

Original Research Article

Screening of Different Pigeon pea (*Cajanus cajan* L. Millspough) Varieties against Pod borer (*H. armigera*) resistance

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ABSTRACT

The present investigation was carried out at the instructional farm, Narendra Deva University Agriculture and Technology, Kumarganj, Faizabad (U.P.) during the season 2015-2016. Ten varieties of pigeon pea namely NDA-1, NDA-2, NDA-3, NDA-94-2, NDA-14-6, NDA-13-6, MAL-6, MAL-13, BAHAR and UPAS 120 were collected from Department of Genetic and Plant Breeding, N.D.U.A. & T., Kumarganj, Faizabad (U.P.). The larvae (*H. armigera*) were collected from Pigeon pea field of N.D.U.A. & T. campus and nearest villages of University campus. Two larvae were left at each variety pods for feeding in petriplates and the experiment was conducted in three replication for screening of each variety. After feeding the Pods of above mentioned varieties, the minimum percentage increment in weight of larvae was observed in MAL-6 after 6 Hr (1.36 %) followed by NDA-2(2.40%), NDA-94-2(4.64%),MAL-13 (6.84%), BAHAR (8.14%), UPAS-120 (12.81%). While maximum percentage increment in weight of larvae was observed in NDA-14-6(25.89) followed by UPAS-120 (24.46 %), NDA-13-6 (21.30%), NDA-1 (16.64 %). Approximately the same results were observed at 12 hr while after 18 hr. the percentage reduction was found in all varieties. Maximum reduction was found in UPAS-120 (18.03%) and minimum reduction was found MAL-6 (3.01 %).

Keywords

Pigeon pea,
Helicoverpa
armigera

Introduction

Pigeon pea [*Cajanus cajan* (L.) Millsp.] is an important legume crop of rain fed agriculture in the semiarid tropics. It is one of the major pulses grown in the semi-arid tropics between 30°N and 30°S, covering about 50 countries in Asia, Africa and the Americas. Pigeon pea is damaged by more than 200 species of insects, of which *Helicoverpa armigera* is the most important pest in the semi-arid tropics (Reed *et al.*, 1989; Sharma 2005). *Helicoverpa armigera* has a wide host range, and feeds on more than 250 crop species. It has developed very

high levels of resistance to conventional insecticides, including synthetic pyrethroids (Kranthi *et al.*, 2002). *Helicoverpa armigera* is a polyphagous pest (Firempong and Twine 1986), damaging a wide range of agricultural crops including cotton, tomato, sunflower, grain legumes, vegetables, cereals and fruit crops. It causes an estimated annual loss of over \$350 million in pigeon pea, and over \$2 billion in the semiarid tropics on different crops despite application of insecticides costing over \$500 million annually (Sharma 2005).

The pod borer complex comprises of *Helicoverpa armigera*, *Grapholita critica*, *Maruca testulalis*, *Lampides boeticus*, *Exelastis atomosa* and *Melanagromyza obtusa*.

Amongst them, *Helicoverpa armigera* a key pest inflicting 80-90% of loss caused by pod borers. It causes considerable yield loss of 250000 tonnes of grains/annum worth more than 3750 million rupees per year. (Banu *et al.*, 2005).

Since pigeon pea growers have to spend many on inputs like pesticides, it was considered viable to search the available germplasm for sources of resistance to these insect pests for use in breeding insect resistant cultivars. The present experiment was conducted to screen the different pigeon pea varieties resistance to pod borers.

Materials and Methods

The field trial was conducted at the instructional farm, Department of Plant Molecular Biology and Genetic Engineering, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India, during the season of 2014-15. The details of varieties used in experiment is given below:

The experiment was conducted in a complete randomized design (CRD) in three replications in laboratory, Dept. of P.M.B. & G.E., N.D.U.A. & T., Kumarganj, Faizabad (U.P.).

Ten varieties of pigeon pea were screened against *H. armigera*. The totally different or new screening method was used for screening purpose. In this experiment, the live larvae (*H. armigera*) and fresh pigeon pea pods were collected from pigeon pea field, N.D.U.A. & T. campus and nearest

villages like Haliapur, Shivnathpur and Pithla, Faizabad (U.P.). The experiment was performed in petriplates to screen each variety of pods. For each replication, 3- 4 pods were kept in each Petri-plate and two larvae were left per plate for feeding the pods.

Observations were recorded by weighing the weight of larvae at 0 hr, 6hr, 12 hr and 18 hr and the mean of three replications was calculated. The differences in each variety were determined by percentage differences in the weight of larvae and at different interval of feeding.

Results and Discussion

The results of present study showed variability among ten varieties of pigeon pea against *Helicoverpa armigera*.

After screening, the minimum percentage increment in weight of larvae in MAL-6 after 6 Hr (1.36 %) followed by NDA-2 (2.40%), NDA-94-2 (4.64%), MAL-13 (6.84%), BAHAR (8.14%), and UPAS-120 (12.81%) while maximum percentage increment in weight of larvae was observed in NDA-14-6 (25.89) followed by NDA-3 (24.46 %), NDA-13-6 (21.30%), NDA-1 (16.64 %).

Approximately the same results were observed at 12 hr of feeding while after 18 hr percentage reduction was found in all varieties. Maximum reduction in percentage was found in NDA-3 (18.09) and minimum reduction was found MAL-6 (3.01 %) followed by UPAS-120 (3.93) (Table-1, Fig. a-j). The results were closely agreed with Sahoo and Senapati (2000), they reported that relative abundance of *G. critica* in UPAS 120 was 48.72, 13.25 and 9.55 per cent at 50 per cent flowering, pod elongation and grain filling stage, respectively.

Table.1 List of Pigeon pea varieties used in present investigation with their Characteristics features

S. No.	Name of Varieties	Date of Sowing	Plant population	Days of Maturation	Plant height (cm)	1000 seed weight (gm)	Days to 50% flowering
1	NDA-1	28-July 2014	92	258	190	11.5	153
2	NDA-2	-do-	95	250	210	13.0	145
3	BAHAR	-do-	85	260	200	12.0	150
4	NDA-14-6	-do-	90	255	180	12.0	155
5	NDA-13-6	-do-	90	255	210	12.0	150
6	NDA-94-2	-do-	95	265	180	13.0	160
7	NDA-3	-do-	96	240	225	10.0	120
8	UPAS-120	-do-	90	155	165	8.0	93
9	MAL-6	-do-	95	258	165	12.0	150
10	MAL-13	-do-	90	256	205	12.0	145

Table.2 Showing the percentage differences of different varieties of Pigeon pea against *H. armigera*

S. No.	Name of varieties	Percent difference b/w 0 to 6 hr	Percent difference b/w 6 to 12 hr	Percent difference b/w 12 to 18 hr	Overall percentage
1	MAL-13	6.84	2.40	-6.09	2.74
2	NDA-2	2.40	4.49	-3.18	3.60
3	NDA-1	16.64	6.18	-6.42	15.90
4	NDA-13-6	21.30	1.68	-12.31	8.15
5	BAHAR	08.14	2.75	-6.48	3.91
6	NDA-94-2	4.64	1.21	-7.37	-1.90
7	NDA-14-6	25.89	13.24	-10.23	27.98
8	NDA-3	24.46	1.54	-18.03	3.60
9	UPAS-120	12.81	6.18	-3.93	15.07
10	MAL-6	1.36	1.72	-3.01	0.00
	SEm±	0.012			
	CD or LSD	0.034			

Fig.1 (a-j) Graph showing the increase and decrease in weight of larvae (*H. armigera*) after feeding the pods of different pigeon varieties at different time interval

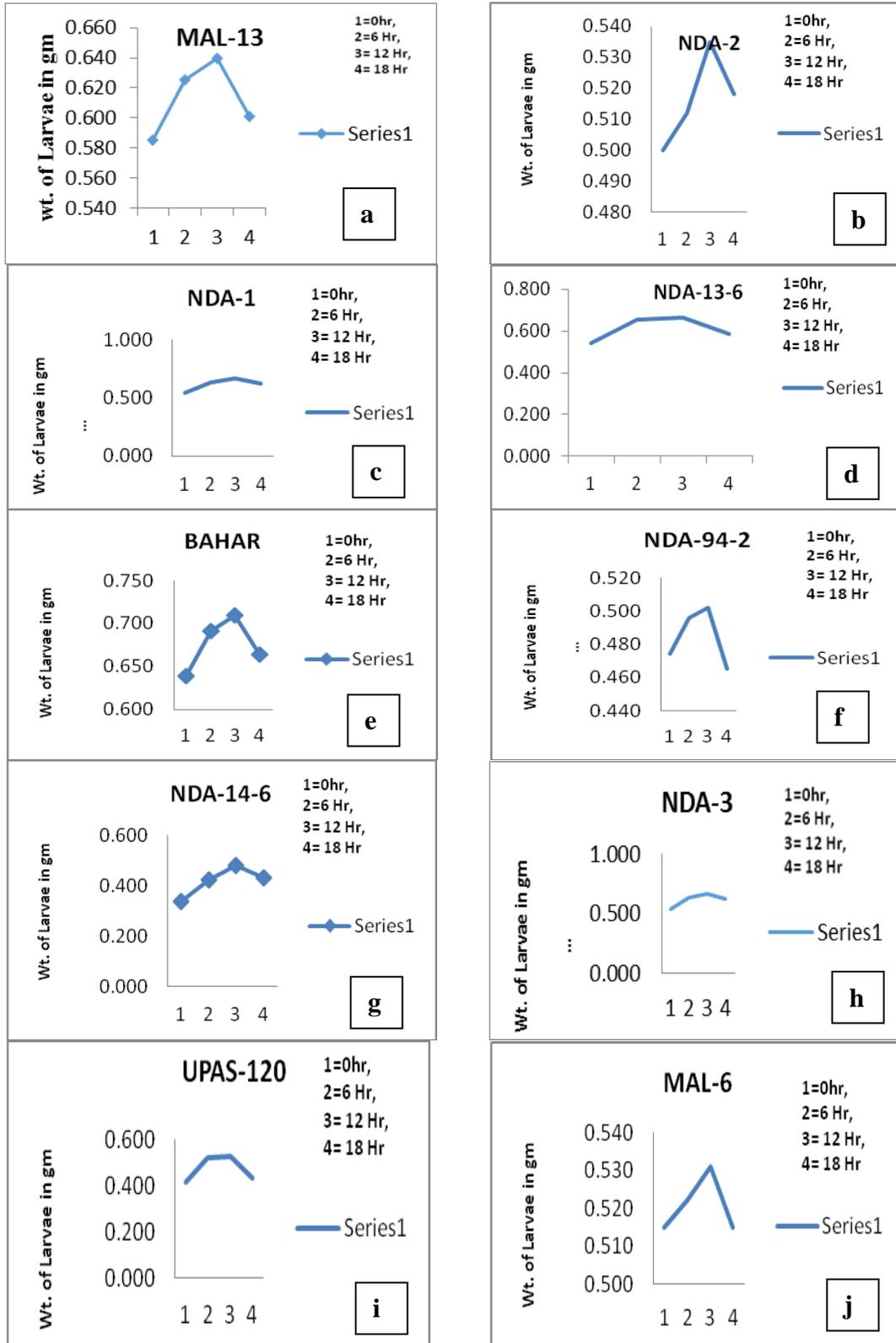
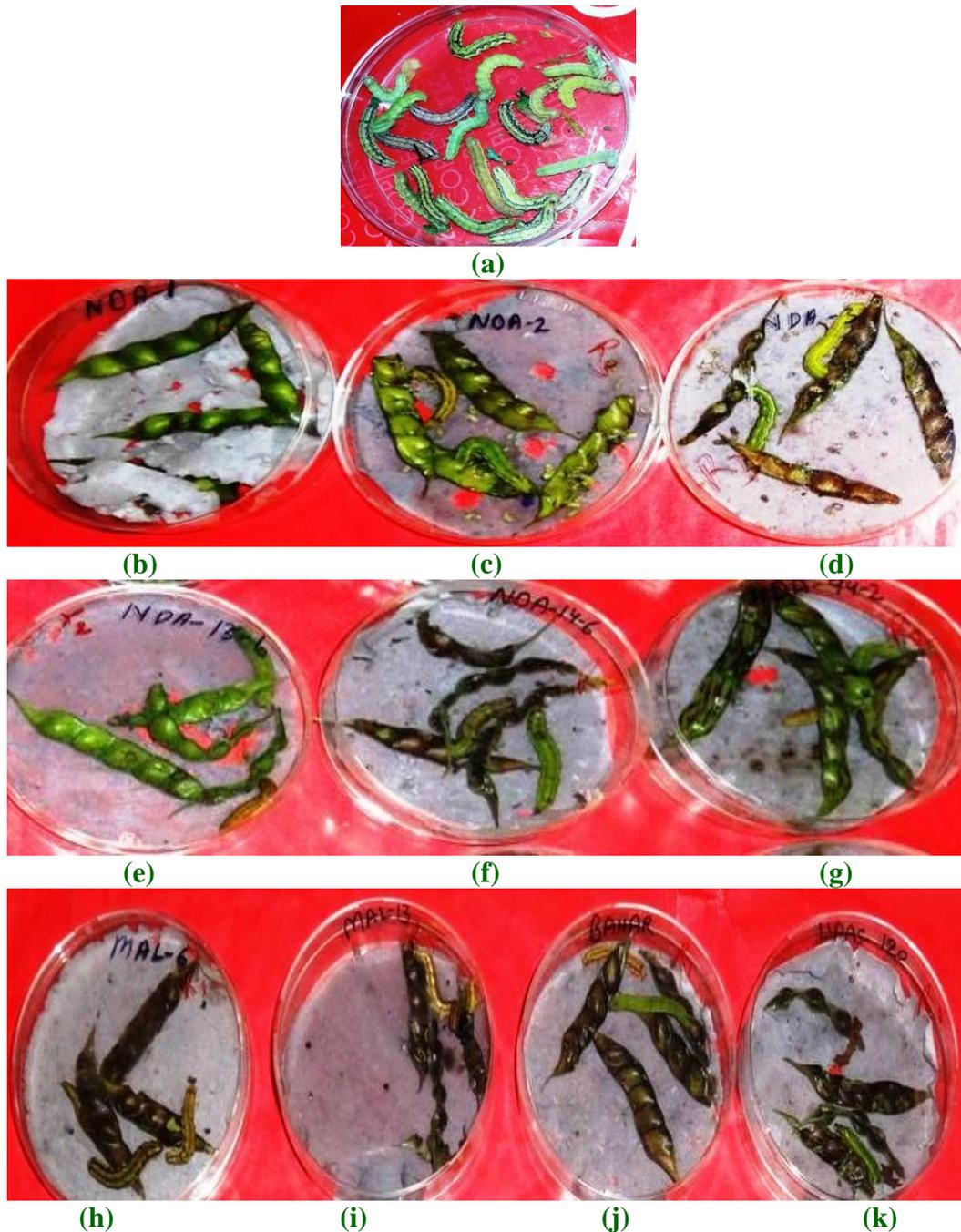


Fig.2 (a-k) A view of feeding of Pigeon pea pods by *H. armigera* during the screening time (a) Collection of *H. armigera*, (b) NDA-1, (c) NDA-2, (d) NDA-3, (e) NDA-13-6, (f) NDA-14-6, (g) NDA-94-2, (h) MAL-6, (i) MAL-13, (j) BAHAR, (k) UPAS-120



In present investigation, among ten varieties of pigeon pea, MAL-6, NDA-2 and NDA-94-2 were found resistant whereas UPAS-120 and MAL-13 were found moderately resistant. NDA-14-6 was found highly

susceptible followed by NDA-3. The result was also supported by Rathod *et al.*, (2014), they studied the ten varieties of Pigeon pea against pod fly. The highest pod damage was recorded on variety ICPL-87119 (16.64

%). The remaining varieties BDN-2, GT-102, GT-101, and GT-103 recorded moderately susceptible to pod fly which registered 12.81 to 11.99 per cent pod damage, respectively. Patel *et al.*, (1994) also studied the susceptibility of pigeon pea genotypes against *H. armigera*, *M. liophanes* and *M. obtusa* at Anand (Gujarat). Genotype GAUT 82-90 was found least susceptible to all 3 insect pests with the highest yield potential. Based on the above study, higher grain yield and lower susceptibility to pod borer was recorded in AG-2. Hence, this line can be used as resistant variety to the pod borer complex of pigeon pea.

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