Studies on Seasonal Occurrence, Incidence and Population Fluctuation of Shisham Leaf Binder, *Dichomeris eridantis* Mey.

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ABSTRACT

A systematic study was conducted on the seasonal sequence of occurrence, incidence and population fluctuation of *Dalbergia sissoo* leaf binder, *Dichomeris eridantis* Mey. in 1993. It revealed that moderate to maximum occurrence of the pest was recorded from February to October. Periodic incidence of the pest ranged from 0.30 to 10.80 in different growth stages of tree. The population of *D. eridantis* in different growth stages of tree varied from 9.99 to 18.00 and was recorded maximum in the 3rd week of June 1993. The maximum temperature showed significant and positive correlation (r=0.912) with the population. Relative humidity had no significant effect.

Key words : *Shisham leaf binder, occurance, incidence, population, seasonality*

1. INTRODUCTION

Among the commercial timber trees, *Dalbergia sissoo* Roxb., vernacularly called sissoo/ shisham is a deciduous multipurpose tree. It has extensively been planted throughout the country but mostly restricted up to lower foothills. On account of its great strength, elasticity and durability, it is highly valued as constructional and general utility timber throughout north India. Recently the different growth stages of this valuable tree have been victim of severe biotic stresses. It has about one hundred and twenty five insect pests associated with it, out of which only ten species are known to have attained economic status and have been recognized as potential pest of nurseries and plantations (Tewari, 1994).

2. MATERIALS AND METHODS

In order to record the sequence of occurrence of shisham leaf binder, regular surveys were conducted in and around Dholi-Pusa-Birauli during different sampling periods in 1993 and periodic observations on the sequence of this pest in different growth stages of *D. sissoo* were recorded. Observations on the incidence of shisham leaf binder were made from three leaves selected at random from the upper, middle and lower branches in different growth stages of the tree. In all, ten randomly selected plants were observed in every plot of three replictions after 30, 60,120 and 150 days of plantation (DAP). About 50 different aged plants were tagged and coded for recording periodic observations.

RESULTS AND DISCUSSION

Pest surveillance

Seasonal occurrence of shisham leaf binder has

Table 1. Sequence of occurrence of *D. Eridantis* in its different growth stages in north Bihar

Month	Growth stages of *D. sissoo*		
	Seedling	Sapling	Tree
January' 93	*	***	*
February	*	**	**
March	**	**	**
April	**	***	***
May	**	***	***
June	**	***	***
July	**	***	***
August	**	***	***
September	**	***	***
October	**	***	**
November	*	**	*
December	*	*	-

- Not present

* First occurrence

** Moderate occurrence

*** High/ maximum occurrence

been shown in Table 1. The sequence of occurrence of this pest in different growth stages of *D. sissoo* varied in different sampling periods. Very low occurrence of this pest was noticed at both seedling and sapling stages of the tree. But its low occurrence was also recorded at sapling and young tree stage during December to January. Gradually its occurrence became moderately high in the month of March and October. However, the maximum occurrence of this pest was recorded at only sapling and young tree stage of *D. sissoo*

during April to October. Beeson (1941) and Mathur (1960) reported variation in abundance and occurrence of the pest from year to year which was governed by climatic factors.

Seasonal incidence of *D. sissoo* leaf binder in shisham plantations at Dhab land areas, R.A.U.Pusa Farm (Table 2) revealed variations in different sampling months (1993). Periodic incidence of this binder in different ages of the trees varied form 0.30 to 10.80. Low incidence of the pest was recorded in the range of 0.30 to1.44 during January 1993 to March 1993 and 3.42 to 2.60 during

November 1993 to December 1993. Moderate incidence of this binder varied from 4.44 in the month of March to 5.94 in the month of October, 1993. The maximum incidence of the pest was recorded in the range of 10.40 to 10.80 during April, 1993 to October, 1993. The seasonal occurrence and incidence would be due to the influence of biotic and biotic factors that have operated in different periods of the year. Singh and Singh (1987) also reported extensive damage of shisham plantations due to *P. reflexa* and *D. Eridantis.* These caused losses of increment amounting to 10-25 per cent and killed the young shisham trees gradually.

Table 2. Seasonal incidence of *D. Eridantis* in *D. Sissoo* plantation stocks at Pusa dhab area

Sampling period	After planting of shisham					
	30	60	90	120	150	Mean
January' 93	0.0	0.00	0.00	0.6	0.9	0.30
February	0.0	0.0	0.0	0.6	0.9	0.30
March	2.1	2.3	2.7	6.3	8.8	4.44
April	2.4	7.8	12.2	14.3	16.1	10.56
May	2.7	7.8	12.2	14.3	16.1	10.56
June	2.7	7.8	12.3	14.3	16.2	10.66
July	3.1	7.9	12.3	14.4	16.3	10.80
August	3.5	8.1	12.7	13.9	14.1	10.46
September	4.1	8.3	10.5	12.6	14.7	10.40
October	4.3	5.2	6.1	6.9	7.2	5.94
November	2.2	3.5	3.7	3.8	3.9	3.42
December	0.9	1.7	1.9	2.3	3.5	2.60

Table 3 reveals population fluctuation of the leaf binder on shisham saplings. The number of the pest on middle branch was noticed high between the first weeks of April to second week of April, 1993. There was variation of insect population during this sampling period. The maximum population of *D. eridantis* was 6.36 between third week of June to last week of June (25th SMW). Insect population gradually declined by the turn of the last week of June, 1993.

The insect population on lower branch of shisham saplings varied from 4.55 to 7.62 during first week of April, 1993 to second week of July. Population fluctuation was also recorded on the lower branches of the saplings during whole sampling periods. The maximum number 70.62 per lower branch of shisham sapling was recorded between fourth week of May, 1993 to first week of June, 1993.

The population of shisham leaf binder in the field plantations ranged from 2.12 to 4.45 on upper branch per shisham sapling , 2.32 to 6.36 on middle branch per shisham sapling and 4.55 to 7.62 lower

branch respectively during 1st week of April,1993 to second week of July(Table 3).

The insect made its appearance by the first week of April and maintained its population upto second week of July. The insect gradually attained its peak by the first week of April and maintained its maximum population of 4.45 between third week of June and fourth last week of June 1993. The pest population then gradually declined to a lower number after last week of June 1993 to 1st week of July (26th MSW). There was some variation at the time of population buildup.

Insect population of *D. eridantis* on middle branch of shisham sapling varied from 3.32 to 6.36. There was high variation in population of this pest on middle branch/twig of *D. Sissoo.*

D. eridantis was active from the first week of April to second week of July1993. The population of the pest ranged from 9.99 to 18.10 with the maximum of 18.10 per shisham sapling in the third week and June. Its population declined gradually by the last week of June to the first week of July.

Table 3. Population fluctuation of *D eridantis* in *D. sissoo* saplings at Pusa dhab area

Period of observation Standard Meterological Week (MW)	Insect population on different position of shisham sapling			Grand Total
	No. of insect on the upper branch/ sapling	No. of insect on the middle branch/ sapling	No. of insect on the lower branch/ sapling	
W_{14} (2.4.93-8.4.93)	2.23	5.77	6.25	14.25
W_{15} (9.4.93-15.4.93)	2.25	3.35	4.60	10.20
W_{16} (16.4.93-22.4.93)	2.75	5.73	6.88	15.36
W_{17} (23.4.93-29.4.93)	250	3.52	5.15	11.02
W_{18} (30.4.93-6.5.93)	2.12	3.32	4.55	9.99
W_{19} (7.5.93-13.5.93)	3.30	4.45	4.75	12.40
W_{20} (14.5.93-20.5.93)	3.35	3.35	4.65	11.85
W_{21} (21.5.93-27.5.93)	4.25	5.42	5.58	15.25
W_{22} (28.5.93-3.6.93)	4.35	5.38	7.62	17.35
W_{23} (4.6.93-10.6.93)	4.35	4.22	5.68	14.25
W_{24} (11.6.93-17.6.93)	4.36	4.74	5.85	14.95
W_{25} (18.6.93-24.6.93)	4.45	6.39	7.19	18.00
W_{26} (25.6.93-1.7.93)	2.21	4.29	5.41	11.91
W_{27} (2.7.93-8.7.93)	2.20	3.70	5.10	11.00

In this case it was also observed that maximum and minimum temperature had a significant and positive correlation while relative humidity at 7 hours and 14 hours had a non-significant and negative correlation with the shisham leaf binder population. As the temperature started increasing from April, 1993 onward, there was a relative increase in the shisham leaf binder population.

Temperature was maximum from first week of April to July, 1993 and during the period the shisham leaf binder population ranged from 9.99 to 18.00 per shisham sapling. Total seasonal population of *D. eridantis* (Y) was correlated with the maximum temperature (X_1), minimum temperature (X_2), relative humidity at 7 hours (X_3) and relative humidity at 14 hours (X_4) and rainfall (X_5) to find out the effect of weather.

The correlation coefficient with weather factors *viz.*, maximum temperature (r = 0.912), minimum temperature (r = 0.169), relative humidity at 7 hours(r = -0.345), relative humidity at 14 hours (r = -0.2) and rainfall (r = -0.235), respectively. This showed that there was a significant and positive correlation (rX_1Y= 0.9120) between the maximum temperature and shisham leaf binder population. A positive correlation was also obtained between

minimum temperature and shisham binder population($r X_2 Y = 0.1693$).

The coefficient of determination ($R^2=0.90$) indicates that the variability upto 90 per cent in the population of binder was due to the inter play of the aforesaid abiotic factors. The regression equation is as follows.

$$Y = -0232.324 + (1.944) X_1 +(0.51) X_2 +(0.205) X_3 + (-0.101) X_4 (0.001) X_5$$

($R^2 = 090965$)

Information on shisham leaf binder, *D. eridantis,* is available from Punjab and Dehradun (Beeson, 1941; Singh and Singh, 1987). But there is no information on seasonal incidence of *D. eridantis* from any part of eastern India.

It revealed that by unit increase in maximum temperature, it will bring about 1.94 numbers of the pest population. The influence of minimum temperature, relative humidity and rainfall on the pest population although has been regressed with $R^2 = 0.90$ through multiple correlation, non-linear models with each weather parameter may provide better correlation since biological developments are non-linear function of weather. The equation can be used to predict pest outbreak and help to undertake effective pest management strategy to keep its population under check.

REFERENCES

Tewari, D.N. 1994. *A monograph on Dalbergia sissoo Roxb.* International Book Distributors, Dehradun, India. 316 p.

Beeson, C.F.C. 1941. *The ecology and control of the forest insects of India and the neighbourign countries*, Vasant Press, Dehardun. 1107 p.

Mathur, R.N. 1960. Pest of teak and their control. *Indian For. Res. N.S. (Ent.)* **10**: 44-66.

Singh, P. and Singh, S. 1987. Pests and pathogens managements in agro-forestry for rural needs. *In :* Proceedings of the workshop of the IUFRO Project Group, New Delhi.