

Population Dynamics and Seasonal Incidence of *Liriomyza huidobrensis* (Blanchard) (Diptera : Agromyzidae) on Onion vegetable in Manipur

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ABSTRACT : The present study embodies population dynamics and the seasonal incidence of insect pest, *Liriomyza huidobrensis* (Blanchard) on onion plantation in Manipur during the period from January 2011- June 2013. This period is subdivided in to 5 parts namely 1. January to June 2011, 2. July to December 2011, 3. January to June 2012, 4. July to December 2012 and 5. January to June 2013. The observation has been done month-wise throughout the period and then these are clustered for six month each. The population of insect pest and percentage of infestation on the vegetable have been recorded month wise but calculated as mean for every subdivision in order to get easy calculation. Added parameters for the study during the period are altitude (780m), temperature (3° – 34.1°), relative humidity (60-92%)and rainfall (1200 -1500mm / annum). The Highest seasonal incidence has been recorded during March(30.94%) in every year and percentage of infestation is also highest during March (85.19%). The minimum incidence has been recorded during January (0.66%) and minimum Infestation has also been recorded during January (6.33%) every year.

Keywords:- *Insect pest, Population dynamics, Seasonal incidence, Percentage of infestation, Onion plantation.*

I. INTRODUCTION

The pea leaf miner *Liriomyza huidobrensis* (Photograph) is a major insect pest of Onion plantation in Manipur. The plantation of this economically important vegetable has been done in most of the Manipuri families near the kitchen room being the top spices item for the preparation of curry. Malipatil (2007) reported that *L. huidobrensis* is destructive insect pest of Onion plantation in the world. Gray(2003) & Steck(2006) cited that the insect pest *L. huidobrensis* is highly polyphagous capable of inflicting severe damage to crops. Many scientists have studied its distribution, infestation and polyphagous natures of feeding on green leaf of various vegetables like pea, potato, mustard and others in the world (Braun, 1997; Videla et al.,2006; Martinez,2007 ; Pitkin et al.,2008). Hammad & Nemer(1999) described the population densities, spatial pattern and development of pea leaf miner- *L. huidobrensis*, on cucumber, Swiss-chard and bean at Lebanon. Weintraub (2001) discussed the changes in population dynamics of *L. huidobrensis* in Israeli Potato field, Israel. During spring season, the highest population and infestation of *L. huidobrensis* on the host plant has been observed. Bing & Le (2004) reported the variation in cold hardiness and latitudinal gradients of the pest from China. Viraktamath(2002) reported the invasive nature of *L. trifolii* from India. So far the relevant literatures show that there were no work on the studies of infestation, population dynamics and distribution of *L. huidobrensis* on varieties of vegetables.



Photograph of Adult *Liriomyza huidobrensis*

II. MATERIAL AND METHODS

The investigations were carried out in the onion cultivated areas of Manipur like Khoijuman, Bishnupur and Nambol from January 2011 up to June 2013. This period is subdivided into 5 parts namely 1. January to June 2011, 2. July to December 2011, 3. January to June 2012, 4. July to December 2012 and 5. January to June 2013. The observations have been done month wise during the period. During the investigations, the recorded parameter includes Altitude (780 meters), Temperature (3° – 34.1°), Relative Humidity(60-92%) and Rainfall(1200 -1500mm / annum). 5 Plots have been selected in each choice experimental field. Each plot has an area of 1 m^2 and 9 onion plants in the plotted area. Observations on the seasonal incidence of the insect pest were made at monthly intervals by selecting 45 plants (5x9) at 9 plants per plot. Seasonal incidences have been calculated by using statistical formula with the collected data.

III. OBSERVATIONS AND DISCUSSION

Observations on insect pest *L. huidobrensis*, insect pest population, percentage of infected host plant from January 2011 up to June 2013 in Manipur valley have been scientifically remarkable as per data (Table-1a,1b and 1c). The leaf miner has been observed as major insect pest of onion plantation in Manipur. The maximum abundance of insect pest on the host plant has been recorded during the month of March and minimum abundance has been recorded during the month of January of every year (Chart 1,2 &3). The highest seasonal incidences of the pest were recorded as 31.10% in March, 2011; 31.25% in March,2012 and 30.46% in March, 2013 and rate of infestation as 88.89% in March, 2011; 77.78% in March,2012 and 88.89% in March, 2013 respectively on the onion plantation. The minimum seasonal incidence of the pest were recorded as 0.52% in January 2011; 0.96% in January 2012 and 0.51% in January 2013 (Table-1a,1b and 1c) and minimum rate of infestation were also recorded as 4.44 in January 2011, 6.67% in January 2012 and 8.89% in January 2013 respectively.

The maximum infected plant population has been recorded 40 numbers during March 2011; 35 numbers during March 2012 and 40 numbers during March 2013. The minimum population of the infected plant were recorded during January of every year. Total mean populations of insect pest have been recorded 2.60, 2.80 and 4.38 in 2011, 2012 and 2013 respectively (Table 1a,1b and 1c).

Cisneros and Mujica (1997) reported that the distribution of leaf miner, *L. huidobrensis* on different host plants were available throughout the season in Peru. Hammad and Nemer(1999) cited that the highest population densities, Infestation level, spatial pattern and development of *L. huidobrensis* on cucumber, swisschard and bean at Lebanon were recorded during June to September and lowest population had been recorded during December to April. And Weintraub(2001) reported that the highest population and infestation of *L. huidobrensis* in Israeli have been recorded during spring season. The present findings were coincided with that of Weintraub and Cisneros & Mujica and it was found that a part of present findings were contradict to Hammad and Nemer. The difference between observations of Hammad and Nemer(1999) and those of present research may be due to different locations, duration and environmental factors. Malipatil (2007) reported that the insect pest *L. huidobrensis* was major pest of Onion plantation. This concept is coincided with the present observation. In fact, the present search in this area is the first and original so far the relevant literatures are concerned.

IV. TABLES AND CHARTS

Table -1a: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to December 2011.

| Sl. No | Month | Pest pop ⁿ at a given time | Total pest pop ⁿ during the Season | % of Incidence | No. of Infected host plant | Total No. of plant sample | % of Infected Host plant | Mean Pest pop ⁿ /plant | Total mean Pop ⁿ /plant |
|--------|-------|---------------------------------------|---|----------------|----------------------------|---------------------------|--------------------------|-----------------------------------|------------------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1 | Jan | 1 | 193 | 0.52 | 2 | 45 | 4.44 | 4.29 | 2.60 |
| 2 | Feb | 4 | | 2.07 | 6 | | 13.33 | | |
| 3 | Mar | 60 | | 31.1 | 40 | | 88.89 | | |
| 4 | Apr | 56 | | 29.01 | 34 | | 75.55 | | |
| 5 | May | 52 | | 26.94 | 30 | | 66.67 | | |
| 6 | Jun | 20 | | 10.36 | 18 | | 40 | | |
| 7 | Jul | 9 | 41 | 21.95 | 15 | 45 | 33.33 | 0.91 | |
| 8 | Aug | 9 | | 21.95 | 15 | | 33.33 | | |
| 9 | Sep | 8 | | 19.51 | 10 | | 22.22 | | |
| 10 | Oct | 7 | | 17.07 | 8 | | 17.78 | | |
| 11 | Nov | 5 | | 12.19 | 6 | | 13.33 | | |
| 12 | Dec | 3 | | 7.32 | 3 | | 6.67 | | |

Chart 1: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to December 2011.

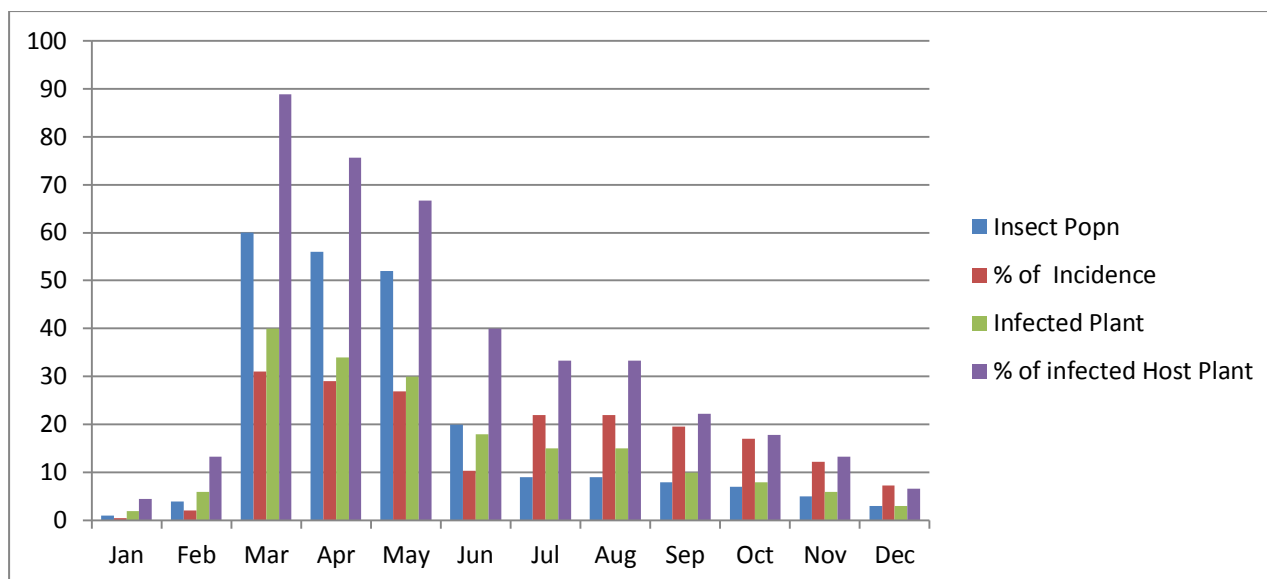


Table -1b: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to December 2012

| Sl. No. | Month | Pest pop ⁿ at a given time | Total pest pop ⁿ during the Season | % of Incidence | No. of Infected host plant | Total No. of plant sample | % of Infected Host plant | Mean pest pop ⁿ /plant | Total mean Pop ⁿ /plant |
|---------|-------|---------------------------------------|---|----------------|----------------------------|---------------------------|--------------------------|-----------------------------------|------------------------------------|
| 1 | 2 | | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1 | Jan | 2 | 208 | 0.96 | 3 | 45 | 6.67 | 4.62 | 2.80 |
| 2 | Feb | 5 | | 2.40 | 7 | | 15.55 | | |
| 3 | Mar | 65 | | 31.25 | 35 | | 77.78 | | |
| 4 | Apr | 60 | | 28.85 | 30 | | 66.67 | | |
| 5 | May | 55 | | 26.44 | 27 | | 60 | | |
| 6 | Jun | 21 | | 10.10 | 20 | | 44.44 | | |
| 7 | Jul | 8 | 41 | 19.51 | 13 | 45 | 28.89 | 0.91 | |
| 8 | Aug | 9 | | 21.95 | 13 | | 28.89 | | |
| 9 | Sep | 7 | | 17.10 | 11 | | 24.44 | | |
| 10 | Oct | 7 | | 17.10 | 9 | | 20 | | |
| 11 | Nov | 6 | | 14.63 | 7 | | 15.55 | | |
| 12 | Dec | 4 | | 9.76 | 4 | | 8.89 | | |

Chart 2: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to December 2012

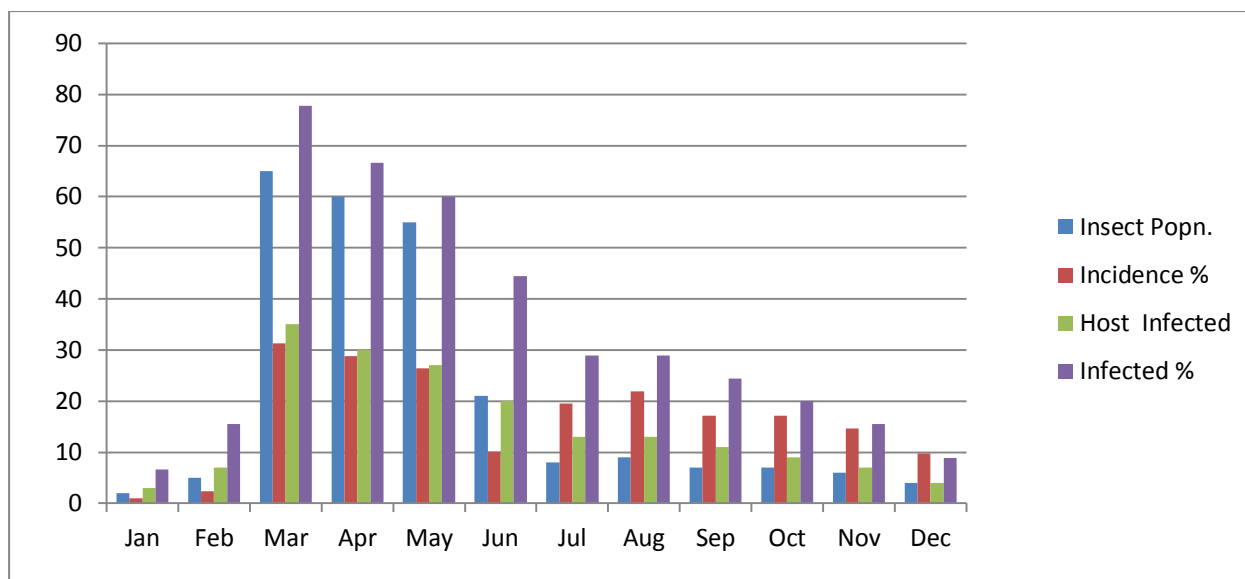
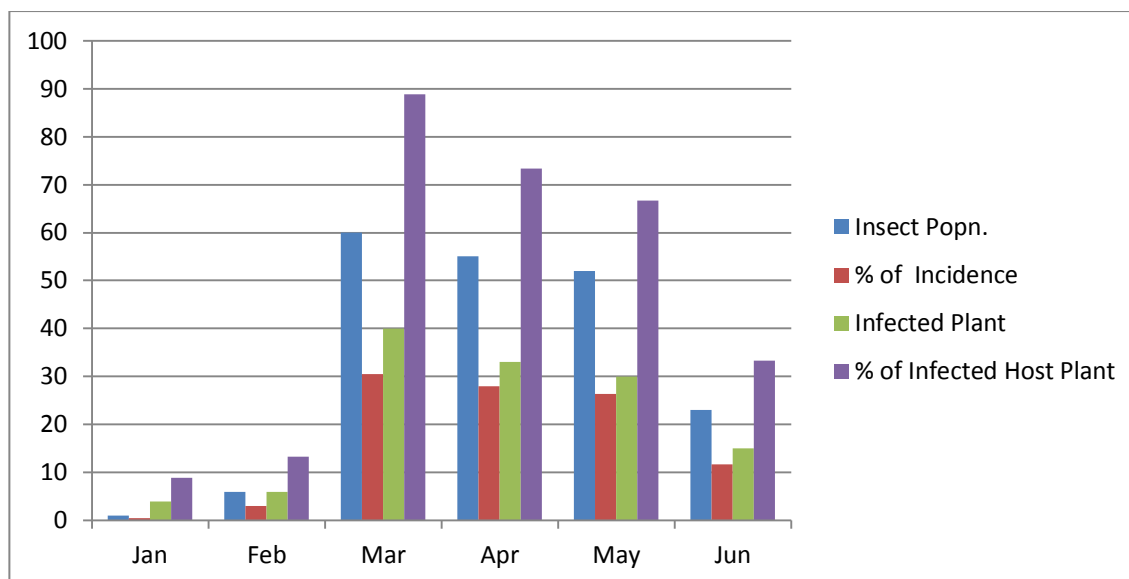


Table -1c: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to June 2013

| Sl. No. | Month | Pest pop ⁿ at a given time | Total pest pop ⁿ during the Season | % of Incidence | No. of Infected host plant | Total No. of plant sample | % of Infected Host plant | Mean Pest pop ⁿ /plant | Total mean Pop ⁿ /plant |
|---------|-------|---------------------------------------|---|----------------|----------------------------|---------------------------|--------------------------|-----------------------------------|------------------------------------|
| 1 | 2 | | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1 | Jan | 1 | 197 | 0.52 | 4 | 45 | 8.89 | 4.38 | 4.38 |
| 2 | Feb | 6 | | 3.04 | 6 | | 13.33 | | |
| 3 | Mar | 60 | | 30.46 | 40 | | 88.89 | | |
| 4 | Apr | 55 | | 27.92 | 33 | | 73.33 | | |
| 5 | May | 52 | | 26.39 | 30 | | 66.67 | | |
| 6 | Jun | 23 | | 11.67 | 15 | | 33.33 | | |

Chart 3: Showing % of incidence and population of *Liriomyza huidobrensis* on onion plantation in Manipur during the period January to June 2013



V. CONCLUSION

The present observation has concluded that the Leaf miner, *Liriomyza huidobrensis* is a major insect pest of Onion plantation in Manipur, India. The highest population of the insect pest was found during March and lowest was recorded during January. The maximum seasonal incidence of the insect pest on the Onion was also recorded during March and minimum was recorded during January. After knowing the seasonal incidence on the crop, people may be able to protect it from such insect pest by means of acceptable application of insecticides and care because this crop is daily used in the kitchen in the preparation of varieties of curry items.

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