Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 1732-1735

Received: 28-05-2020
Accepted: 30-06-2020

Prajna Devaiah B
Department of Agricultural Entomology, College of Agriculture, V.C. farm, Mandya, UASB, Karnataka, India

Vijay Kumar L
Assistant Professor of Agricultural Entomology College of Agriculture, V.C. farm, Mandya, UASB, Karnataka, India

Shivanna B
Assistant Professor of Agricultural Entomology Department of Agricultural Entomology, University of Agricultural Sciences, Bengaluru, Karnataka, India

Pallavi D
Department of Agricultural Entomology Department of Agricultural Entomology, University of Agricultural Sciences, Bengaluru, Karnataka, India

Moulya MR
Department of Agricultural Entomology, College of Agriculture, V.C. farm, Mandya, UASB, Karnataka, India

Corresponding Author:
Prajna Devaiah B
Department of Agricultural Entomology, College of Agriculture, V.C. farm, Mandya, UASB, Karnataka, India

Population dynamics of mirid bugs *viz, Poppiocapsidea biseratense* (Distant) and the influence of abiotic factors on the population fluctuation of mirid bugs on sesame

Prajna Devaiah B, Vijay Kumar L, Shivanna B, Pallavi D and Moulya MR

DOI: https://doi.org/10.22271/j.ento.2020.v8.i4aa.7379

Abstract
A field experiment was conducted during *Summer* and *Kharif* 2018 at College of Agriculture, V. C. Farm, Mandya where the incidence of nymph and adult population of mirid bugs *viz, Poppiocapsidea biseratense* (Distant) was observed during the study. In *Summer,* the highest incidence of *P. biseratense* was recorded during the fourth week of February and during *Kharif,* the highest incidence was recorded during the third week of September. Among the meteorological variables, morning RH (-0.71) rainfall (-0.45) and rainy days (-0.44) were found to have a significant negative influence on the incidence of *Poppiocapsidea biseratense* (Distant) on sesame.

Keywords: *Poppiocapsidea biseratense,* population dynamics, meteorological variables, sesame

Introduction

Sesame is one of the oldest domesticated oilseeds known by the human beings (Weiss, 1971) [11] and they are mainly cultivated in tropical and warm temperate regions for its seeds that contain about 50% fat, 23% carbohydrates and also protein about 18% (Sasikumar and Kumar, 2015) [6]. Despite of its greater importance, the productivity and yield level in major growing regions are low. The decrease in yields has been attributed to several factors which includes lack of high yielding cultivars, poor agronomic practices, poor planting methods and frequent occurrence of pest and diseases, among the factors, insect pests take a heavy toll in yield loss (Ssekabembe *et al.*, 2001) [8]. Among different insect pest recorded on sesame in India, leaf webber, *Antigastra catalaunalis*; sphinx caterpillar, *Acherontiastyx*; gall fly, *Asphondyliasesami*; cotton aphid, *Aphis* gossypii; leaf hopper, *Orosius albicinctus* (Ahuja and Bakhetia, 1995) [1] and mirid bugs were considered as major importance. Among mirid bugs, three species *viz*., *Poppiocapsidea biseratense* (Distant), *Nesidiocoris tenuis (*Reuter) and *Calocoris* sp. were observed throughout the cropping season. Among the three species of mirid bugs, *P. biseratense* (Distant) was the dominant species causing heavy flower dropping during flower and pod initiation stage. Earlier the mirid bugs were considered as of minor importance, but due intensive cultivation of sesame especially in early and late *Kharif* as major pre-monsoon crop, the bugs assumed major status (Jyothi, 2017) [2].

The adult bugs are brown in colour with semi-transparent brown wings whereas the nymphs are light yellow with brownish thorax and prominent wing pads are observed in the later nymphal stages. The nymph being the rapid movers, the adults are swift fliers. Both nymph and adults are the damaging stages sucking the sap through piercing their stylet into the plant tissues. The major symptoms of damage caused by *P. biseratense* include dropping of flowers, shedding of young pods, necrotic lessons, brown patches of flowers, pods, leaves, shriveling of seeds with perforated leaves.

Materials and Methods

A field experiment was conducted at College of Agriculture, V.C, Farm, Mandya (12^0 32’ N latitude, 76^0 53’ E longitude, and 690 m above MSL) during *Summer* and *Kharif* 2018.

A popular and susceptible sesame variety GT- 1 was sown in the plot size of 6X6 m (36 m^2) with spacing of 30 X 15 cm between rows and plants, respectively. Four such blocks were made and the observations on the seasonal incidence and abundance of the mirid bug, *P. biseratense* (Distant) was recorded at weekly intervals from 14 days after sowing. The incidence of adults and nymphs of mirid bug was recorded on 20 designated plants in each block and mean population per plant was worked out to know the activity of mirid bugs in different seasons.

Results and Discussion

Population dynamics of mirid bug in sesame

***P. biseratense* (Distant) (Miridae: Hemiptera):**

During *summer* 2018, the population of mirid bug, *P. biseratense* varied from 0.00 to 5.60 bugs/plant with mean of 2.19/plant and there was no incidence during second week of January. However, the incidence started from third week of January (0.30 bugs/plant) and there was a gradual increase from first week to fourth week of February (5.60 bugs/plant). The population started declining gradually from third week of March (2.00 bugs/plant) and there was no incidence from April second week onwards (Table 1, Figure 1).

Likewise, during *Kharif* 2018, the population of mirid bug, *P. biseratense varied* from 0.00 to 8.30 bugs/ plant with mean of 3.10/plant and there was no incidence during third week of August. However, the incidence started from fourth week of August (0.50 bugs/ plant) and there was a gradual increase from first week to third week of September (8.30 bugs/ plant). The population started declining gradually from second week of October (3.70 bugs/plant) and there was no incidence from November third week onwards (Table 2, Figure 2). However, there were no reports to corroborate and contradict the present findings.

Rohini *et al.* (2012) [5] and Udikeri *et al.* (2009) [9] both reported the maximum incidence of *P. biseratense* on cotton during October and November. The peak incidence was noticed during second fortnight of November. Similar conclusion was made by Ravi (2007) [4] on incidence of mirids and this variation in the incidence might be due to the change in the local meteorological variables, crop stages, population density and local agronomical practices. Likewise, Vinaykumar *et al.* (2013) [10] reported the peak incidence of *P. biseratense* during October II fortnight (12.2 bugs/ 10squares) in Dharwad.

Influence of abiotic factors on the population fluctuation of mirid bugs on sesame

During *Summer* 2018, the correlation matrix and regression co-efficient indicating relationship between *P. biseratense* incidence and meteorological variables, the population of mirid bug, *P. biseratense* exerted a negative association with minimum temperature (r = - 0.34), morning relative humidity (r = - 0.70), rainfall (r = - 0.45), rainy days (r = - 0.45) and sunshine hours (r = - 0.27). While, the population exerted positive association with maximum temperature (r = 0.04), and afternoon relative humidity (r = 0.39). However, the influence of morning relative humidity, rainfall and rainy days were found to be significant (Table 3). When the data was subjected to multi linear regression analysis (MLR), the results revealed that 65 per cent (R^2 = 0.65) of *P. biseratense* population was influenced by morning relative humidity, rainfall and rainy days negatively (Table 3).

Table 1: Seasonal incidence of mirid bugs in sesame, *Summer*2018

Month	MSW	*P. biseratense*	Meteorological variables (weekly ±)						
			Temperature		RH%		Rainfall	Rainy days	Sun shine hours
			Max	Min	I	II			
Jan	2	0	31.3	13.9	91	39	0	0	8.9
	3	0.3	32.3	12.8	86	49	0.1	0	8.6
	4	1.2	31.0	16.3	91	47	6.4	1	6.4
Feb	5	1.1	31.4	13.4	91	50	0	0	9.15
	6	3.3	32.9	11.0	77	61	0	0	8.64
	7	3.9	32.9	10.6	78	66	0	0	7.9
	8	5.6	34.6	11.1	49	63	0	0	5.96
March	9	4.3	34.5	12.4	80	40	0	0	7.7
	10	5.3	35.0	20.4	84	40	0	0	7.3
	11	2.0	34.4	19.6	87	38	8.4	1	7.5
	12	3.3	35.5	19.4	85	30	0	0	8.1
April	13	0.4	36.7	17.6	84	42	0	0	8.63
	14	0	36.8	22.2	90	34	6.6	1	7.36
	15	0	36.9	22.1	90	38	11	1	6.1
Mean±SD		2.19±1.97							

N = 14; MSW – Meteorological Standard Week

Table 2: Seasonal incidence of mirid bugs in sesame, *Kharif* 2018

Month	MSW	*P. biseratense*	Meteorological variables (weekly ±)						
			Temperature		RH%		Rainfall	Rainy days	Sun shine hours
			Max	Min	I	II			
Aug	31	0	32.1	18.2	91	92	14.1	1	4.8
	32	0.5	31.7	19.4	91	92	46.1	3	4.6
	33	2.3	30.6	20.1	95	93	119.6	4	3.0
Sept	34	4.6	30.6	20.5	93	92	32.5	2	2.2
	35	5.6	30.8	20.7	96	92	23.1	3	3.5

	36	8.3	32.0	17.9	93	76	87.0	4	5.1
	37	7.1	31.4	19.3	92	65	3.5	1	7.0
Oct	38	7.4	30.7	19.6	89	67	9.8	2	4.8
	39	3.7	30.6	20.0	96	68	98.7	5	2.6
	40	2.2	30.9	21.4	95	75	42.5	3	3.5
	41	1.3	30.9	20.7	96	70	11.0	1	4.7
Nov	42	0.5	30.4	20.4	94	80	5.2	1	2.0
	43	0	30.1	19.4	93	76	4.8	1	5.8
	44	0	29.9	19.6	89	73	00	0	6.4
Mean±SD		3.10±2.72							

N = 14; MSW – Meteorological Standard Week

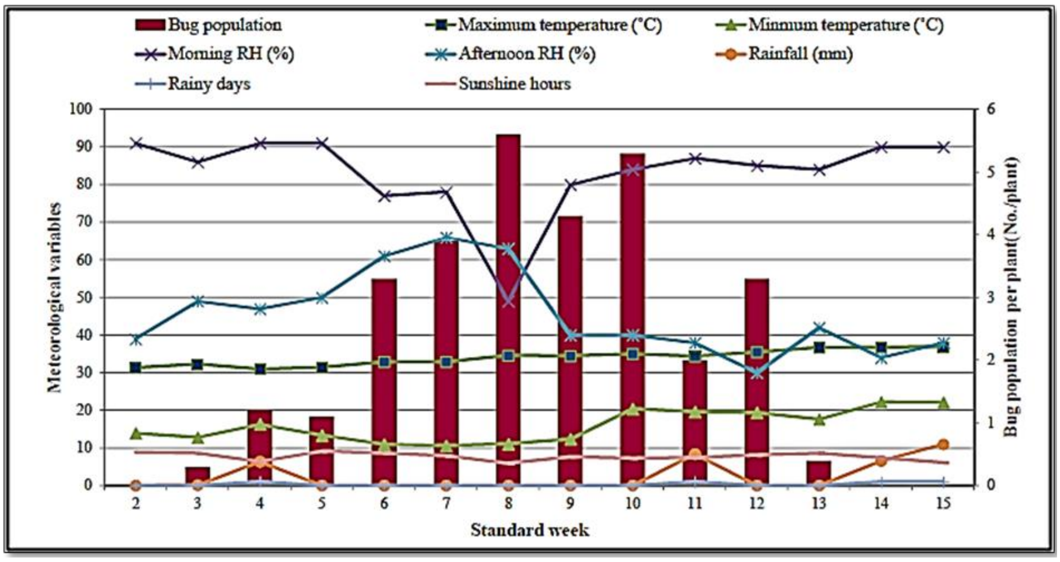

Fig 1: Influence of meteorological variables on the incidence of mirid bug, *P. biseratense, Summer* 2018

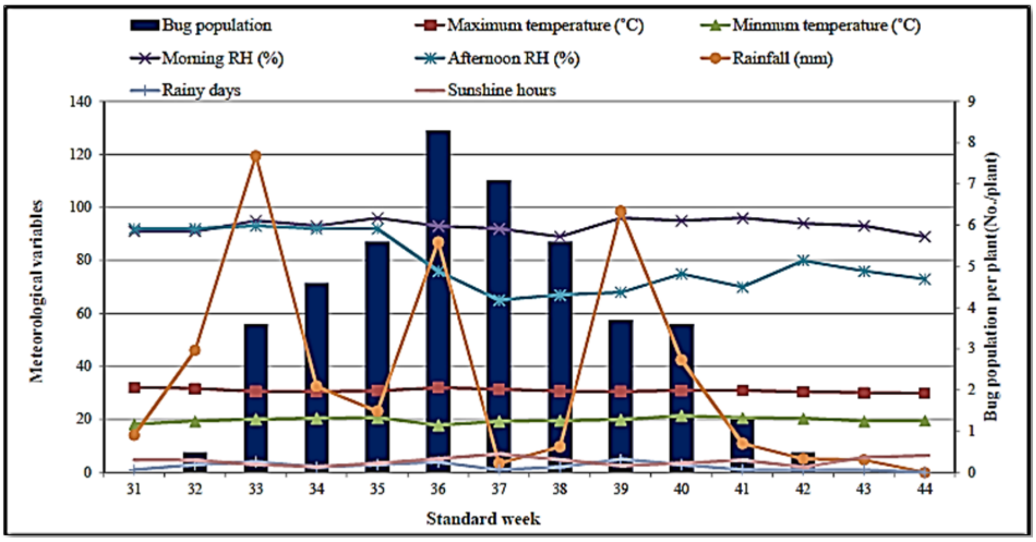

Fig 2: Influence of meteorological variables on the incidence of mirid bug, *P. biseratense, Kharif* 2018

Table 3: Correlation coefficient and regression equation for *P. biseratense* in sesame, *Summer* and *Kharif,* 2018

Season	Correlation coefficient (r)							R^2	Regression equation
	Temperature (°C)		Relative humidity (%)		Rainfall (mm) (X_6)	Rainy days (X_7)	Sunshine hours (X_8)		
	Max. (X_2)	Min. (X_3)	Morning (X_4)	Afternoon (X_5)					
Summer	0.04	-0.34	-0.70**	0.39	-0.45*	-0.45*	-0.27	0.65	$Y=17.16-0.09X_2+0.13X_3-0.61X_4+0.01X_5-0.29X_6-0.91X_7-1.07X_8$
Kharif	0.29	-0.09	0.14	-0.21	0.34	0.48*	0.01	0.41	$Y=-25.01+0.95X_2+0.22X_3-0.04X_4-0.06X_5-0.02X_6+1.63X_7+0.28X_8$

N=14, *Significant at p = 0.05; **Significant at p = 0.01 and 0.05

Similarly during *Kharif* 2018, the population of mirid bug, *P. biseratense* exerted a negative association with minimum temperature (r = - 0.09) and afternoon relative humidity (r = - 0.21). Likewise, the population exerted positive association with, mean maximum temperature (r = 0.29), minimum temperature (r = 0.03), morning relative humidity (r = 0.14), rainfall (r = 0.34), rainy days (r = 0.48) and sunshine hours (r = 0.01). However, the influence of rainy days was found to be significant (Table 3). When the data was subjected to multiple linear regression analysis (MLR), the results revealed that 41 per cent (R^2 = 0.41) of *P. biseratense* population was found to be influenced by rain days negatively (Table 3). The present findings are in conformity with Singh *et al.* (1990) [7] who reported the positive association between the mirid bug growth and survival with maximum temperature and high humidity. Similarly, Prakash *et al.* (2013) [3] reported a non-significant negative association between minimum temperature (r = - 0.17) and morning relative humidity (r = - 0.05) with mirid infestation, but in contradictory to the present findings he reported a non-significant negative relation with maximum temperature (r = - 0.07), evening relative humidity (r = - 0. 04) and rainfall (r = - 0.35).

Conclusion

During *Summer* 2018, the activity of *P. biseratense* started from 3rd week of January and declined gradually from 3rd week of March. The peak activity was noticed during 4th week of February (5.60 bugs /plant). Likewise, during *Kharif*, the activity started from 4th week of August and declined gradually from 2nd week of October. The peak activity was noticed during 3rd week of September (8.30 bugs /plant).

The population of mirid bugs showed a significant negative correlation with morning relative humidity and rainy days in *Summer* and during *Kharif*, the rainy days showed a significant positive correlation. The combined and overall impact of all the significant abiotic factors on mirid population during *Summer* and *Kharif* was to the extent of and 41 per cent, respectively.

References

1. Ahuja DB, Bhakhetia DRC. Bio-ecology and management of insect pests of sesame. A Review. J Insect Sci. 1995; 8:1-19.
2. Jyothi J. Studies on population dynamics, varietal response, mechanism of resistance and management of sesame leaf webber and capsule borer, *Antigastra catalunalis* (Dup.) (Pyraustidae: Lepidoptera). M. Sc. (Agri.) Thesis, Uni. Agric. Sci., Bangalore (India). 2017; 27-134.
3. Prakash. Bio - Ecology and Management of Mirid Bug, *Poppiocapsidea* (*Creontiades*) *biseratense* (Distant) (Hemiptera: Miridae) on *bt* cotton, M. Sc. (Agri) Thesis, Department of Agricultural Entomology, Univ. Agril. Sci., Raichur, Karnataka, India. 2013, 23-97.
4. Ravi PR. Bioecology, loss estimation and management of Mirid bug *Creontiades biseratense* (Distant) (Hemiptera: Miridae) on Bt cotton. M. Sc. (Agri.) Thesis, Uni. Agric. Sci., Dharwad (India). 2007, 28-84.
5. Rohini, Mallapur CP. Status and management of mirid bug, *Creontiades biseratense* (Distant) (miridae: hemiptera) in Bt cotton. M. Sc. (Agri.) Thesis, Uni. Agric. Sci., Dharwad (India). 2012, 24-95.
6. Sasikumar K, Kumar K. Bioefficacy of insecticides against shoot and leaf webber, *Antigastra catalaunalis* Duponchel on leaf damage basis in sesame. Ann. Pl. Protec. Sci. 2015; 23(2):237-240.
7. Singh TVK, Singh KM, Singh RN. Groundnut pest complex. Incidence of insect pests in relation to agro climatic conditions as determined by graphical super imposition technique. Indian J Ent. 1990; 52(4):686-692.
8. Ssekabembe CK, Osiru Dso, Ogenga-Latigo MW, Nantongo S, Okidi J. Some aspects of sesame production in Northern and Eastern Uganda. In: Proceedings of Ann. African crop sci. conf. 2001; 5:689-697.
9. Udikeri SS, Patil SB, Shaila HM, Guruprasad GS, Patil SS, Kranthi KR *et al.* Mirid Menace-A Potential Emerging Sucking Pest Problem in Cotton. 2009. http://www.icas.org
10. Vinaykumar MM. Investigations on seasonal incidence and Management of mirid bug, *Poppiocapsidea biseratense* distant in *bt* cotton. *Ph.D (Agri.) Thesis*, Uni. Agric. Sci., Dharwad (India), 2013, 29-130.
11. WEISS WA. Castro, Sesame Safflower. Leonard Hill London, 1971, 311-525.