



# SEASONAL INCIDENCE OF LEAF MINER, *APROAEREMA MODICELLA* (DEVENTER) IN GROUNDNUT ECOSYSTEM IN ARIYALUR DISTRICT OF TAMIL NADU, INDIA

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## Abstract

A field trial was conducted for two consecutive years in both seasons of *Rabi* and *Kharif* during 2010 and 2011 indicated that the *Aproaerema modicella* was noticed from 5<sup>th</sup> MSW (Meteorological Standard Week) to 14<sup>th</sup> MSW (28% to 88.5%) and 33<sup>rd</sup> week to 42<sup>nd</sup> standard week (10.5% to 92%), during the *rabi* and *kharif* season of 2010, respectively. Maximum larval population were recorded on 9<sup>th</sup> standard week (7.4 larvae/plant) and 38<sup>th</sup> standard week (4.8/larvae/plant) and also it was coincided with highest per cent infestation of *A. modicella* during *kharif* and *rabi* season, respectively. *A. modicella* was observed at 4<sup>th</sup> MSW to 12<sup>th</sup> MSW (21.5% to 85.6%) during the season *rabi* of 2011 while in *kharif* 2011, it was noticed on 33<sup>rd</sup> MSW to 44<sup>th</sup> MSW, which was ranged from 22% to 86.5%. Correlation studies between incidence of larval population and weather parameters revealed that significant positive correlation with minimum temperature while relative humidity showed significant negative correlation during *rabi* and *kharif* seasons.

**Key words :** Seasonal incidence, leaf miner, *Aproaerema modicella*, weather parameters, correlation, groundnut.

## Introduction

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and subtropical regions of the world. India is the second largest producer of groundnut after China and occupies an area of 6.9 million ha. About 80% of the peanut area in the country is rain dependent and the productivity is very low compared to irrigated peanut. In India, 70% of the groundnut area and 75% of the production are concentrated in the four states *viz.*, Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka.

Groundnut is infested by many insect pests. Among them, leaf miner, *Aproaerema modicella* (Deventer) (Gelechiidae: Lepidoptera) is an oligophagous insect pest feeding on leguminous host plants and a serious insect pest of groundnut in rainy and post rainy seasons in India. This insect is considered as the most important pest in India, particularly in rainfed situation (Praveena *et al.*, 2011). More than 50% pod yield loss due to leaf miner was reported from Tamil Nadu, India (Logiswaran and Mohanasundaram, 1985). *A. modicella* infestations are most serious when they damage the growing points of young plants, thereby reducing growth and pod yield (35 to 44% lower) (Shanower *et al.*, 1995).

The seasonal variation of the insect is important information necessary for careful timing of applications of control measures. Hence, the present study was undertaken to study seasonal incidence of *A. modicella* and its correlation with weather parameters. This will facilitate to execute proper timing of insecticidal spray and other control strategies for the management of *A. modicella*.

## Materials and Methods

The field experiment was conducted at Farmer Field in Variyankaval village, Jayankondam, Ariyalur district of Tamil Nadu (India) during the *Rabi* and *Kharif* season of 2010 and 2011 to study the seasonal incidence of leaf miner infesting groundnut, the popular cultivar VRI 2 was sown at spacing 30 × 10 cm with plot size 3.5 × 4.5 m. All the recommended agronomic practices were followed to grow the crop except the measures for plant protection. Visual observations were made on per cent foliage damage due to leaf miner (0-100%) during the cropping period by following the standard scale given by Anonymous (1986).

The observations were made at weekly interval on per cent leaflet damage by counting total number and

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**Table 1:** Seasonal incidence of *Aproaerema modicella* (Deventer) in groundnut ecosystem during Rabi and Kharif seasons of 2010 and 2011.

Seasonal incidence of <i>Aproaerema modicella</i> during 2010										Seasonal incidence of <i>Aproaerema modicella</i> during 2011									
Mon.	Std Week (MSW)	Rabi		Mon.	Std Week (MSW)	Kharif		Mon.	Std Week (MSW)	Rabi		Mon.	Std Week (MSW)	Kharif					
		% infestation of leaf lets	No. of Larvae/ plant			% infestation of leaf lets	No. of Larvae/ plant			% infestation of leaf lets	No. of Larvae/ plant			% infestation of leaf lets	No. of Larvae/ plant				
Jan.	2	0	0	Aug.	31	0	0	Jan.	2	0	0	Aug.	31	0	0				
	3	0	0		32	0	0		3	0	0		32	0	0				
	4	0	0		33	16.5	0.9		4	21.5	1.1		33	22.0	0.9				
Feb.	5	28	1.6		34	20.1	1.5	Feb.	5	27.3	1.4		34	41.2	2.1				
	6	39.5	3.4	Sep.	35	31.4	2.4		6	48.4	2.6	Sep.	35	55.6	2.9				
	7	44.6	3.8		36	49.5	2.8		7	54.5	3.5		36	64.5	4.6				
	8	46.8	6.5		37	83.2	3.6		8	85.6	5.9		37	70.1	5.6				
Mar.	9	88.5	7.4		38	92.0	4.8	Mar.	9	70.5	5.8		38	80.4	5.9				
	10	75.2	6.8	Oct.	39	71.2	3.1		10	69.8	3.9	Oct.	39	86.5	6.7				
	11	70.2	5.2		40	68.4	2.9		11	51.5	3.5		40	82.1	6.2				
	12	68.5	4.5		41	45.5	1.2		12	28.5	2.1		41	70.2	5.4				
April	13	44.4	3.3		42	40.2	0	April	13	0	0		42	64.3	3.3				
	14	24.5	0.9	Nov.	43	0	0		14	0	0	Nov.	43	44.1	1.4				
	15	0	0		44	0	0		15	0	0		44	30.5	0.6				
	16	0	0		45	0	0		16	0	0		45	0	0				
May	17	0	0		46	0	0	May	17	0	0		46	0	0				
	18	0	0	Dec.	47	0	0		18	0	0	Dec.	47	0	0				
	19	0	0		48	0	0		19	0	0		48	0	0				

Mean larva population /10 pants, MSW- Meteorological standard week.

**Table 2 :** Correlation of leaf miner *Proaerema modicella* with weather parameters during *Rabi* and *Kharif* of 2010 and 2011.

No. of larvae /meter row	Weather parameters				
	Max. Temp. (°C)	Min. Temp. (°C)	RH (%)	Wind speed (kmph)	Rainfall (mm)
<i>Rabi</i> 2010	0.022	0.874**	-0.779**	0.202	0.026
<i>Kharif</i> 2010	0.048	0.883**	-0.902**	-0.827**	-0.185
<i>Rabi</i> 2011	-0.019	0.856**	-0.623**	0.452	0.210
<i>Kharif</i> 2011	0.311	0.886**	-0.403	-0.742**	-0.034

\*\* Significant at 0.05 probability level.

damaged leaflets from 10 randomly selected plants of each field and expressed as per cent leaflet damage. Absolute larval population was also recorded from same selected plants. The mean insect population was pooled and expressed at weekly intervals. The weather data collected from automatic weather station, Jayankondam were averaged out. The statistical analysis of data on mean number larva per plant and average weather parameters were subjected to correlation studies following the methods of Gomez and Gomez (1984).

## Results and Discussion

### Seasonal incidence of *A. modicella* during *Kharif* season of 2010 and 2011

The leaf miner incidence on groundnut variety VRI 2 for *Rabi* and *Kharif* seasons of 2010 and 2011 are presented in table 1. In *Kharif* season 2010 revealed that the per cent incidence of *A. modicella* was noticed from 33<sup>rd</sup> week to 42<sup>nd</sup> MSW, which was ranged from 10.5% to 92%. Whereas in *Kharif* 2011, it was noticed on 33<sup>rd</sup> MSW to 44<sup>th</sup> MSW, which was ranged from 22% to 86.5%. The maximum larval populations were appeared on 38<sup>th</sup> MSW in *Kharif* 2010 (4.8/larvae/plant) and 39<sup>th</sup> MSW (6.7 larvae/plant) during the *Kharif* 2011 and also it were coincided with highest per cent infestation of *A. modicella* and thereafter larval population was declined gradually. These results are supported by the findings of Basha Hussain *et al.* (2012), who indicated that highest leaf miner incidence was recorded during September (15.40 larvae/plant) on groundnut crop sown on 1<sup>st</sup> of August 2009. Besides similar results reported by Joshi and Patel (2010) noticed that *A. modicella* (Deventer) incidence in soybean reached to peak level 6.9 larvae per plant during 10<sup>th</sup> week after sowing *i.e.* 3<sup>rd</sup> week of September.

### Seasonal incidence of *A. modicella* during *Rabi* season of 2010 and 2011

The results on per cent leaflet damage of *A. modicella* on groundnut (table 1) noticed on 5<sup>th</sup> MSW to 14<sup>th</sup> MSW, which was ranged from 28% to 88.5% during 2010 and it was observed at 4<sup>th</sup> MSW to 12<sup>th</sup> MSW (21.5% to 85.6%) during the season of *Rabi* 2011. Maximum leaf miner population were recorded during 9<sup>th</sup> MSW (7.4 larvae/plant) followed by 10<sup>th</sup> MSW (6.8 larvae/plant) in *Rabi* 2010. There was no larval population recorded during 2<sup>nd</sup>, 3<sup>rd</sup> MSW and 15<sup>th</sup> MSW to till end of the both *Rabi* seasons of 2010 and 2011. The highest per cent leaf let damage was recorded at 9<sup>th</sup> MSW (88.8%) followed by 10<sup>th</sup> MSW (75.2%) and 11<sup>th</sup> MSW (70.2%). The present findings are in accordance to Hanamant Gadad *et al.* (2013) showed that incidence of leaf miner was observed from 5<sup>th</sup> to 12<sup>th</sup> MSW with peak incidence between 8<sup>th</sup> and 9<sup>th</sup> MSW, while incidence of leaf miner was not observed in the initial two weeks of the crop growth and last two weeks of the cropping period. Leaf miner occurred after second week of February and continued upto second week of April and then gradually declined (Anon, 1987) and Chaudhuri and Senapathi (2004) observed that seasonal incidence of leaf miner was much lower at beginning of the season. The higher level of infestation was maintained during 11<sup>th</sup>- 19<sup>th</sup> standard week.

The results of correlation study between mean larval population and various weather parameters revealed that minimum temperature showed significant positive association and with mean larvae per plant during *Rabi* and *Kharif* 2010 and 2011 (table 2). While the relative humidity showed significantly negative correlation with mean larva/plant during *Rabi* and *Kharif* season of 2010 and 2011. There was no significant relationship existed with mean larva per plant and rainfall. These findings are in line with the result revealed that minimum temperature showed significantly positive correlation with incidence of leaf miner (Chaudhuri and Senapati, 2004). Lewin *et al.* (1979) who reported positive correlation of temperature with leaf miner incidence. Logiswaran and Mohanasundaram (1986) reported rainfall was not correlated with mean larva/plant of *A. modicella*. Hanamant Gadad *et al.* (2013) studied the influence of weather parameters on incidence of leaf miner indicated a negative and significant relationship with morning relative humidity.

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