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# Study on Seasonal incidence of Leaf webber Diaphania pulverulentalis on mulberry

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**ABSTRACT**

*Mulberry, the sole food plant of silkworm Bombyx mori L is prone to various pests and diseases which reduce the quality and quantity of leaf there by silk production. Among various defoliators Leaf webber (Leaf roller) Diaphania pulverulentalis is one of the major pest which causes extensive damage to the mulberry gardens. The incidence of this pest is mainly seen in the major sericulture districts of Andhra Pradesh especially in Ananatapuramu. Hence, the present study is carried out to know the seasonal incidence of the leaf webber on mulberry and its intensity level.*

**Key words:** *Diaphania pulverulenatlis*, Defoliation, Mulberry leaf, Leaf roller.

**Introduction:**

India is the second largest producer of silk in the world. In India sericulture is mostly a village based industry providing employment opportunities to a large section of the rural population. The mulberry leaf is the only source of food for rearing of silkworm Bombyx mori L. The insect pests mulberry leaf roller (*Diaphania pulverulentalis*) is one of the major pests. The pest attacks mainly chawki garden 15days after pruning and is known to infest all the commercial mulberry varieties.

Recently the Lepidopteron leaf roller *Diaphania pulverulentalis* (Hampson) has attained a serious pest status in the south of India during rainy, winter months with high percentage of infestation (Sengupta *et al.*, 1990; Siddegowda *et al.*, 1995; Anonymous, 1996., 1997; Geethabai *et al*., 1997; Anonymous, 1998; Rajadurai *et al*; 1999.) Rajadurai *et al.*, (1999) reported that *Diaphania pulverulentalis* is a serious pest on mulberry in Mysore and Bangalore districts of Karnataka, Chittoor district of Andhra Pradesh and Salem district of Tamil Nadu. *D. pulverulentslis* is distributed in almost all the traditional sericulture areas of Karnataka, Andhra Pradesh, and Tami Nadu (Munjunath, 2005).Leaf roller has become a serious pest in mulberry causing severe damage in sericulture areas of Ananthapuamu district. Andhra Pradesh. Similar incidences of infestation of leaf roller have been reported in Karnataka and Tamil Nadu states (Rajadurai *et al*-1999). In the present study an attempt was made to identify the severity of the leaf roller infestation and its seasonal incidence and nature of its incidence in the sericulture villages of Anantapuramu district, which is a major sericulture area.

**Methodology:**

Survey was conducted during June 2014 – 16 January during August to January in Anantapuramu district. Total 40 mulberry gardens were observed for this study from four mandals viz. Madakasira, Gudibanda, Rolla, and Amarapuram.
Total percentage of leaf roller infestation was calculated by using formula –
% of infestation = No. of gardens infested / Total no. of Gardens × 100
Total percentage of gardens infested with leaf roller = 62.5 percent.
% 0f infestation = No. of plants infested / Total no. of plants selected × 100
Total percentage of infested plants with leaf roller = 78.5 percent.
All the infested mulberry gardens were observed for the feeding behavior of the leaf roller larvae and percentage of infestation was also noted. The percentage of infestation in different seasons in ten selected villages was calculated and the details were presented in the results.

**Results:**

**Observations on the life cycle of Leaf roller:**

The leaf roller female moth lays 150-200 eggs at the rate of 4-6 eggs per apical shoot of mulberry plant, they hatch four five days. The larval stage lasts for 12-15days and then pupates into the older leaves or in soil. Papal stage lasts for 9-10days.The total life cycle completes within 34-36 days. The larvae defoliate the tender leaves, Reduction 0f mulberry leaf yield. The young caterpillar binds the tender leaves by silky secretion settle inside and devours the soft leaf surface. Young larvae start feeding on tender leaves, mainly apical buds. Apical tips are preferred for feeding, also apical shoots are destroyed. Larvae web the leaves together and feed from inside on soft tissues, skeletonise them. Quality of leaf yield is severely affected. Were causing drying of apical parts and shoots and also burning of leaf edges.

The observations were made during early hours of the day i.e. between 6am to 8am during August - January 2014-16 and it was observed that the larvae feeds more voraciously during morning hours and move actively on the tender apical shoots when it is cool and as the day passes and the temperature increases the larvae make a silky web by joining two ends of the leaf and binding them with silky secretion and reside inside and feed on the leaves. Morphological changes like infested leaf area, percentage of defoliation and number of leaves damaged were also observed.

The peak incidence was found in November (2015) which is 94.5%, followed by 89.5 percent in December and 84.5 percent January during 2016. The reason for the higher infestation may be due to the favorable climatic conditions and also higher quality of leaf with good moisture percentage.

From this study we can understand that there is a relation in the percentage of infestation and climatic conditions. When the climatic conditions are cooler the percentage of infestation was high which gradually reduced with the increase in temperature and moisture. The temperature, humidity and precipitation was recorded and mentioned in the table-1.

In order to find out percentage in infestation initially 40 gardens were chosen from ten villages from four mandals which were mentioned earlier. The highest infested percentage was found in D.Gollahatti village with 94.5, followed by 89.5 percent in Basavanapalli and84.5 percent in K. Nagepalli village.

Total number of mandals studied: 4
Total number of Villages studied: 10
Total number of gardens selected: 40
Total number of plants selected/village =200
Total number of plants selected: 2000
The percentage of infestation in the district was calculated as follows

$$\text{Percentage of infestation} = \frac{\text{Total number of gardens infested}}{\text{Total number of Mulberry gardens}} \times 100$$

$$= 25 / 40 = 62.5\ \%$$

$$\text{Percentage of infestation} = \frac{\text{Total number of plants infested}}{\text{Total number of plants selected}} \times 100$$

$$= 1570 / 2000 = 78.5\ \%$$

**Village wise leaf roller infestation during peak season (November) 2014-16**

Among the ten villages selected D.Gollahatti village of Madakasira mandal the percentage of infestation was found to be very high i.e. 94.5 followed by Basavanapalli with 89.5% and the percentage of infestation was less in Hanumanathannapalli with 63.55.

**Discussion:**

The disease severity depends upon the mulberry leaf availability, soil condition and environmental factors like temperature, humidity and rain fall. The present study clearly indicates that the pest severity is always related with favorable climatic conditions availability of host and the quality of leaf. Since temperature gradually reduces from August to January and also favorable for the growth of plants the quality of the leaf is good and attracts various pests especially defoliators. This may be the reason for peak incidence in the months of November to January. The pest infestation was not found during the months of March, April, May, and June which are summer months.

These observations are in conformity with the finding of Srinivasgowda *et al*., (2001a) who observed the peak incidence of *D. pulverulentalis* during January with 91.25 per cent infestation. The leaf roller was found to occur on mulberry during June to February months. Infestation declined below 50 per cent when the ambient temperature increased during January, February, decline in infestation was noticed to the level of 25 per cent in February and 14 percent in March (Geethabai *et al*., 1997; Anonymous, 1998). The incidence of leaf roller occurs during June and persists up to February, but disappears from March to May. The average incidence of this pest on mulberry was 27.85 per cent in Karnataka, 20.98 per cent in Andhra Pradesh and 16.48 percent in Tamil Nadu (Rajadurai *et al.,* 1999).

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**Conclusion:**

The leaf roller is one of the serious pests which infests mulberry predominantly in winter season. Crop pest is relationship between pest population and physical weather factors like temperature, rainfall, relative humidity, sunshine hours, cloudiness etc. Hence this study gives a clear view about the infestation levels of leaf webber in different seasons which help the sericulture farmers to take up appropriate precautionary as well as management methods to tackle the leaf roller.

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**Leaf webber infestation on mulberry**

Leaf roller infested mulberry garden

**Table 1: Weather conditions reported during various months during2014-16:**

| S. No | Month/ Year | Temperature Max./Min. | Rh1 (%) | Rh2 (%) | Rainfall | WS (KMPH) |
|---|---|---|---|---|---|---|
| 01 | January | 30.2 – 16.8 | 84 | 34 | 0.0 | 8.8 |
| 02 | February | 32.9 – 18.9 | 69 | 29 | 0.0 | 8.2 |
| 03 | March | 35.7 – 21.7 | 65 | 28 | 44.6 | 9.3 |
| 04 | April | 39.3 – 25.2 | 56 | 22 | 10 | 7.6 |
| 05 | May | 38.3 – 25.5 | 59 | 28 | 21.2 | 11.4 |
| 06 | June | 36.9 – 24.8 | 71 | 35 | 54.2 | 17.4 |
| 07 | July | 33.7 – 23.5 | 72 | 43 | 31.2 | 20.4 |
| 08 | August | 33.5 – 23 | 76 | 44 | 90.8 | 15.7 |
| 09 | September | 32.9-22.5 | 77 | 45 | 41.3 | 12.5 |
| 10 | October | 33.4 – 21.4 | 81 | 42 | 124.2 | 6.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | November | 31.1 – 18 | 84 | 37 | 15.9 | 5.8 |
| 12 | December | 29.9 – 17.6 | 78 | 39 | 7.6 | 7 |
| 01 | January | 29.7 – 17 | 78 | 37 | 1.3 | 6.3 |
| 02 | February | 33.5- 17.4 | 76 | 22 | 0 | 7.9 |
| 03 | March | 36.7 – 22.4 | 64 | 25 | 45.2 | 8.4 |
| 04 | April | 37.1 – 24.3 | 68 | 33 | 130.3 | 8.4 |
| 05 | May | 38.7 – 25.4 | 66 | 33 | 90.2 | 11 |
| 06 | June | 34.9 – 23.8 | 73 | 42 | 89.4 | 14.9 |
| 07 | July | 35.6 – 24.8 | 72 | 42 | 15.9 | 18.1 |
| 08 | August | 34.4 – 23.9 | 75 | 45 | 86.4 | 14.1 |
| 09 | September | 33.2 – 23.3 | 81 | 49 | 212.8 | 8.4 |
| 10 | October | 31.1 – 21.6 | 84 | 44 | 93.4 | 4.2 |
| 11 | November | 29.6 – 20.2 | 88 | 55 | 170.5 | 5.3 |
| 12 | December | 31.3 – 17.4 | 87 | 38 | 166.2 | 4.8 |
| 01 | January | 28.9 – 19.8 | 89 | 37 | 46.4 | 8.4 |

**Table 2: Leaf Webber infestation in selected Sericulture villages in Madakasira taluk of Anantapuramu district during peak infestation period November 2014 - January 16:**

| S. No | Name of the village | No of gardens selected | No of gardens infested | No of plants infested | Total no of plants selected | % of infestation |
|---|---|---|---|---|---|---|
| 01. | D. Gollahatti | 04 | 04 | 189 | 200 | 94.5 |
| 02. | Basavanapalli | 04 | 03 | 179 | 200 | 89.5 |
| 03. | K .Nagepalli | 04 | 03 | 169 | 200 | 84.5 |
| 04. | Gundumala | 04 | 03 | 167 | 200 | 83.5 |
| 05. | Madhanakunte | 04 | 02 | 158 | 200 | 79.0 |
| 06. | Bullasamudram | 04 | 02 | 152 | 200 | 76.0 |
| 07. | Papasanipalli | 04 | 02 | 148 | 200 | 74.0 |
| 08. | Thimmalapuram | 04 | 02 | 143 | 200 | 71.5 |
| 09. | M. Rayapuram | 04 | 02 | 138 | 200 | 69.0 |
| 10. | Hanumanthanapalli | 04 | 02 | 127 | 200 | 63.5 |