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INCIDENCE AND AVOIDABLE LOSS DUE TO LEAF ROLLER/CAPSULE BORER

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ABSTRACT

Avoidable losses in grain yield due to leaf roller and bud fly were assessed in four varieties of sesame (*Sesamum indicum* L.) *during 2004 to 2007 at Tikamgarh, (M.P). Results revealed that three spray of 0.07% endosulfan significantly reduced flower and capsule damage caused by leaf roller and flower damage caused by bud fly in protected plots as compared to unprotected plots. Consequently, grain yield was significantly increased in protected plots as compared to unprotected plots. Net profits of ₹. 2997.5 in JT-307, ₹. 2556.3 in JT-308, ₹. 2463.8 in JTS-8 and ₹.2408.7 in JT-306 were earned due to protection of crop with three spray of endosulfan. The ICBR 4.6, 4.3 4.1 and 3.6 were worked out in respective cultivars.*

Key words: *Antigastra catalaunalis*, bud fly, avoidable loss, sesame

INTRODUCTION

Sesame (*Sesamum indicum* L.) is predominantly grown during Kharif season on various soil types in different regions of the country. The production of the oilseed crops in our country including sesame is not enough to meet the massive domestic demand. Low production of the sesame is attributed to the fact that the crop is constrained by a large number of insect pests, of which the leaf roller is the most serious one accounting for approximately 90 % of yield losses (Egonyu *et al.*, 2005), however losses in yield are much variable depending upon the pest reaction of different varieties and season (Ahirwar *et al.*, 2008; Dhandhalya and Shiyani, 2009; Ahuja and Bakhtia., 1995 and Rohilla and Singh., 1992). Keeping these facts in view, yield losses due to the incidence of leaf roller and bud fly were assessed on four varieties of sesame in Bundelkhand zone of Madhya Pradesh.

MATERIAL AND METHODS

A field experiment was conducted at JNKVV, College of Agriculture, Tikamgarh, M.P. during Kharif seasons of 2004 to 2007 in paired plot under randomized block design. Plot size was kept 3X4 meters and distance between row and plant was maintained at 30 and 10 cm during each season. Varieties JT-306, JT-307, JT-308 and JTS-8 were sown in first week of July during each Kharif season. One set of four plots of each variety was treated with three foliar sprays of endosulfan 0.07% whereas one set of plot were left untreated. Flower and capsule damage by leaf roller/capsule borer was recorded on ten randomly selected plants from each plot at 50 and 70 days of crop stage respectively. Flower damage caused by bud fly was also recorded on flowers at 50 days. Per cent avoidable loss in grain yield was calculated along with net profit and C: B ratio.

RESULTS AND DISCUSSION

Four varieties *viz*. JT-306, Jt-307, JT-308 and JTS-8 were grown during Kharif seasons of 2004 to 2007. It was observed that per cent flower and capsule damage due to leaf roller/capsule borer and per cent flower damage due to bud fly were significantly reduced in protected plot of all four varieties as compared to unprotected plot.

Per cent flower damage due to *Antigastra catalaunalis*

During 2004, flower damage was observed negligible in all the four varieties in protected plots whereas the maximum flower damage was recorded in variety JT-307 and minimum in JTS-8. During second year, the flower damage was significantly low in protected plots of JT-306, JT-307, JT-308 and JTS-8 as compared to their unprotected plots. The maximum per cent of flower damage was found in unprotected plot of JTS-8. During third year, the per cent flower damage was still lower than second year but was significantly reduced in protected plot of all four varieties (JT-306, JT-307, JT-308 and JTS-8) as compared to the unprotected plots. During fourth year, the per cent flower damage was maximum in JTS-8 and minimum in JT-308 (Table 1). Pooled mean per cent flower damage of four years was also significantly lower in protected plots of four varieties of sesame (JT-306, JT-307, JT-308 and JTS-8) as compared to be unprotected plots. The maximum damage was observed in variety JTS-8 followed by JT-308, JT-307 and JT-306.

Per cent capsule damage due to *Antigastra catalaunalis*

Capsule damage caused by *Antigastra catalaunalis* was also significantly controlled in protected plots being negligible in all four varieties, whereas in unprotected plots, the maximum damage

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Table 1: Per cent flower damage due to leaf roller in different varieties of sesame

Varieties	Treatment	Per cent flower damage due to *Antigastra catalaunalis*				
		2004	2005	2006	2007	Mean
JT-306	Protected	0.0 (0.0)	2.3 (8.5)	1.9 (6.6)	2.3 (8.8)	1.6 (6.0)
	Unprotected	1.5 (5.9)	9.1 (17.3)	6.6 (14.2)	5.9 (14.0)	5.8 (12.9)
JT-307	Protected	0.0 (0.0)	3.8 (11.0)	2.3 (7.5)	2.3 (8.8)	2.1 (6.8)
	Unprotected	1.7 (6.3)	11.8 (20.0)	7.6 (14.6)	5.7 (13.7)	6.7 (13.7)
JT-308	Protected	0.0 (0.0)	4.0 (11.1)	1.2 (3.1)	0.9 (5.6)	1.5 (5.0)
	Unprotected	1.2 (5.4)	10.5 (18.8)	8.0 (16.0)	4.6 (12.4)	6.1 (13.2)
JTS-8	Protected	0.0 (0.0)	4.2 (10.1)	1.5 (5.0)	2.7 (9.3)	2.1 (6.1)
	Unprotected	1.2 (5.4)	7.9 (16.1)	9.0 (15.0)	10.6 (18.9)	7.2 (13.9)
S Em ±		1.6	1.7	3.0	0.8	1.8
CD(P=0.05		4.6	5.0	8.9	2.4	5.2

was in variety JTS-8 followed by JT-308 in 2004 crop seasons. During 2005, the per cent capsule damage was relatively higher with respect to previous year. However the per cent capsule damage was significantly reduced in protected plots of all four varieties of sesame (JT-306, JT-307, JT-308 and JTS-8) as compared to unprotected plots. Among unprotected plots of these four varieties, per cent capsule damage was minimum in JT-306 and maximum in JTS-8. During 2006-07 the per cent capsule damage was lower than the second year but was significantly reduced in protected plots of all four varieties (JT-306, JT-307, JT-308 and JTS-8) as compared to the unprotected plots. During 2007 the per cent capsule damage was significantly reduced in protected plots as compared to unprotected plots. The maximum damage was in variety JT-306 and minimum in JTS-8 (Table 2). The present findings are in conformity with the results of Ahirwar *et al.* (2010), who reported that the flowers and capsules were infested to the extent of 23.4, 7.94 and 3.12% by *Antigastra catalaunalis*.Pooled mean per cent capsule damage was significantly lower in protected plots as compared to unprotected plots. Significant reduction in capsule damage was in variety JT-306 (0.7%) in comparison to the rest of the varieties. However, in unprotected plots the maximum capsule damage was in variety JTS-8 and minimum in JT-307 was recorded.

Table 2: Per cent capsule damage due to leaf roller in different varieties of sesame

Varieties	Treatment	Per cent flower damage due to *Antigastra catalaunalis*				
		2004	2005	2006	2007	Mean
JT-306	Protected	0.0 (0.0)	1.4 (6.7)	0.8 (5.0)	0.4 (3.6)	0.7 (3.8)
	Unprotected	0.6 (4.2)	2.8 (9.5)	1.5 (7.0)	4.5 (12.3)	2.4 (8.3)
JT-307	Protected	0.0 (0.0)	1.7 (7.3)	0.9 (5.3)	0.4 (3.4)	0.8 (4.0)
	Unprotected	0.5 (4.1)	3.1 (10.1)	1.6 (7.1)	4.1 (11.7)	2.3 (8.3)
JT-308	Protected	0.0 (0.0)	2.1 (8.3)	0.9 (5.1)	0.3 (3.1)	0.8 (4.1)
	Unprotected	0.6 (4.5)	3.8 (11.2)	1.4 (6.8)	3.3 (10.5)	2.3 (8.3)
JTS-8	Protected	0.0 (0.0)	2.0 (8.0)	0.9 (5.5)	0.2 (2.2)	0.8 (3.9)
	Unprotected	0.8 (4.8)	4.0 (11.2)	1.5 (7.0)	3.8 (11.1)	2.5 (8.5)
S Em ±		0.5	0.9	0.6	0.5	0.6
CD(P=0.05)		1.4	2.6	NS	1.5	1.8

Per cent flower damage due to bud fly

Flower damage due to bud fly was significantly reduced in protected plots of all varieties as compared to unprotected plots (Table 3). The maximum flower damage due to bud fly in 2004 was in variety JT-308 and minimum in JT-307 in protected plots, whereas in unprotected plots variety JT-308 was more suffered. During 2005, flower damage was comparatively lower than previous year in protected and unprotected plots. During 2006 flower damage was significantly higher as compared to previous year. During 2007, the flower damage was significantly higher in variety JTS-8 (5.3%) followed by JT-306 (4.6%), JT-307 (4.4%) and JT-308 (3.1%).

Table 3: Per cent flower damage due to bud fly in different varieties of sesame

Varieties	Treatment	Per cent flower damage due to bud fly				
		2004	2005	2006	2007	Mean
JT-306	Protected	10.0 (4.1)	2.2 (4.1)	2.2 (7.4)	4.6 (12.3)	2.0 (7.0)
	Unprotected	3.3 (9.0)	0.9 (3.6)	4.0 (11.4)	13.0 (21.0)	5.3 (11.3)
JT-307	Protected	0.0 (0.0)	0.5 (2.0)	4.0 (11.3)	4.4 (12.0)	2.2 (6.3)
	Unprotected	2.3 (8.4)	1.0 (4.7)	9.1 (17.3)	13.6 (21.6)	6.5 (13.0)
JT-308	Protected	1.1 (4.3)	0.0 (0.0)	4.3 (11.9)	3.1 (10.1)	2.1 (6.6)
	Unprotected	3.6 (10.5)	0.5 (2.9)	7.0 (15.3)	10.5 (18.9)	5.4 (11.9)
JTS-8	Protected	0.4 (1.9)	0.0 (0.0)	3.4 (10.3)	5.3 (13.3)	2.3 (6.4)
	Unprotected	2.9 (9.4)	0.2 (1.4)	6.1 (14.0)	11.2 (19.5)	5.1 (11.1)
S Em ±		2.0	0.7	1.3	0.9	1.2
CD(P=0.05)		6.0	2.0	3.9	2.5	3.6

Grain yield and avoidable losses

Grain yield increased significantly in protected plots of each variety during each year and pooled mean (Table 4). The profound loss in grain yield in unprotected plots is primarily accounted for the nature of pest attack as the leaf roller attacks the *Kharif* crops right from the beginning of the growth and if the infestation occurs at very early stage, the plants dies without producing any branch or shoot and a single caterpillar could destroy two to three plants in a week (Karuppaiah, 2014). Among protected plots of all four varieties, yield was maximum in JT-308 (646.3 kg ha^{-1}) followed by JT-307 (630.8 kg ha^{-1}), JTS-8 (595.8 kg ha^{-1}) and JT-306 (528.0 kg ha^{-1}). Maximum yield in JT-308 might be due to lower flower and capsule damage due to leaf roller and flower damage due to bud fly. However, among unprotected plots of all four varieties, the mean grain yield was minimum in JT-306 (412.8 kg ha^{-1}) and maximum in JT-308 (526.5 kg ha^{-1}).

Table 4: Mean avoidable loss and grain yield in different varieties of sesame

Varieties	Treatment	Mean grain yield (kg ha^{-1})	Mean % avoidable losses	Mean net profit (₹. ha^{-1})	Mean C:B Ratio
JT-306	Protected	528.0	22.4	2408.7	3.6
	Unprotected	412.8			
JT-307	Protected	630.8	22.9	2997.5	4.6
	Unprotected	487.8			
JT-308	Protected	646.3	18.3	2556.3	4.3
	Unprotected	526.5			
JTS-8	Protected	595.8	19.1	2463.8	4.1
	Unprotected	482.5			
SEm ±		29.9	-	-	-
CD (P=0.05)		66.9	-	-	-

Avoidable losses in different varieties varied from 11.4 to 16.4 % during 2004-05, 18.5 to 32.4 % during 2005-06, 19.2 to 28.9 % during 2006-07 and 19.9 to 24.6 % during 2007-08. Mean avoidable losses were 18.3, 19.1, 22.4 and 22.9 %, respectively in sesame varieties JT-308, JTS-8, JT-306 and JT-307. Higher losses in grain yield of sesame varieties JT-307 may be due to maximum flower and capsule damage by leaf roller and bud fly as compared to other varieties (Table 4).Mean net profits of ₹ 2409, 2464, 2556 and 2998 ha^{-1} were notedin sesame varieties JT-306, JTS-8, JT-308 and JT-307 respectively along with perspective ICBR of 3.6, 4.1, 4.2 and 4.6. Thus, during all the four Kharif seasons, the incidence of leaf roller/capsule borer (Flower and capsule damage) was significantly controlled in all the four varieties with three foliar sprays of endosulfan @ 0.07%. These findings are in conformity with those of Gorpade and Thakur (1995). Grain yield of all four varieties tested was also significantly increased in crop treated with endosulfan which might be due to the reduced incidence of pests. Gorpade and Thakur (1995) also reported similar increase in grain yield with endosulfan treated crop of sesame. Gupta *et al.* (2002) also reported that three spray of 0.07% endosulfan significantly reduced the capsule damage caused by *Antigastra catalaunalis* and also increased the grain yield in all the sixteen varieties of sesame.

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