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Evaluation of commonness of earhead caterpillars by changing sowing dates in *kharif* Sorghum

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Abstract: *Sorghum hybrids like CSH-14 and CSH-16 were sown on different dates with weekly interval. Lowest larval population was recorded at flowering stage (1.16 larvae/earhead), when crop was sown during 12th and 19th June 2010. CSH-14 hybrid recorded (2.00 larvae/earhead) low larval load on 12th June, 2010 date of sowing. Per cent earhead damage was minimum (11.33%) and maximum grain yield was recorded (39.81 q/ha) when CSH-14 was sown on 12th June 2010. As sowings were delayed larval count and per cent earhead damage increased whereas grain yield decreased.*

Keywords – *earhead, grain, hybrid, sown, yield*

I. Introduction

In India, sorghum ranks third in area and production after rice and wheat, covering an area of 7.68 mha. producing 7.31 million tones with an average yield of 9.52 q per ha , Anonymous [1]. Several reasons have been attributed for the low yield of sorghum. Among them insect pests ravage is one of the principal factor. Among different insect pests of sorghum, the ear head caterpillars *viz.*, *Helicoverpa armigera* (Hubner), *Cryptoblabes gridiella* (Miller) and *Euproctis subnotata* (Walker) and *Stenochroia elongella* (Miller) are important species. *Helicoverpa armigera* is one of the most important earhead pest reported to cause as much as 37.11 per cent yield loss in sorghum, Kulkarni *et al*.[2] .*Euproctis subnotata* is principally a pest of sorghum. It assumed the importance of a serious pest in recent years particularly with the introduction of hybrid sorghums, Patil [3]. *Cryptoblabes gnidiella* causes considerable loss to hybrid sorghum, the larval feed on milky and hardy grains inside the earheads, Srivastava and Singh [4]. Although, the larvae of the old world webworm, *Stenachroia elongella* is smaller in size than *Heliothis,* probably causes more damage.

II. Methodology

The experiment included seven treatments and three replications. The different treatments included sowing dates on different weeks *viz.*, June 2nd, June 3rd, June 4th, July 1st, July 2nd, July 3rd, July 4th weeks. CSH-16 was used in the experimentation and each plot size of 4 × 2.7 m. The observation were made on the number of larvae on 25 sorghum earheads at weekly interval from flowering to till harvest and expressed as number of larvae per earhead. Though, the dates of sowing were planned during 3rd and 4th weeks of May and 1st week of June but could not be done because of non-receipt of rains. Observations were recorded on number of larvae per earhead, per cent earhead Damage And Grain Yield.

III. Number of larvae per earhead

3.1 Results

3.1.1 Earhead caterpillars incidence on different stages of earhead

Among different earhead caterpillars, *H. armigera* was major and *E. subnotata* and *S. elongella* were minor ones on both the popular hybrids (CSH-14 and CSH-16). With irrespective of hybrids, on flowering stage least larval load was recorded (1.16 larvae/earhead) when crop was sown early i.e., both 12th June (D_1) and 19th June (D_2) 2010. On milk stage larval load ranged from 4.33 larvae per earhead (D_1) to 8.00 larvae per earhead (D_3). However, all these treatments were found on par with each other. At dough stage, larval population ranged from 1.16 (D_3) to 4.50 (D_6) larvae per earhead. However, there was no significant difference existed among treatments (TABLE 1). Amongst different stages, dough stage recorded lowest mean number of larvae (2.28%) followed by flowering (3.14 larvae/earhead) and milk stage (6.52 larvae/earhead) irrespective of different dates of sowing. It indicated that dough stage showed moderate resistance to earhead caterpillars as compared to flowering and milk stages.

3.1.2 Earhead caterpillars incidence on hybrids

CSH-14 hybrid recorded 3.81 larvae per earhead, as against CSH-16 which recorded (4.15 larvae/earhead) with irrespective of different dates of sowing. This clearly indicated superiority of CSH-14 over

CSH-16 establishing moderate resistance as it was possessing loose earhead. Mean larval number recorded more than economic threshold level during different dates of sowing, on all the stages and in two different hybrids.

3.2 Discussion

Kongwad [5] and Shivanand [6] carried experiment in Dharwad, India. Reported occurrence of earhead caterpillars were confined to *kharif* season. Incidence of earhead caterpillars was more on the crop sown during June second fortnight compared to the crop sown on July first fortnight. Amongst all stages with irrespective of hybrids on milk stage registered maximum larval population (6.52 larvae/earhead) when compared to other two stages and all these stages are significantly differed with each other. Among CSH-14 and CSH-16 although CSH-14 recorded less infestation (3.81 larvae/earhead) but statistically found on par with CSH-16 with respect to larval incidence

IV. Per cent earhead damage

4.1 Results

Per cent earhead damage was mainly due to *Helicoverpa armigera* (Hubner) and to little extent by *Euproctis subnotata* (Walker) and *Stenachroia elongella* (Miller). Mean per cent earhead damage with irrespective of hybrids on different dates of sowing ranged from 13.33 to 44.0 per cent. Minimum mean per cent earhead damage (13.33%) recorded on 12th June 2010 (D_1) was on par with 19th June 2010 ($D_{2)}$ recorded 16.66 per cent and significantly differed with other treatments. Amongst hybrids, irrespective of different dates of sowing CSH-14 recorded minimum mean per cent earhead damage (28.76%) which was on par with CSH-16 which recorded 31.28 per cent (TABLE 2). In CSH-16 hybrid, minimum mean per cent earhead damage was recorded (15.33%) when the crop was sown on 12th June 2010 (D_1) which was on par with D_2 (19th June, 2010) recorded 17.00 per cent and differed significantly with all other treatments. Minimum mean per cent earhead (11.33%) damage was recorded from 12th June 2010 (D_1) sowing in CSH-14. All the treatments differed significantly with each other. At all dates of sowings in two hybrids CSH-14 and CSH-16, per cent earhead damage crossed economic threshold level *i.e.*, more than 10 per cent this showed that manipulation of sowing date of escape the attack from earhead caterpillars alone will not be helpful to the crop from earhead caterpillar.

V. Grain yield

Mean grain yield with irrespective of hybrids on different dates of sowing ranged from 9.98 to 39.39 q per ha. Maximum grain yield of 39.39 q per ha was recorded when crop sown early on 19th June, 2010 (D_1). Amongst hybrids, CSH-16 recorded maximum mean grain yield of 28.68 q per ha whereas CSH-14 registered 26.14 q per ha. However, they were found on par with each other (TABLE 3).

VI. Conclusion

CSH-14 hybrid recorded (2.00 larvae/earhead) low larval load, minimum per cent earhead damage (11.33%) and maximum grain yield (39.81 q/ha) when early sowing was taken on 12th June 2010. As sowings were delayed larval count and per cent earhead damage increased whereas grain yield decreased.

References

[1] Anonymous, *Agricultural Statistics at a Glance*, *Directorate of Economics and Statistics*, 2009, 90-92.

[2] Kulkarni, K. A, Thontadharya, T. S, Jotwani, M. G, and Parameshwarappa, R, Present status of earhead caterpillars on sorghum and their management. *Presented at the All India Sorghum Workshop*, Coimbatore, India, 12-14 May, 1980.

[3] Patil, S. B, *Studies on the biology and control of tussock caterpillar, Euproctis subnotata Walker (Lepidopera : Lymantriidae) on sorghum*, M. Sc. (Agri.) Thesis, University of Agricultural Sciences Dharwad, Karnataka, India, 1985

[4] Srivastava, A. S. and Singh, Y. P, Control of *Heliothis armigera* Hub. (Noctuidae : Lepidoptera) attacking sorghum. *Curr. Sci.,* 42, 1973, 865-867.

[5] Kongwad, S. B, *Bio-ecology and management of sorghum earhead caterpillar with special reference to Cryptoblabes gnidiella (miller)*, M. Sc. (Agri.) Thesis, University of Agricultural Sciences Dharwad, Karnataka, India, 2000.

[6] Shivanand, *Bio-ecological management of Helicoverpa armigera (Hub.) on sorghum*, M. Sc. (Agri.) Thesis, University of Agricultural Sciences Dharwad, Karnataka, India, 2002.

Table 1: Effects of dates of sowing on the incidence of earhead caterpillar, *Helicoverpa armigera* at different stages on *kharif* sorghum

Dates Of Sowing	Number Of Larvae Per Earhead					Mean
	Stages			Hybrids		
	Flowering	Milk	Dough	CSH-16	CSH-14	
D_1 - 12th June 2010	1.16 (1.47)	4.33 (2.3)	1.33 (1.53)	2.55 (1.88)	2.00 (1.73)	2.27 (1.80)
D_2 - 19th June 2010	1.16 (1.47)	4.83 (2.4)	2.16 (1.78)	2.88 (1.97)	2.55 (1.88)	2.72 (1.92)
D_3 - 27th June 2010	4.66 (2.38)	8.00 (3.0)	1.16 (1.47)	4.55 (2.36)	4.66 (2.38)	4.61 (2.36)
D_4 - 03rd July 2010	3.16 (2.04)	7.16 (2.8)	2.00 (1.73)	4.33 (2.31)	3.88 (2.21)	4.11 (2.26)
D_5 - 10th July 2010	3.00 (2.00)	6.83 (2.8)	1.66 (1.63)	4.11 (2.26)	3.55 (2.13)	3.83 (2.19)
D_6 - 17th July 2010	4.16 (2.27)	7.50 (2.9)	4.50 (2.35)	5.55 (2.56)	5.22 (2.49)	5.38 (2.52)
D_7 - 24th July 2010	4.66 (2.38)	7.00 (2.8)	3.16 (2.04)	5.11 (2.47)	4.77 (2.40)	4.94 (2.43)
Mean	**3.14 (2.03)**	**6.52 (2.74)**	**2.28 (1.81)**	**4.15 (2.26)**	**3.81 (2.19)**	
	S.Em.±			C.D. At 5%		
Sowing Dates (D)	0.32			0.89		
Hybrids (H)	0.17			0.47		
Stages (S)	0.21			0.58		
Interaction (D × S)	0.56			1.56		
Interaction (D × H)	0.45			1.26		

Figures in parentheses indicate square root ($\sqrt{x+1}$) transformed values

Table 2: Effects of dates of sowing on the incidence of earhead caterpillar, *Helicoverpa armigera* on *kharif* sorghum

Dates of sowing	Per cent earhead damage		
	CSH-16	CSH-14	Mean
D_1 - 12th June 2010	15.33 (23.04)	11.33 (19.66)	13.33 (21.40)
D_2 - 19th June 2010	17.00 (24.34)	16.33 (23.82)	16.66 (24.08)
D_3 - 27th June 2010	34.66 (36.05)	37.33 (37.64)	36.00 (36.85)
D_4 - 03rd July 2010	33.66 (35.45)	28.66 (32.35)	31.16 (33.91)
D_5 - 10th July 2010	31.66 (34.23)	26.00 (30.64)	28.83 (32.46)
D_6 - 17th July 2010	41.66 (40.18)	38.66 (62.00)	40.16 (39.30)
D_7 - 24th July 2010	45.00 (42.11)	43.00 (40.95)	44.00 (41.53)
Mean	**31.28 (33.99)**	**28.76 (32.41)**	
	S.Em.±		C.D .at 5%
Sowing dates (D)	1.21		3.50
Hybrids (H)	0.64		1.85
Interaction(D × H)	1.71		4.95

Figures in parentheses indicate Angular transformed values.

Table 3: Effects of different dates of sowing on the Grain yield of *kharif* sorghum

Dates of sowing	Yield (q/ha)		
	CSH-16	**CSH-14**	**Mean**
D_1 - 12th June 2010	37.96	39.81	38.88
D_2 - 19th June 2010	39.00	39.78	39.39
D_3 - 27th June 2010	36.22	38.04	37.13
D_4 - 03rd July 2010	32.66	34.60	33.63
D_5 - 10th July 2010	24.82	15.17	19.99
D_6 - 17th July 2010	11.57	8.40	9.98
D_7 - 24th July 2010	18.56	12.90	15.73
Mean	**28.68**	**26.96**	
	S.Em.±		C.D. at 5%
Sowing dates (D)	1.71		4.95
Hybrids (H)	0.91		2.63
Interaction (D × H)	2.42		7.01