

## SCREENING OF BLACKGRAM GENOTYPES AGAINST POD BORER (*HELICOVERPA ARMIGERA* HUBNER)

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**Abstract:** The research was carried out to investigate the screening of blackgram genotypes against pod borer (*Helicoverpa armigera* Hubner) during *Kharif* season 2021 at experimental area of Research-cum-Instructional Farm of Raj Mohini Devi College of Agriculture and Research Station, Ambikapur, Surguja district of Chhattisgarh. The experiment was conducted in Randomized block design with three replications comprising of twelve genotypes and one check variety viz., Indira urd-1. The damage caused by pod borer was recorded at weekly interval i.e., 41 SMW (14<sup>th</sup> - 20<sup>th</sup> October) and 42<sup>nd</sup> SMW (21<sup>st</sup> - 27<sup>th</sup> October). All twelve genotypes were showed significantly difference with each other which ranges between 7.21 to 24.06 percent pod damage. Among blackgram genotypes minimum pod damage by *H. armigera* was observed in genotype IU 03-52 with 7.21 percent and categorized as resistant (R) while maximum pod damage was recorded in genotypes IU 02-1-3 with 24.06 percent were categorized as moderately resistant (MR). The data on grain damage were recorded at the time of harvest and was recorded minimum in IU 03-52 with 6.47 percent and maximum in IU 02-1-3 with 11.90 percent.

**Keywords:** Black gram, Genotypes, Pod damage, Pod borer, Screening, *Vigna mungo*

### INTRODUCTION

Pulses play an important role in supplying protein to large masses to the people as well as maintaining soil health in the country. India being world's largest producer of pulses as grows variety of pulse crop under wide range of agro-climatic condition. Blackgram is an important pulse crop occupying a unique position in Indian agriculture and it stands fourth in area and production among the pulses. Blackgram (*Vigna mungo* L. Hepper) belongs to the family of Fabaceae, Sub family Papilionaceae, with chromosome number  $2n = 22$  and commonly called as urdbean, mash kalai, minapa pappu, uddu etc. India is its primary origin and is mainly cultivated in Asian countries including Pakistan, Myanmar and parts of Southern Asia. The popularity of this pulse is due to its nutritional and industrial values (Nene, 2006). It is a rich source of protein (24%), carbohydrate (59.6%), fat (1.4%), mineral (3.2%) and fiber (0.9%) (Tiwari and Shivhare, 2016). It provides a major share of the protein requirement of the vegetarian population of the country.

About 70 per cent of the world's black gram production comes from India. India is the world's largest producer as well as consumer of black gram. Black gram area accounts for about 19 per cent of India's total pulse acreage which contributes 23 per cent of total pulse production. It produces about 24.5 lakh tonnes of urd annually from about 4.6 million hectares of area, with an average productivity of 533 kg per hectare (Department of Agriculture, Cooperation & Farmers Welfare, 2020-21). In

Chhattisgarh total area of black gram in *Kharif* is 134.13 hectare and productivity is 371 kg per hectare and during Rabi season total area covered is 23.14 hectare and productivity is 310 kg per hectare. Blackgram is an important food legume with excellent source of good quality protein and having ability to restore fertility of soil though symbiotic nitrogen fixation (Gupta *et al.*, 2008) is an erect, fast-growing annual, herbaceous legume reaching 30-100 cm in height. It has a well-developed taproot and its stems are diffusely branched from the base. The leaves are trifoliate with ovate leaflets, 4-10 cm long and 2-7 cm wide. The fruit is a cylindrical, erect pod, 4-7 cm long  $\times$  0.5 cm broad. The pod is hairy and has a short-hooked beak. It contains 4-10 ellipsoid black or mottled seeds.

Major insect-pests such as *Helicoverpa armigera* (Hubner), spotted pod borer, *Maruca vitrata* (Geyer), and bihar hairy caterpillar *Spilosoma obliqua* (Walker) are serious insect-pests of black gram causing seed and pod damage. The damage caused by *H. armigera* is generally confined to flower, seeds and pods. Young larva feed on the leaves for some time and then attacks fruits. Varietal adaptation is the important factor which is generally associated with low productivity of this crop. The new improved cultivars have high yield potential as compared to old and degenerated cultivars. Keeping this in view the present investigation was initiated to find out the best cultivar which is resistant *Helicoverpa armigera* Hubner for *Kharif* blackgram production under the agro-climatic conditions of Ambikapur, Surguja district of Chhattisgarh.

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## MATERIALS AND METHODS

A field experiment was undertaken at experimental area of Research-cum-Instructional Farm at Raj Mohini Devi College of Agriculture and Research Station, Ambikapur (C.G.) during *Kharif* season 2021. The experimental material comprised of twelve blackgram genotypes. Each genotype was planted in a plot size of 2.0 × 1.8 m<sup>2</sup> having 30 × 10 cm<sup>2</sup> spacing between rows and plants in a Randomized block design with three replications. The observations on pod damage were recorded on randomly selected three plants from each plot at weekly interval and grain damage was recorded at the time of harvest. The pod and grain damage were recorded by using the formula:

$$\text{Pod damage \%} = \frac{\text{Total number of damaged pods}}{\text{Total number of pods}} \times 100$$

$$\text{Grain damage \%} = \frac{\text{Total number of damaged grains}}{\text{Total number of grains}} \times 100$$

The entries were categorized into resistant, moderately resistant, moderately susceptible and susceptible based on pod borer infestation as mentioned in Table 1 (Krishna *et al.*, 2006).

Table 1 Percent of pod damage and category for blackgram genotypes

Pod damage (%)	Category
1-12	Resistant
13-24	Moderately resistant
25-30	Moderately susceptible
>30	Susceptible

## RESULTS AND DISCUSSION

The twelve genotypes of blackgram were screened to check the resistance and susceptibility against *Helicoverpa armigera* Hubner. The statistically analyzed data in Table 2 and Figure 1 revealed that all twelve genotypes were showed significantly difference with each other which ranges between 7.21 to 24.06 percent pod damage. Among blackgram genotypes minimum pod damage by *H. armigera* was observed in genotype IU 03-52 with 7.21 percent and followed by IU 2021-1, IU 02-4 with 8.40 and 11.12 per cent and categorized as resistant (R). Whereas, nine genotypes viz., IU 2021-2, IU 05-2, IU 2021-3, IU 03-22-4, Indira Urd-1, IU 08-2, IU 02-6, KU 96-3 and IU 02-1-3 with 12.53, 14.57, 14.96, 17.51, 19.21, 21.45, 21.99, 22.85 and 24.06 percent pod damage considered as moderately resistant (MR).

The data on grain damage were recorded at the time of harvest and was recorded minimum in IU 03-52 with 6.47 per cent and maximum in IU 02-1-3 with 11.90 per cent followed by IU 2021-1, IU 02-4, IU 2021-2, IU 05-2, IU 2021-3, IU 03-22-4, Indira Urd-

1, IU 08-2, IU 02-6, KU 96-3 with 6.80, 7.15, 7.22, 8.22, 8.99, 9.22, 9.57, 9.88, 10.09, and 11.16 per cent whereas maximum grain damage was recorded in IU 02-1-3 with 11.90 per cent.

Similar results were obtained by Yadav *et al.*, (2021) who screened the 15 blackgram genotypes to test the resistance and susceptibility against *Helicoverpa armigera*. Among all the black gram genotypes minimum pod infestation of 6.33% was recorded in Azad Urd-1 genotype and followed by KU-99- 05, Shekhar-2 and PU-6 with 7.00, 9.33 and 10.67 per cent, correspondingly and classified as resistant (R). Whereas, 10 genotypes viz., PU-19, PU-35, Azad Urd-2, KU-96-7, PU- 40, KU-302, Shekhar-1, PU-30, Azad Urd-3 and KU-719 were observed with pod infestation of 13.33, 15.67, 16.00, 18.67, 19.00, 20.67, 21.33, 22.00, 22.67 and 24.00%, respectively and these genotypes were found moderately resistant (MR). Only one genotype viz., KU-88-9-1 was observed with most pod infestation and recorded as moderately susceptible (MS) with 26.67%. No genotypes were found susceptible (> 30% pod damage) among all the 15 genotypes of black gram. Kumar and Singh (2014) were evaluated a total of 25 black gram genotypes for resistance to major insect pests, including white fly, jassid, flower thrips and pod borer. Among the genotypes the pod borer, minimum damage was recorded in KUG-503 and UH-08-05, followed by COBG-10-5 and VBG10-024, and the maximum in TU 631 the highest yield was obtained from RVSU-11-8 (7.82 q/ha), followed by KPU-1-10 (7.51 q/ha) and AKU10-4 (6.87 q/ha), and so the lowest yield from TU-631 (2.33 q/ha). Soundararajan *et al.*, (2014) screened 51 blackgram (*Vigna mungo* L.) genotypes germplasm for resistance against pod borer complex. In rabi and kharif seasons 9 germplasms i.e., CBG 08-009, CBG 08-014, CBG 08-040, CBG 08-045, CBG 08-057, PLU 102, 5-16-7, PLS 364/42, KU 301 were scored as moderately resistant. Singh (2019) carried out that the field experiments on different green gram genotypes. Twenty genotypes were raised beneath unprotected condition for finding out the population build up of major insect pests on varied greengram genotypes and damage assessment in relative to per cent damage by pod bugs and spotted pod borer. Pavithradevi and Muthukumaran (2021) was conducted the varietal screening of hundred accessions were screened against spotted pod borer. Among the accessions, sivanmalai local recorded considerably highest pod damage (46.17%) with mean (3.02) larval population of insect.

## STATISTICAL ANALYSIS

The data obtained were analyzed statistically after using appropriate transformation. The data on pod and grain damage was first recorded from the plants and then converted into percentage. The percentage data was processed under arcsine transformation Sin-

1 ( $\sqrt{x} / 100$ ) before statistical analysis. The transformed data was then analyzed by the method of analysis of variance as described by Gomez and Gomez (1984). The “F” test was used at 5 percent level of significance.

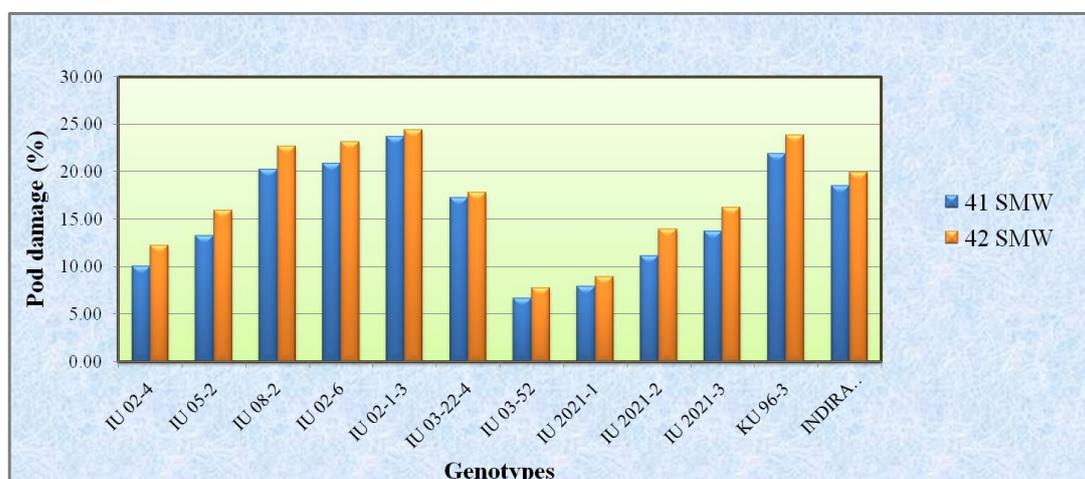
**CONCLUSION**

On the basis of the investigation performed under agro- climatic condition, the tested genotypes on different parameters i.e. pod damage and grain damage. The results concluded that genotype IU 03-52, IU 2021-1 and IU 02-4 with 7.21, 8.40 and 11.12 percent pod damage is resistant against *Helicoverpa armigera* and less grain damage was recorded in genotype IU 03-52 with 6.47 percent.

**Table 2.** Percentage pod damage by pod borer and grain yield in different genotypes of blackgram (Kharif 2021-22)

S.No.	Name of genotypes	41 <sup>st</sup> SMW(14 <sup>th</sup> -20 <sup>th</sup> October)	42 <sup>nd</sup> SMW (21 <sup>st</sup> -27 <sup>th</sup> October)	Mean	Grain damage (%)	Category
		Pod damage (%)	Pod damage (%)			
1	IU 02-4	10.01 (18.40)	12.23 (20.45)	11.12	7.15 (15.5)	R
2	IU 05-2	13.21 (21.27)	15.94 (23.51)	14.57	8.22 (16.64)	MR
3	IU 08-2	20.26 (26.74)	22.63 (28.38)	21.45	9.88 (18.31)	MR
4	IU 02-6	20.83 (27.14)	23.15 (28.74)	21.99	10.09 (18.51)	MR
5	IU 02-1-3	23.69 (29.11)	24.43 (29.60)	24.06	11.90 (20.16)	MR
6	IU 03-22-4	17.24 (24.52)	17.78 (24.79)	17.51	9.22 (17.67)	MR
7	IU 03-52	6.66 (14.90)	7.76 (16.12)	7.21	6.47 (14.72)	R
8	IU 2021-1	7.91 (16.29)	8.89 (17.23)	8.40	6.80 (15.10)	R
9	IU 2021-2	11.11 (19.42)	13.94 (21.90)	12.53	7.22 (15.57)	MR
10	IU 2021-3	13.72 (21.71)	16.20 (23.72)	14.96	8.99 (17.44)	MR
11	KU 96-3	21.88 (27.87)	23.83 (29.20)	22.85	11.16 (19.50)	MR
12	INDIRA URD-1	18.52 (25.47)	19.90 (26.48)	19.21	9.57 (18.00)	MR
	<b>C.D. at 5%</b>	<b>2.01</b>	<b>2.10</b>		<b>0.43</b>	
	<b>SE(m)</b>	<b>0.68</b>	<b>0.71</b>		<b>0.14</b>	

Figure in parenthesis ( ) are angular transformed value



**Fig. 1.** Per cent pod damage by pod borer in blackgram genotypes during Kharif 2021



Fig. 1 Experimental field of blackgram (*Vigna mungo* L.)



Fig. 2 Pod Damage by (*H. armigera* Hubner)



Fig. 3 Larvae of pod borer (*H. armigera* Hubner)



Fig. 4 Grain damage by pod borer (*H. armigera* Hubner)

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