

## RESEARCH ARTICLE

# Estimation of per cent earhead damage and yield loss due to earhead caterpillar, *Helicoverpa armigera* under natural condition on *Kharif* sorghum

■ B. KIRAN GANDHI, SHEKHARAPPA AND R. A. BALIKAI\*

Department of Agricultural Entomology, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

---

## ARTICLE INFO

**Received** : 12.01.2013

**Revised** : 04.04.2013

**Accepted** : 17.04.2013

## Key Words :

*Helicoverpa armigera*,  
Cultivars, sorghum

---

## ABSTRACT

Variant cultivars (varieties and hybrids) of sorghum were estimated for per cent earhead damage and yield loss caused by earhead caterpillar, *Helicoverpa armigera*. Within varieties DSV-6 recorded lowest per cent (26.66) earhead damage and high yield of 29.25 q/ha without taking protection. In plots where protection measures were taken with malathion DSV-6 recorded highest (95.0) per cent earhead avoidable damage but DSV-3 recorded highest per cent avoidable yield loss of 27.01. Among hybrids, CSH-14 and CSH-23 recorded lowest and equal (16.66) per cent earhead damage with yield of 36.22 and 37.66 q/ha, respectively in unprotected plots. Whereas in protected plots (malathion 5D), CSH-16 recorded highest (92.6) per cent of earhead avoidable damage but DSV-3 recorded highest per cent avoidable loss of 27.01. If we look out the results, 93.2 per cent of earhead avoidable damage and 17.46 per cent avoidable yield loss was noticed in protected plots over unprotected irrespective of cultivars.

**How to view point the article :** Gandhi, B. Kiran, Shekharappa and Balikai, R.A.(2013). Estimation of per cent earhead damage and yield loss due to earhead caterpillar, *Helicoverpa armigera* under natural condition on *Kharif* sorghum . *Internat. J. Plant Protec.*, **6**(1) : 168-170.

\*Corresponding author:

---

## INTRODUCTION

Among different insect pests of sorghum, the ear head caterpillars viz., *Helicoverpa armigera* (Hubner), *Cryptoblabes gridiella* (Miller) and *Euproctis subnotata* (Walker) and *Stenochroia elongella* are important species. As these caterpillar pests damage the crop during earhead stage, a considerable amount of loss is incurred.

One of the earliest records of earhead caterpillar occurring on sorghum was by Mally (1893), who observed larva of *H. armigera* feeding on the milky and developing grains of sorghum. *H. armigera* is one of the most important earhead pests reported to cause as much as 37.11 per cent yield loss in sorghum (Kulkarni *et al.*, 1980).

The earhead caterpillar, *H. armigera* originally a pest of pigeonpea, now firmly established as a 'major pest' of many other crops. Being polyphagous and cosmopolitan pest, this

noctuid feeds on variety of host plants. Mote and Murthy (1989) reported losses of 665 kg per ha (14.51%) in CSH-9 and 518 kg per ha (12.87%) in CSH-5 as recorded by *Helicoverpa armigera*. The overall loss for the two crops was 592 kg per ha (13.72%). Hence, attempt had been made to know the per cent earhead damage caused by *H. armigera* in protected and unprotected plots under natural conditions.

## MATERIALS AND METHODS

A field trial was conducted to know the effectiveness of protection of sorghum crop over unprotection in terms of per cent earhead damage and to assess yield loss under natural condition due to earhead caterpillar, *H. armigera* during *Kharif* season sown on 9<sup>th</sup> July, 2010 in the black soils of Main Agricultural Research Station, Dharwad. The design followed was two factor randomized complete block design (RBD). Two

main plots were selected, first plot was taken care with insecticides for all the pest including earhead caterpillars (protected plot) whereas in second plot insecticidal application had taken for all pests except earhead caterpillars (unprotected plot). The chemical insecticide used to manage earhead caterpillars in protected plot was malathion 5D @ 8 kg/acre under need based situation *i.e.*, earhead caterpillars range exceeds one larvae per earhead (ETL). And within each main plot, six popular cultivars were cultivated. The six cultivars included three varieties *viz.*, DSV-6, DSV-3, CSV-15 and three hybrids *viz.*, CSH-23, CSH16, CSH-14 and replicated thrice. Each treatment was sown in an area of 4 m × 2.7 m on 9<sup>th</sup> July 2010. The spacing between rows was 45 cm and between plants 6.8 cm. A gangway of 1 m was left between replications.

In each treatment, five plants were selected randomly and observations on earhead caterpillars incidence were made at flowering, milk and dough stages of crop at regular intervals *viz.*, per cent earhead damage and grain yield. All these

observations were tabulated for comparison between treated and untreated plots.

## RESULTS AND DISCUSSION

Amongst different genotypes evaluated with irrespective of protection and unprotection, the minimum per cent earhead damage of 8.83 was recorded in CSH-14 followed by CSH-23 (8.99%) (Table 1). These entries were found on par with each other. However, the incidence was below economic threshold level (1 larvae/plant). The next best entry was CSH-16 (9.66%). The maximum of 19.99 per cent earhead damage was recorded in DSV-3 followed by CSV-15 (14.49%) and DSV-6 (13.99%). In unprotected plot CSH-23 and CSH-14 recorded least per cent earhead damage (16.33%). In the order of promising entries, CSH-16, DSV-6, CSV-15 and DSV-3 recorded 18.00, 26.66, 27.33 and 37.66 per cent earhead damage, respectively. However, the degree of damage was more than economic threshold level.

Cultivars	Per cent earhead damage			% earhead avoidable damage
	Unprotected	Protected	Mean	
CSV-15	27.33 (31.50)	1.66 (7.33)	14.49 (19.41)	93.9
DSV-3	37.66 (37.84)	2.33 (8.46)	19.99 (23.15)	93.8
DSV-6	26.66 (31.05)	1.33 (6.53)	13.99 (18.79)	95.0
CSH-14	16.66 (23.64)	1.33 (6.53)	8.83 (15.08)	92.0
CSH-16	18.00 (25.05)	1.33 (6.53)	9.66 (15.79)	92.6
CSH-23	16.66 (23.64)	1.66 (7.33)	8.99 (15.48)	90.0
Mean	23.77 (25.70)	1.60 (7.11)		93.2
	S.E.±		C.D. at 5%	
Treatments (C)	1.33		3.89	
Protection (P)	0.77		2.25	
Interaction (C×P)	1.88		5.50	

Figures in parentheses indicate angular transformed values

Cultivars	Yield (g/ha)			Per cent avoidable yield loss
	Unprotected	Protected	Mean	
CSV-15	28.85	35.59	32.22	18.93
DSV-3	25.15	34.46	29.81	27.01
DSV-6	29.25	36.41	32.83	19.66
CSH-14	36.22	44.10	40.16	17.86
CSH-16	35.12	40.84	37.98	14.00
CSH-23	37.66	41.51	39.59	9.27
Mean	32.04	38.82		17.46
	S.E.±		C.D. at 5%	
Treatments(C)	1.97		5.76	
Protection(P)	1.14		3.33	
Interaction(C×P)	2.79		8.16	

In protected plots, the per cent earhead damage varied between 1.33 (CSH-14, CSH-16 and DSV-6) to 2.33 (DSV-3). All the entries were statistically found on par with each other with respect to degree of damage. Among different popular entries screened under two different conditions *viz.*, protected and protected, the maximum per cent earhead avoidable damage was recorded in DSV-6 (95%) followed by CSV-15 (93.9%), DSV-3 (93.8%), CSH-16 (92.6%), CSH-14 (92.0%) and CSH-23 (90.0%). Overall mean per cent earhead avoidable damage of 93.2 per cent damage can be prevented by affording chemical plant protection. The maximum avoidable loss and satisfactory control was achieved because of less number of larvae and less degree of damage may be because of inbuilt character of resistance in CSV-15 and DSV-6. The correlation study made by Mote and Murthy (1989) revealed that an increase in one larva per earhead, there was a corresponding increase in grain damage upto 4.84 per cent. These findings are in conformity to the present results. Present findings are in line with results placed on records by Burkhardt and Breithaupt (1955). They reported that sorghum head infested with 16 larvae was examined and observed to have 25 to 30 per cent of its kernel damage.

CSH-14 recorded maximum mean grain yield (40.16 q/ha) followed by CSH-23 (39.59 q/ha) and CSH-16 (37.98 g/ha) with irrespective of protection or no protection (Table 2). However, all these entries were on par with each other. Lowest mean grain yield was recorded in DSV-3 (29.81 q/ha). In unprotected plot, the mean grain yield ranged from 25.15 q per ha (DSV-3) to 37.66 q per ha (CSH-23). CSH-23 (37.66 q/ha) was on par with CSH-14 (36.22 q/ha) and CSH-16 (35.12 q/ha) and significantly differed with all other varieties. However, varieties CSV-15, DSV-3 and DSV-6 were on par with each other. Same entries when screened under protection, the maximum grain

yield of 44.10 q per ha was recorded in CSH-14 followed by CSH-23 (41.51 q/ha) and CSH-16 (40.84 q/ha). However, all these entries were on par with each other. Lowest grain yield was recorded in DSV-3 (34.46 q/ha) followed by CSV-15 (32.22 q/ha) and DSV-6 (32.83 q/ha). Maximum per cent avoidable yield loss was recorded in DSV-3 (27.01%) and next in the order were DSV-6 (19.66%), CSV-15 (18.93%), CSH-14 (17.86%), CSH-16 (14.00%) and CSH-23 (9.27%). An extent of 17.46 per cent yield loss can be avoided by taking protection with irrespective of different entries. These findings are in line with reports placed on records by Kishore and Jotwani (1982) that average avoidable loss of grain in the insecticidal treatments ranged from 1.71 to 19.81 per cent as against 44.35 per cent in control.

## REFERENCES

- Burkhardt, C.C. and Briethaupt (1955).** Chemical control of corn ear worm in sorghum heads. *J. Econ. Ent.*, **48** : 225-229.
- Kishore, P. and Jotwani, M.G. (1982).** Estimation of avoidable losses caused by earhead caterpillars on sorghum and their control. *Entomon.*, **7** : 65-67.
- Kulkarni, K.A., Thontadharya, T.S., Jotwani, M.G. and Parameshwarappa, R. (1980).** Present status of earhead caterpillars on sorghum and their management. Paper presented at the All India Sorghum Workshop, 12-14 May, 1980, Coimbatore, India. All India Co-ordinated Sorghum Improvement Project, INDIA.
- Mally, P. W. (1893).** Report on the bollworm of cotton (*Heliothis armigera* Hbn.). *U. S. Bent. Agric. Bull.*, **29**: 1-73.
- Mote, U. N. and Murthy, D. K. (1989).** Loss of sorghum grains due to the density of earhead caterpillar. *J. Maharashtra Agric. Univ.*, **14** (3) : 384-386.

\*\*\*\*\*