***Original Research Article***

# Incidence and severity of blister mite (*Eriophyes erinea*) on Walnut (*Juglans regia* L.) under temperate conditions of Kashmir Valley


## ABSTRACT

Walnut is an important crop that is widely grown for its edible nuts, timber, and other commercial uses. Walnut pests can cause significant damage to the trees and reduce the quality and quantity of the crop.Walnut blister beetles can cause significant damage to walnut trees, especially during the early stages of fruit development.The data generated on incidence and severity revealed that the incidence of *E. erinea*commenced from 13$^{th}$ standard meteorological week (SMW) with mean incidence of 1.2 blister per leaf observed in this SMW, reached to its peak (22.7 per leaf) during 30$^{th}$ SMW and then decreased and reached to 0.8 blisters per leaf during 43$^{rd}$ SMW. The mean number of blister was found highest (18.64±1.62) in the month of July and lowest (1.25±0.2) in the month of October. Low severity (4.0%) of *E. erinea* was recorded in April, which reached to its peak (28.5%) in the month of July, thereafter, the severity decreased and reached to 1.5 per cent in the month of October.



**Key Words:**Walnut,blister beetle, standard meteorological week, severity.


**Comment [JOD1]:** Walnut is an important crop that is widely grown for its edible nuts, timber, and other commercial uses. Walnut pests can cause significant damage to the trees and reduce the quality and quantity of the crop. Walnut blister beetles can cause significant damage to walnut trees, especially during the early stages of fruit development. The data generated on incidence and severity revealed that the incidence of E. erinea commenced from the 13th standard meteorological week (SMW), with a mean incidence of 1.2 blister per leaf observed in this SMW, reached its peak (22.7 per leaf) during the 30th SMW, and then decreased and reached 0.8 blisters per leaf during the 43rd SMW. The mean number of blisters was highest (18.64±1.62) in July and lowest (1.25±0.2) in October. Low severity (4.0%) of E. erinea was recorded in April, which peaked (28.5%) in July; thereafter, the severity decreased and reached 1.5 per cent in October.

**Comment [JOD2]:** MIDE

**Comment [JOD3]:** MIDE

**Comment [JOD4]:** SOME KEYWORDS ARE IN THE TITLE

## INTRODUCTION

Walnut (*Juglans regia* L.) is the most widespread tree nut in the world. It belongs to genus *Juglans* and family Juglandaceae (Ogunmoyole *et al.*, 2011).There are numerous insect pests associated with walnuts that have been reported from all over the world, inflicting severe harm to walnut trees and walnut products. Although there are various insect pests reported on walnut in Kashmir valley but among them walnut weevil, stem borer, hairy caterpillar, walnut aphid, dusky-veined aphid, leaf roller, gypsy moth, bark beetle, walnut blister mite and tortrix moth present a severe threat and cause considerable economic damage to the plant and their attack thus reduce quality as well as quantity of walnuts (UCIPM, 2011). Like in traditionally cultivated giant and isolated walnut trees, there are also apprehensions of pests and other diseases which may destroy the plant under regular orchard conditions. Though some work has been carried out in Kashmir regarding studies on pests affecting traditional walnut trees but no such work has been carried out in regular/compact walnut orchards having short sized grafted trees.

**Comment [JOD5]:** ADD A PARAGRAPH TALKING ABOUT THE PEST

## MATERIALS AND METHODS

The investigations on "Incidence and severity of blister mite (*Eriophyes erinea*) on Walnut (*Juglans regia* L.) under temperate conditions of Kashmir Valley" were carried out at Faculty of Agriculture, SKUAST-K Wadura, situated at an altitude of 1,610 meters above mean sea level between 34°20 North Latitude and 74°24 East Longitude on nine year old established walnut orchard during cropping season 2020. The detail of materials and methodologies followed during the course of investigation is as under:

**To study the seasonal incidence of blister mites**

Incidence of blister mites was carried out by counting the number of blisters from 20 randomly selected leaves per plant at three different heights in all the four directions. The average of the data generated from 20 leaves was considered as number of blistersper leaf.

**Severity index**

Severity was recorded by observing the number of blisters/leaf from the same plants and leaves for which incidence was computed. The categorization for severity was done on the basis of score/grade system per leaf per plant developed by (McKinny, 1923)

**Scale 1:** Severity index

| Description | **Score assigned / Grade** |
|---|---|
| No blisters | 0 |
| 1-4 blisters | 1 |
| 5-8 blisters | 2 |
| 9-12 blisters | 3 |
| .> 12 blisters | 4 |

**Per cent Severity Index (PSI):**

$$\textbf{PSI} = \frac{\text{Sum of numerical ratings}}{\text{Max. Grades Value} \times \text{Total No. of leaves observed}} \times 100$$

Sum of numerical ratings = 1N+2N+3N+4N
Where 1,2,3,4 are grades
(N) Is the number of leaves showing respective grades or scores

## RESULTS and DISCUSSION

**Incidence of blister mite on walnut**

The data on incidence of blister mite (*Eriophyes erinea*) on walnut is illustrated by Figure I. The perusal of data revealed that activity of blister mite commenced from 13$^{th}$ standard meteorological week (SMW) with mean incidence (1.2 blisters per leaf) was observed in this meteorological week. Thereafter, there was gradual increase in the pest incidence which reached to its peak (22.7 blisters per leaf) in 30$^{th}$ SMW from where it started declining and reached to minimum (0.8 blister per leaf) in 43$^{rd}$ SMW. The mean number of blister/ leaf was found highest (18.64±1.62) in the month of July and lowest (1.25±0.2) in the month of October. Coefficient of variance (CV) was recorded highest (40%) in the month of October and lowest (2.26%) in the month of June.The present findings are also supported by the studies of Devi *et al.* (2017) who also reported that incidence of mango bud mite, *Aceria mangiferae*(gall mite) in mango showed increasing trend in May (33.30 per leaf ) and June (37.5 per leaf). Our findings are also supported by the findings of Sauro *et al.* (2018) who reported that the apple rust mite, *Aculus schlechtendali* first appeared in mid-summer and mite populations were low in May, started to increase in June, and peaked in July as reported in our study. Our findings revealed that blister mites cause blisters (galls) on the upper surface of foliage. Weber (1980) also reported that the velvet gall mite, *Eriophyes cauliseifer*causes a noticeable velvety red growth up to an inch long on the leaf stem in orchards of black walnut in the Eastern United States, forcing the leaf to curl or twist over on it. The results of Rather (1989) who conducted survey and found that walnut blister mite, *Eriophyes erinea* (Nelepa) occurs in epidemic form in all agro climatic zones of Jammu &

**Comment [JOD6]:** INCIDENCE OF GALLS WITHOUT CORRELATION;
THE TEXT DOES NOT MAKE CLEAR THE RELATIONSHIP OF THE STANDARD WEEKS TO WEATHER CONDITIONS, WHICH WEEKS ARE DRY WEATHER AND WHICH ARE RAINY WEATHER, PERHAPS THIS IS A COMMON PRACTICE IN THE REGION BUT YOU ARE WRITING FOR EVERYONE

**Comment [JOD7]:** UNTIL WHEN CAN YOU COMPARE DATA FROM ANOTHER SPECIES?

**Comment [JOD8]:** NOT IN THE REFERENCES

Kashmir and prevails as a major acarine pest of walnut due to which affected leaves showed galls on upper surface of leaves are in consonance with our results.

**Correlation and Regression studies of blister mite with important weather parameters**

The data on correlation of blister mite (*Eriophyes erinea*) on walnut with temperature (°C), humidity (%) and rainfall (mm) from 13$^{th}$ to 43$^{th}$ standard meteorological week under field conditions revealed that among the different weather parameters, maximum temperature had a significant and positive correlation (r=0.787) with blister mite, and negative and significant correlation (r=- 0.397) with rainfall and morning and evening relative humidity (r=-0.332 and -0.330). Minimum temperature had a non-significant and positive correlation (r=0.681) with it.The data presented in Table-1 indicated the regression between populations of blister mite with the weather parameters. The regression analysis showed that the weather parameters have a significant effect on the population density of blister mite. From the regression equation, $R^2$ value (0.73) suggested that all the weather parameters jointly contributed 73 per cent variation in population indicating higher dependence of population on weather parameters.The present study is in conformity with the findings of Balaji and Hariprasad (2016) who reported a positive correlation between the population of coconut mite, *Aceria guerreronis* in the coconut palm with maximum temperature and negative correlation with relative humidity, rainfall, and sunshine hours. Devi *et al*. (2017) also reported a positive correlation of population of mango bud mite, *Aceria mangiferae* in mango with maximum temperature and minimum temperature and negative correlation with rainfall and relative humidity. Sauro *et al.* (2018) also found that the apple rust mite showed a significant and positive correlation with maximum temperature and a highly negative and significant correlation with rainfall.

**Severity of blister mite on walnut**

The data on mean per cent severity of blister mite/leaf presented in Table-2 revealed that blister formation on leaves is directly related to the pest population. A scale (1-4) was used to determine the mean pest severity. The data presented in the Table-2 showed increased trend of severity from 13$^{th}$ standard meteorological week (SMW) till 43$^{rd}$ SMW. The maximum severity (28.5%) was observed in 30$^{th}$ SMW from where it started declining and reached to minimum (1.5%) in 43$^{rd}$ SMW.The mean per cent severity was recorded highest (24.84%) in the month of July and lowest (2.50 %) in the month of October.

## CONCLUSION

Mean number of blister mites, dusky-veined aphids and grey weevils were highest in the month of July while as mean number of walnut aphids was highest in the month of June. The incidence was found lowest number is in the month of October in all these pests.Blister mites have a significant and positive correlation with maximum temperature, a significant and negative correlation with rainfall, and a positive and non-significant correlation with minimum temperature.

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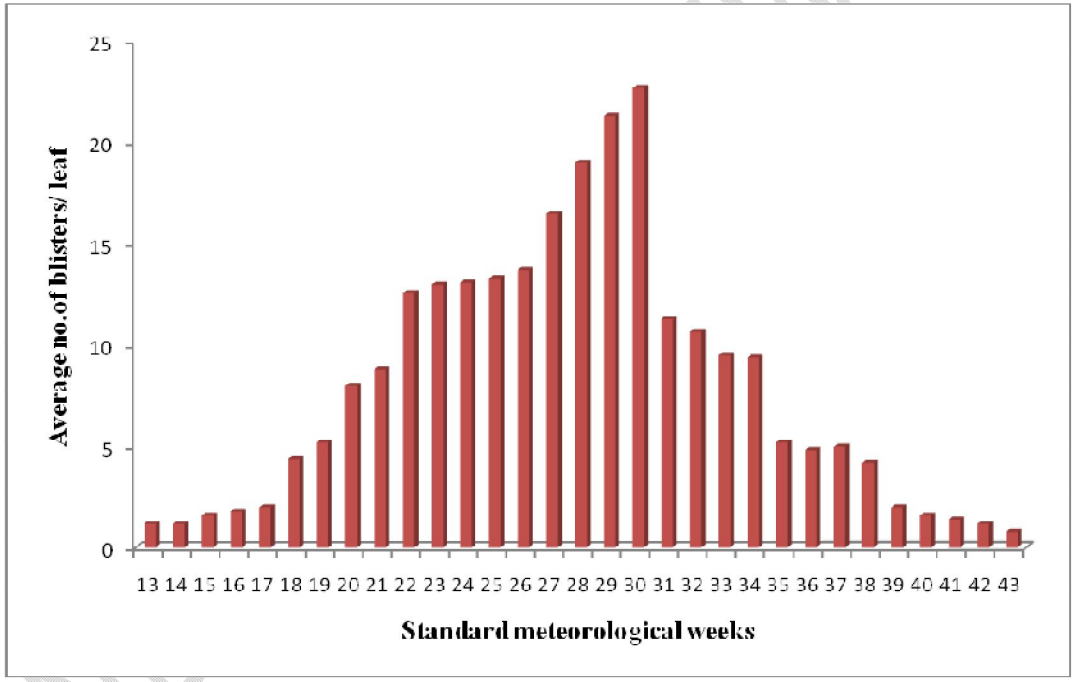


**Figure I: Incidence of blister mites (*Eriophyes erinea*) on walnut**

**Table-1 Regression between incidence of blister mite (*Eriophyes erinea*) with weather parameters on walnut (*Juglans regia* L.)**

| **Weather parameters** | ***Eriophyes erinea*** | | | |
|---|---|---|---|---|
| | **Coefficients** | **Standard Error** | **"t" value** | **"p" value** |
| Intercept | -18.939 | 12.616 | -1.501 | 0.146 |
| Max temperature ($^{o}$C) | 0.581 | 0.281 | 2.06 | 0.01 |
| Min temperature ($^{o}$C) | 0.435 | 0.267 | 1.63 | 0.90 |
| Rainfall (mm) | -0.190 | 0.185 | -1.09 | 0.02 |
| Relative humidity (Morning) | -0.144 | 0.118 | -1.12 | 0.04 |
| Relative humidity (Evening) | -0.099 | 0.055 | -1.79 | 0.05 |
| Coefficient of Determination ($R^2$) | **0.738** | | | |
| Regression Equation | $\mathbf{Y = -18.939 + 0.58x_1 + 0.43x_2 - 0.19x_3 + 0.14x_4 + 0.099x_5}$ | | | |

**Table-2 Percent severity index of blister mite (*Eriophyes erinea*) on walnut**

| Month | SMW | Mean severity index (%) | *Grade |
|---|---|---|---|
| April | 13th | 4.00 | 1 |
| | 14th | 4.00 | 1 |
| | 15th | 4.50 | 1 |
| | 16th | 7.00 | 2 |
| | 17th | 9.00 | 3 |
| | **Mean** | **5.70** | |
| May | 18th | 11.00 | 3 |
| | 19th | 12.50 | 4 |
| | 20th | 14.00 | 4 |
| | 21st | 14.70 | 4 |
| | **Mean** | **13.05** | |
| June | 22nd | 16.20 | 4 |
| | 23rd | 17.40 | 4 |
| | 24th | 18.50 | 4 |
| | 25th | 19.00 | 4 |
| | **Mean** | **17.77** | |
| July | 26th | 21.00 | 4 |
| | 27th | 23.00 | 4 |
| | 28th | 25.00 | 4 |
| | 29th | 26.70 | 4 |
| | 30th | 28.50 | 4 |
| | **Mean** | **24.84** | |
| August | 3Ist | 24.00 | 4 |
| | 32nd | 22.00 | 4 |
| | 33rd | 21.50 | 4 |
| | 34th | 18.00 | 4 |
| | **Mean** | **21.37** | |
| September | 35th | 15.50 | 4 |
| | 36th | 12.40 | 4 |
| | 37th | 11.20 | 3 |
| | 38th | 11.00 | 3 |
| | 39th | 7.00 | 2 |
| | **Mean** | **11.42** | |
| October | 40th | 5.50 | 2 |
| | 4Ist | 1.50 | 1 |
| | 42nd | 1.50 | 1 |
| | 43rd | 1.50 | 1 |
| | **Mean** | **2.50** | |

**SMW= Standard meteorological week**
***Grade 0 = No blisters**
**Grade 1= 1-4 blisters**
**Grade 2= 5-8 blisters**
**Grade 3= 9-5 blisters**
**Grade 4 = > 12 blisters**