large concentration could ward off the insect pests because of their direct toxicity (Mohan *et al.,* 1987) and the adverse effects, as an anti nutritional factor (Murkute *et al.,* 1993). The levels of resistance to maruca in the tested entries are low to moderate and this has necessitated the need for selecting genotypes with greater ability to tolerate or recover from the pod borer damage (Sharma *et al.,* 2005).

The results clearly revealed that there was a wide variation in the behavior of thrips & *Maruca* on blackgram entries. The resistant genotypes identified were very poor in yield. Thus these resistant entries can not be exploited directly but can be used in resistant breeding programmes to identify the source of resistance.

LITERATURE CITED

Chhabra K S and Kooner B S 1998. Insect Pest management in mung bean and blackgram-status and strategies. In:IPM System in Agriculture-Pulses, R.K. Upadhyay, K.G Mukerji and R.L. Rjak (eds.). Vol. 4, pp. 233-310.

Dreyer H, Baumgartner and Tamo M 1994. Seed damaging field pests of cowpea (*Vigna unguiculata* W) in Benin: Occurrence and pest status. International Journal of Tropical Pest Manage, 40: 252-260.

Echendu T N and Akingbohung A E 1989. The larval populations and plant growth phase for screening cowpea for resistance to *Maruca testulalis* (Geyer) (Lepidoptera: Pyralidae) in Nigeria based on flowers, pods and yield loss. Tropical Pest Manage. 35: 173-175.

Hardwick D F 1965. The corn earworm complex. Memorial Entomological Society, Canada 40:247.

Kooner B S and Malhi B S 2004 Sources of resistance to bean thrips, *Megaleurothrips distalis* in summer mung bean. Abstr No.Av.5. In: Souvenir and Abstr. 7th Punjab Sci. Congr, Feb 7-9, 2004, GNDU, Amritsar.

Krishna Y, Koteswararao Rao, Rama Subba Rao Y, Rajasekhar P and Srinivasa Rao, V 2006. Screening for resistance against spotted pod borer, *Maruca vitrata* (Geyer) in blackgram. Journal of Entomological Research, 30(1): 35-37.

Mohan S, Jayaraj S, Purushotaman D and Rangarajan AV 1987 Can the use of Azospirillum of biofertilizer control sorghum shootfly. Current Science 56:723-735.

Murkute G R, Dhange A R, Desai B B, Kale A A, Mote U N and Aher A P 1993. Biochemical parameter associated with pod borer damage as influenced by maturity group and growth stages of pigeonpea (Cajanus cajan L.) Mill Sp. Legume Research 16: 51-56.

Nene Y L 1972. Diseases of mung and Urdbean. 4. Leaf curl in Nene L (Ed). A survey of viral diseases of pulse crops in U.P, University Press, Pantnagar, India. pp 142-153.

Ogunwolu E O 1990. Damage to cowpea by the legume pod borer, Maruca testulalis Geyer, as influenced by infestation density in Nigeria, Tropical Pest Manage, 36:138-140.

Patel R K and Singh D 1977. Serious incidence of pod borer, *Maruca testulalis* Geyer on redgram at Varanasi. Science Culture 43:319.

RajaKumar N, Subba Reddy N C, Krishnamurthy K V M and Reddy M V 2007. Influence of seed rate on Leaf curl disease and thrips vector population in blackgram. Ind. J. Pl. Prot 35(1): 90-92.

Sahoo B K and Patnaik H P 2003. Effect of Bio chemicals on the incidence of pigeon pea pod borers. Indian Journal of Plant Protection, 31(1): 105-208.

Sharma H C, Ahmad R, Ujagir R, Yadav R P, Singh R and Ridsdill Smith T J 2005. Host plant resistance to cotton boll worm/ legume pod borer, Helicoverpa. Pages 167-208 in Helicoverpa Management.

Shivalingaswami T M and Balasubramanian R 1992 Studies on the susceptibility of groundnut varieties to infestation by *Carydon serratus* (Oliver) Coleoptera: Bruchidae. Bulletin of Grain Technology, 30: 137-140.

Singh S R and Allen D R 1980. Pests, diseases, persistence and protection in cowpea. Advances in Legume Science, pp 419-443.

Sreekanth M 2002. Bio-ecology and management of thrips vector(s) of peanut bud necrosis virus in mung bean (*Vigna radiate* L.) Ph.D thesis submitted to the ANGRAU, R. Nagar, Hyd, A.P., India, 165 pp.

Taylor T A 1978. Maruca testulalis an important pest of tropical grain legumes. In pests of Grain Legumes: Ecology and control Ed. By Singh S. R. Van Emden H.F and Taylor T.A. pp 193-202. Academic Press, London.

Vishakanthaiah M and Jagadeesh Babu C S 1980. Bionomics of the tur web worm, *Maruca testulalis* (Lepidoptera: Pyralidae). Mysore Journal of Agricultural. Sciences, 14: 529-532.

(Received on 05.10.2008 and revised on 19.11.2008)