Biological Forum – An International Journal **15(9): 74-79(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Study the Weather Parameters Affecting Amplitude Fluctuation in the Population Dynamics of Ocimum Leaf Folder, *Orphanostigma abruptelis* on Sweet Basil in Bihar

Amit Kumar[1*], Manoj Kumar[1] and Heenashree Mansion[2]
[1]Department of Entomology, Post-Graduate College of Agriculture,
Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar), India.
[2]Department of Entomology, College of Agriculture,
Acharya Narendra Deva University of Agriculture and Technology, Kumarganj (Uttar Pradesh) India.

(Corresponding author: Amit Kumar)*
(Received: 20 June 2023; Revised: 18 July 2023; Accepted: 18 August 2023; Published: 15 September 2023)
(Published by Research Trend)

ABSTRACT: The present investigation was studied in *Kharif* 2021 in the field of Herbal Garden, Hi-tech unit of Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur) Bihar. In the course of research, the study of seasonal incidence of ocimum leaf folder, *O. abruptalis* on sweet basil revealed that the larval population exhibited significant a non-significant relationship with Standard Meteorological Week (SMW). The incidence of ocimum leaf folder were observed from 39th SMW which was (2.33 larvae/ 5 plants) while the peak population of this pest was recorded at 47th SMW (11.00 larvae/ 5 plants) afterwards the population of leaf folder started gradually decreasing by maturity of the sweet basil crop.
The correlation studies with leaf folder population in relation with weather parameters where larva of ocimum leaf folder were negatively non- significant correlated (-0.14^{NS}) with maximum temperature whereas positively non-significant correlated (0.53^{NS}) with minimum temperature, while positive and non-significant correlation (0.48^{NS}) with morning relative humidity whereas negatively significant correlation (-0.59*) with evening relative humidity and non-significant & negatively correlated (-0.39^{NS}) with rainfall. This study provides basic knowledge about the incidence and damage caused by this pest, and its behavior towards abiotic factors.

Keywords: Sweet basil, Leaf folder, *Orphanostigma abruptelis.* Population dynamics.

INTRODUCTION

Sweet basil (*Ocimum basilicum* L.) is an annual, aromatic, herbal plant, belonging to the family Lamiaceae. The local name of *O. basilicum is* French basil (English) and Babauitulsi (Hindi) (Anonymous, 2014). The word basil is derived from the Greek word "Basileus," which means "Royal" or "King," and it is often referred to as the "King of the herbs" due to its numerous applications in medicine, cosmetics, and the food and pharmaceutical industries (Calderon *et al*., 2021). It is native to South-Eastern Asia's tropical regions and therefore is cultivated in many countries across the world as an aesthetic choice, seasoning, and medicinal plant. The aromatic basil leaves and flowers, as well as the essential oil distilled from the herb are used as aromas for food, perfume and cologne production and in medical therapy. The therapeutic properties of basil are related to the presence of essential oil that has antibacterial, antioxidant and psychotherapeutic properties, as confirmed through numerous scientific studies (Wierdak and Borowski 2011).

The aromatic leaves of sweet basil, common herbs cultivated for fresh market or for use as a spice or seasoning in cooking, could be dried. The leaf of this aromatic basil is mostly needed for the distillation of its essential oil or for flavouring various dishes and beverage. Fresh leaf production per plant ranged between 14 to 713 g, and it was mostly used for the extraction of essential oils and fresh and dry herbs (Egata, 2021). There have been over 160 species of the diverse range of aromatic and therapeutic plants known as basil. Basil (*Ocimum sanctum* L.) & sweet basil are the two most popularly cultivated species for the production of essential oils out of all of them (*Ocimum basilicum* L.). This extract can be utilized as a natural fungicide, pesticide, antifeedant etc. (Amresh *et al.*, 2002).

Basil is grown over an area of 25,000 ha in India, producing approximately 250-300 tonnes per year (Anonymous, 2014). It can be grown as both *Kharif* and *Rabi* crops in the plains of northern India, south India, and Assam. In practise, this species yields about 30-35 Kg/ha oil, which equates to 12-13 kg of flower oil and 18-22 kg of the whole herb oil (Panda, 2005). The majority of India's basil oil is imported, and the market is increasing. The biggest offenders for the essential oil of *O. basilicum* insecticidal effect on *Tribolium castaneum*, *Sitophilus oryzae*, *Stagobium paniceum*, and *Bruchus chinesis* were discovered to be methyl chavicol and methyl cinnamate (Deshpande and Tipnis 1977). Linalool, camphor, 1, 8 cineole, and germacren-D are the main ingredients in basil essential oil (Arabaci and Bayram 2004). French basil is primarily grown in India's Uttar Pradesh, Maharastra, Madhya Pradesh, Rajasthan, Punjab, Haryana, Gujarat, Bihar, Jharkhand, and other regions (Anonymous, 2014).

Basil is farmed in Bihar on an area of around 3.0 acres, producing 1.2 metric tonnes annually (Directorate of Horticulture, Govt. of Bihar, 2018). Nalanda, Muzaffarpur, Samastipur, Vaishali, Begusarai, East Champaran, and West Champaran are the main sweet basil-growing districts in Bihar. The major insect pests reported at different growth stages include: lace bugs (*Monanthia globulifera;* Tingidae), ocimum leaf folder (*Orphanostigma abruptalis;* Crambidae), Thrips (*Bathrips melanocornicus;* Thysanoptera), cotton aphid (*Aphis gossypii;* Aphididae), false-spider mite (*Brevipalpus californicus;* Tenuipalpidae), mealybug (*Pseudococcus* spp.; Pseudococcidae), tobacco whitefly (*Bemisia tabaci;* Aleyrodidae) and leaf miner (*Liriomyza* spp.; Agromyzidae). One of the main biotic factors that limit sweet basil yield and metabolism is insect infestations.

Insect pests happen to be one of the key biotic limiting factors in sweet basil productivity and metabolism. The major insect pests reported at different growth stages include: thrips (*Bathrips melanocornicus*; Thysanoptera), cotton aphid (*Aphis gossypii*; Aphididae), ocimum leaf folder (*Syngamia abruptalis*; Pyralidae), lace bugs (*Monanthia globulifera*; Tingidae), false-spider mite (*Brevipalpus californicus*; Tenuipalpidae), mealybug (*Pseudococcus* spp.; Pseudococcidae), tobacco whitefly (*Bemisiatabaci*; Aleyrodidae) and leaf miner (*Liriomyza* spp.; Agromyzidae). Of the, many insect pests that have been reported upon it, *C. bullita*, is known as Ocimum tingid (Livingstone and Yacoob 1987), It feeds on the tender leaves, stems, and flowers, sucking the cell sap. (Tigvattnanont, 1990) as well as on many other Lamiaceae species, including Coleus parviflorus, *O. basilicum*, and *O. sanctum* (Livingstone and Yacoob 1987). *O. basilicum* was initially found to have *Cochlochila bullita* (Stal) on it in the eastern portion of India and 100 percent of plants were found to have C. bullita infestations in Jharkhand; the latter was noted as a major pest of sweet basil, *O. basilicum.*

In India, Ocimum has been reported to be severely impacted by *Cochlochila bullita* (Heteroptera: Tingidae), which has also been observed infecting *O. kilimandscharicum* and *O. sanctum* (Palaniswami and Pillai 1983). The *C. bullita* population seriously damaged the *O. basilicum* plant at was severely infested by the population of *C. bullita* at Saharanpur that caused drying and wilting of leaves resulting in ultimate death of plants (Dhiman and Datta 2013). Besides these pests, basil plant is also attacked by other pest insects like leaf roller (Panda, 2005). It has been estimated that *C. bullita* causes approximately 27.8 per cent yield loss.

The ocimum leaf folder, *O. abruptalis*, is listed as a serious pest of sweet basil among all of the insect pests able to infect sweet basil (*O. basilicum*). The larvae seriously harm the plants by adhering to the underside of the leaf, folding them lengthwise from the midrib, and webbing them until they start falling off (Anonymous, 2019). The larval infestation was identified in every leaf-fold and terminal shoot, with many larvae being found per inflorescence. The caterpillars bind leaf edge to make a funnel and feed on chlorophyll (Tigvattnanont, 1990). Leaf folder insect pests can have a significantly negative impact on plant growth and production if their incidence rises.

MATERIALS AND METHODS

The present investigation was conducted at the experiment field of Hi-Tech herbal garden of Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar) during *kharif* season 2021-22.

A. Experimental location

It was in between latitude 25.98°N, longitude 85.67°E, and a height of 52.92 m above mean sea level. This location has a sub-tropical climate with moderate winters and scorching, dry summers and southern banks of the Budhi Gandk River in Bihar, Samastipur district.

B. Experimental layout

Experiment was laid out in Randomized Block Design with seven treatments and three replications. The crops were planted in the main field using appropriate agronomic packages and techniques, with each plot measuring 2.5 m × 2.5 m and a gap of 50 cm × 50 cm between two rows of plants. No insecticides were used either in soil or as seed treatment for the experiment conducted. This was done to encourage the native insect pest population of the crop to flourish.

C. Sowing of seed in the nursery and planting materials

The seeds of local variety of sweet basil were used as study materials. The seeds of this sweet basil variety OB1-20 were collected from local market. The seeds of sweet basil were sown during first week of September, 2021. After four weeks of seed germination the crops were planted in the main field using appropriate agronomic packages and techniques, with each plot measuring 2.5 m × 2.5 m and a gap of 50 cm x 50 cm between two rows of plants.

D. Data collection of insect pests

The plants were exposed to natural insect pests' infestation and insecticide of any chemical was not applied during the experiment. Population of leaf folder was recorded at the weekly interval commencing from first incidence. Five randomly selected from each plot were observed individually a d the number of leaf folder was recorded at early in the morning. Data on population dynamics were recorded at

The crops were planted in the main field using appropriate agronomic packages and techniques, with each plot measuring 2.5 m × 2.5 m and a gap of 50 cm × 50 cm between two rows of plants.

E. Statistical analysis

The collected data was statistically analyzed through the analysis of variance using OPSTAT. Means were separated by critical difference values at 5 % level of significance. The data were utilized to work out simple correlation co-efficient between insect pest population and various abiotic factors were statistically analysed.

RESULT AND DISCUSSION

A. Population dynamics of ocimum leaf folder

Date presented in Table 1 and depicted in Fig. 1 showing is it was observed that the information regarding seasonal incidence of *O. abruptalis* noticed throughout the cropping season starting from vegetative stage of crop till the harvesting stage. The initial population was recorded after 30 days of transplanting (39th SMW) with mean population of 2.33 larvae per five randomly selected plants during this Standard Meteorological week the mean maximum, minimum, relative humidity (%) at morning and evening hours and rainfall (mm) were 32.3, 25.8, 88, 77 and 7.8, respectively. The infestation was gradually increasing from the vegetative stage of the crop and it was reached at the mean population of larvae (9.67) on per five randomly selected plants from 46th SMW with corresponding weather factors *i.e.*, maximum, minimum, relative humidity (%) at morning and evening hours and rainfall (mm) were 28.9, 13.8, 92, 55 and 0.0, respectively and expressed its highest mean population 11.00 larvae on per five randomly selected plants at 47th SMW with corresponding weather factors *i.e.*, maximum, minimum, relative humidity (%) at morning and evening hours and rainfall (mm) were 26.9, 12.4, 98, 60 and 0.0, respectively. After that, the population showed gradually decreasing trend. The least mean population was recorded at the end of vegetative stage 6.00 per five randomly selected plants and reached up to mean population 4.67 at harvesting stage during 51st SMW of year 2021 with corresponding weather parameters *i.e.*, maximum, minimum, relative humidity (%) at morning and evening hours and rainfall(mm) were 22.5, 7.6, 96, 56 and 0.0, respectively. The finding is in partial agreement with the results of Kumar *et al.* (2022) observed that the seasonal incidence of *O. abruptalis*, the results revealed that the maximum mean population was recorded the highest population of the pest was 4.4 larvae per plant during 46th SMW of 2020. The population started declined from 47th SMW of 2020 onwards and larvae population was recorded 0.8 larvae per plant were recorded during 51th SMW (Namvong and Chongrattanameteekul 2015). A study conducted in central Thailand between February 2010 and January 2011 found that there were numerous insect pests on sweet basil growing under natural, good agronomic practices (GAP), and conventional production systems. Only 2 species of pest were identified despite there being a total of 6.886 pest specimens collected from all fields. A total of 4119 distinct insect pests were found in the organic field, compared to 1,418 and 1349 in the GAP and conventional fields, respectively. In every system for growing sweet basil, lace bugs (*Monanthia globulifera*), ocimum leaf folder (*Syngamia abruptalis*), thrips (*Bathrips melanicornis*) the most prevalent pest. Generally, the GAP or conventional systems account for 8 out of 12 monthly diversity indices from the organic farm. The highest diversity index from organic farms was measured in August (1.63), while the highest diversity index from GAP systems was measured in September (1.61), and the highest diversity index from conventional systems was measured in October (1.42).

Kumar and Kumar (2016) reported that the incidence of ocimum leaf folder, *Orphanostigma abruptalis*on *O. basilicum* commenced from 47th standard week onwards and till the January, when it stopped. The maximum larvae population (4.1 Mean no. of larvae / plant) was recorded during 51th standard week in 2015. As the temperature decreased, infestations were observed to increase in the 50th standard week 2015 to 1st SMW of 2016 with a mean population range between 2.6- 3.2 mean no. of larvae/ plant.

Earlier reports of insect pests on sweet basil indicate that the larvae of ocimum leaf folder, *Syngamia abruptalis* is damaging to sweet basil because it feeds inside folded leaves in the field, *S. abruptalis* were observed to feed on 10 plant species of the family Labiatae, including *O. basilicum, O. sanctum, O. americanum, O. gratissimum, Orthosiphon grandifloras, Perilla ocymoides* and *Hyptissuaveolens* (Tigvattananount, 1990.) Sahaya *et al.* (2008); Srikacha *et al.* (2008) observed aphids (*Aphis* spp.), lace bugs (*M. globulifera*), mealybugs (*Pseudococus* spp.), whitefly (*B. tabaci*) and leaf-minor fly (*Liriomyza* spp.) on sweet basil. Peng *et al.* (2014) reported the occurrence of *C. bullita* as important pest of the medicinal plants that belongs to Lamiaceae family, *O. basilicum* and *O. aristatus.* Shivakumara *et al.* (2021) reported that the adult perilla moth activity was observed on sweet basil from 41st standard metrological weeks to 48th standard metrological weeks of 2018 and from 25th Standard metrological weeks to 34th Standard metrological weeks of 2019.

B. Correlation studies between weather parameters and pest population of ocimum leaf folder O. abruptalis infesting sweet basil

The correlation analysis between climatic factors and the mean number of ocimum leaf folder were summarized in Table 2 and depicted in Fig. 2. All the weather parameters were taken under study. The correlation coefficient (r) was calculated as - 0.14 and 0.53 for maximum and minimum temperatures showed negatively and positively non-significant effect on ocimum leaf folder population, respectively. The relative humidity (r= 0.48) at morning hours and (r= -0.59) at evening hours showed positively non-significant and negatively significant effect on ocimum leaf folder population, respectively. The correlation coefficient (*r*) computed as -0.39 showed negatively and non-significantly correlated with rainfall on ocimum leaf folder population. The weather factors were found to contribute around 64.0 per cent impact on *Orphanostigma abruptalis* population when acted together (R^2= 0.64). Kumar *et al.* (2022) observed and revealed the seasonal presence of *S. abruptalis*, the data on incidence of pest has recorded during 36th and 38th SMW of 2016 and 2017 respectively, showed significantly negative correlation with the maximum and minimum temperature (r= -70). The significant positively correlated (r= 0.64) with relative humidity during the both years. The coefficient of correlation for mean population showed positively correlated (r= 0.23) with rainfall. Kumari *et al.* (2016) also observed that the correlation analysis between mean no. of lace bugs and weather factors such as maximum, minimum relative humidity (Percentage) at morning and evening hours and rainfall (mm) were (0.92, 0.87 -0.07, 0.41, and-0.53, respectively. Sharma and Chaturvedi (2018) revealed that the population dynamics of *Cochlochila bullita* in relation to weather factors was studied under natural field conditions. Observations revealed that the incidence of tulsi lace bug reached a peak in the first week of September. *i.e*., (standard week) with a mean of 30.6 tulsi lace bugs/plant and thereafter it decreased to its lowest during the end of October. The population of adult *C. bullita* were recorded significant positively correlated with mean maximum and minimum temperature (r= 0.66 and r = 0.59) and pan evaporation (r = 0.61) while with morning (r =-0.18), evening (r =-0.03), mean relative humidity (r =-0.09) and total rainfall (r =-0.08) was found to be negatively non significant. In totality the results indicated that weather parameters like temperature and pan evaporation were affects the population development of this pest.

Multiple regression equation:

$Y = -29.128 + 1.43(X_1) - 1.03(X_2) + 0.071(X3) + 0.07(X_4) + 0.03(X_5)$

Coefficient of determination (R^2) = 0.64

NS = non-significant

Table 1: Seasonal incidence of ocimum leaf folder (*Orphanostigma abruptalis*) on sweet basil in association with weather parameters during *Kharif*-2021.

Month	SMW	Mean No. of larvae per 5 plants	Temperature (˚C)		Relative humidity (%)		Rainfall (mm)
			Max.	Min.	Morning	Evening	
September (2021)	39	2.33	32.3	25.8	88	77	7.8
October (2021)	40	3.67	26.9	24.4	95	83	225.9
	41	5.00	33.7	24.9	95	69	39.8
	42	6.33	31.0	24.3	91	78	93.4
	43	4.67	30.5	20.6	95	65	0.0
November (2021)	44	7.00	29.9	16.5	95	51	0.0
	45	8.33	29.5	15.5	97	51	0.0
	46	9.67	28.9	13.8	92	55	0.0
	47	11.00	27.6	13.9	97	60	0.0
December (2021)	48	9.67	26.9	12.4	98	60	0.0
	49	8.33	29.8	13.9	97	59	0.0
	50	6.00	24.3	9.1	97	56	0.0
	51	4.67	22.5	7.6	96	56	0.0
Mean	-	**6.66**	**28.75**	**17.13**	**95**	**63**	**28.22**

SMW: Standard Meteorological Week

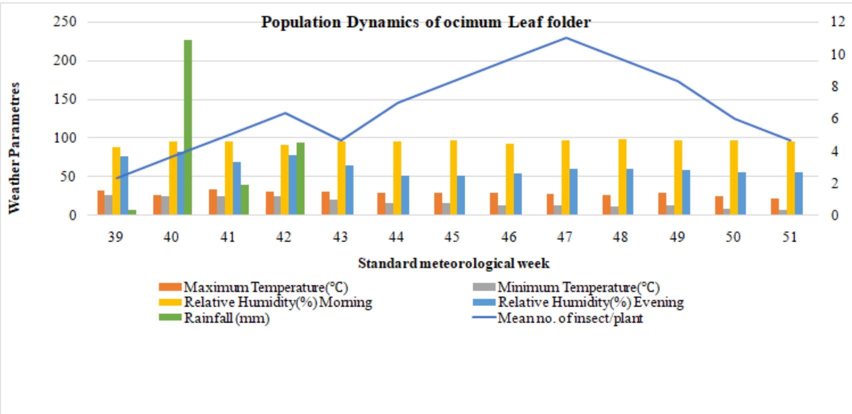

Fig. 1. Seasonal incidence of ocimum leaf folder (*O. abruptalis*) infesting sweet basil in association with abiotic factors during *Kharif* -2021.

Table 2: Correlation coefficient and regression equation in association with weather factors (X) with ocimum leaf folder larval population /5 plants (Y) during *Kharif* season 2021.

Weather parameters	Correlation coefficient(r)
X_1- Maximum temperature(°C)	-0.14^{NS}
X_2- Minimum temperature(°C)	0.53^{NS}
X_3- Relative humidity 7 hrs (%)	0.48^{NS}
X_4- Relative humidity 14 hrs (%)	-0.59^{*}
X_5- Rainfall(mm)	-0.39^{NS}

***Level of Significant** =5%(p=0.05)

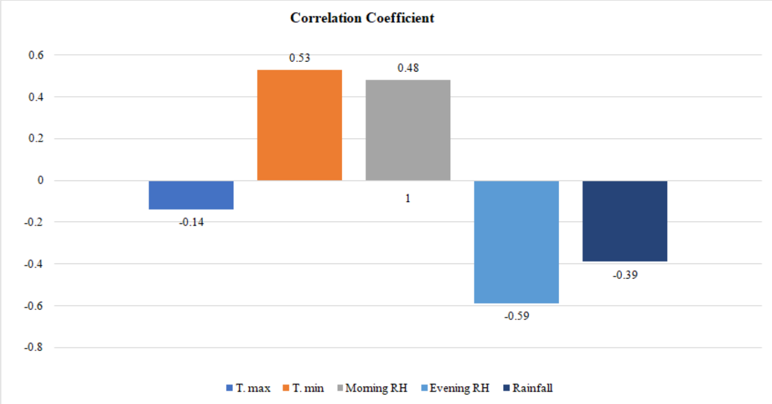

Fig. 2. Correlation coefficient and regression equation in association with weather factors (X) with ocimum leaf folder per 5 plants (Y).

CONCLUSIONS

On the basis of present investigation conducted on sweet basil, it may be concluded that the seasonal incidence of ocimum leaf folder was gradually increasing and it's reached to peak which was recorded (11.00 larvae/5 plants) in 47th SMW. The data on correlation between the mean population of leaf folder and weather factors were calculated by considering maximum temperature (°C), minimum temperature (°C), morning and evening relative humidity, respectively which observed the leaf folder were showed (-0.14^{NS}), (0.53^{NS}), (0.48^{NS}), (-59*) negatively non-significant with maximum temperature and positively non-significant correlation with minimum temperature while positively non-significant and negatively significant correlation with morning and evening relative humidity, respectively. The correlation between rainfall (mm) and mean population of leaf folder was negatively non-significant(-0.39^{NS}). Correlation coefficient of leaf folder with weather factors showed 64 % variation (R^2= 0.64).

Acknowledgment. The authors duly acknowledge to PI & CoPI of All India Coordinated Research Project on Medicinal & Aromatic Plants and Betel vine. We also thanks to Department of Entomology, Dr Rajendra Prasad Central Agricultural University, Pusa Bihar for the support and essential tools for this experiment.

Conflict of Interest. None.

REFERENCES

Amresh, Y. S., Nagrud, V. B., & Somaskhar, B. (2002). Use of botanicals and fungi toxicant against *Alternaria helianthis* (Hansf.). *Indian Journal of Plant Protection*, *30*, 55-58.

Anonymous (2014). Cultivation of Ocimum. *Extension Bulletin*, ICAR-Directorate of Medicinal and Aromatic Plants Research, Boriavi, Anand (Gujarat) pp.17-26.

Anonymous (2017). AICRP on MAPB Annual Report 2016-17, Dr. Rajendra Prasad Central Agricultural University, Pusa. Pp 405.

Anonymous (2019). Biology of leaf folder of Tulsi in laboratory under ambient condition. Annual report of All India Co-ordinated Research Project on Medicinal & Aromatic Plants and Betel vine, DMAPR, Anand (Gujarat) pp. 87.

Arabaci, O., & Bayram, E. (2004). The effect of nitrogen fertilization and different plant densities on some agronomic and technologic characteristic of *Ocimum basilicum* L. (Basil). *Journal of Agronomy*.

Calderon Bravo, H., Vera Céspedes, N., Zura-Bravo, L., & Muñoz, L. A. (2021). Basil seeds as a novel food, source of nutrients and functional ingredients with beneficial properties: A review. *Foods*, *10*(7), 1467.

Deshpande, R. S. and Tipnis, H. P. (1977). Insecticidal activity of *Ocimum basilicum* Linn. Pesticides, pp.11-12.

Dhiman, S. C., & Datta, O. (2013). Seasonal occurrence of *Cochlochila bullita*: A serious pest *of Ocimum bacilicum. Annals of Plant Protection Sciences*, *21*(1), 184-185.

Egata, D. F. (2021). Benefit and use of sweet basil (*Ocimum basilicum* L.) in Ethiopia: a review. *J. Nutr. Food Proces*, *4*(5), 57-59.

Kumar, M., Rai, D., & Kanth, N. (2022). Seasonal incidence, damage intensity and management of Ocimum leaf folder, *Orphanostigma abruptalis* on sweet basil (*Ocimum basilicum*). *Journal of Entomological Research*, *1*, 145-148.

Kumar and Kumar (2016). Biological investigation and seasonal incidence of leaf folder, *Orphanostigma abruptalis* (Lepidoptera: Crambidae) on Tulsi, *Ocimum basilicum* L. Souvenir & abstract: *International seminar on global partnership in agricultural education and research*, pp.104-105.

Kumari, S., Kumar, N., & Kumar, A. (2016). Seasonal incidence and damage intensity of Lace bug, *Cochlochila bullita* (Stal) (Hemiptera: Tingidae) on Tulsi, *Ocimum basilicum* (L.). *International Journal of Science, Environment and Technology*, *5*(6), 4312-4319.

Livingstone, D., & Yacoob, M. H. S. (1987). Biosystematics of Tingidae on the basis of the biology and micromorphology of their eggs. *Proceedings: Animal Sciences*, *96*, 587-611.

Namvong, U., & Chongrattanameteekul, W. (2015). Insect pest abundance on sweet basil, *Ocimum basilicum* L. (Labiatae) under different production systems. *Agriculture and Natural Resources*, *49*(1), 22-31.

Palaniswami, M. S., & Pillai, K. S. (1983). Biology of *Cochlochila bullita* S., a pest on chinese potato. *Journal of Root Crops*, *9*(1-2), 59-62.

Panda, H. (2005). Aromatic Plants Cultivation, Processing and Uses: How to start a successful Aromatic plants business, How to Start Aromatic plants cultivation

Industry in India, How to Start Aromatic plants farm, How to Start Aromatic plants Production Business, Indian aromatic plant, List of aromatic plants and their uses. Asia Pacific Business Press Inc.

Peng, T. L., Sajap, A. S., Jeen, L. H., Hua, L. S., & Chen, L. W. (2014). Occurrence of *Cochlochila bullita* Stål in Malaysia. *Serangga*, *19*(2), 67-76.

Sharma, S., & Chaturvedi, M. (2018). Impact of weather parameters on the population dynamics of *Cochlochila bullita* (Stal), infesting *Ocimum tenuiflorum* L. *Journal of Entomological Research*, *42*(4), 545-548.

Shivakumara, K. T., Venkatesan, T., Keerthi, M. C., Shashank, P. R., Pradeeksha, N., Polaiah, A. C., & Manivel, P. (2021). Occurrence of *Pyrausta panopealis* on sweet basil *Ocimum basilicum* in India. *Journal of Environmental Biology*, *42*(2), 265-270.

Srikacha, S., Srijantra, S., Manasmonkong, B., Chaipoonsri, S., Aunhawut, C., Nounart, U., & Boontop, Y. (2008). Study on species and fluctuation of thrips, sweet basil for export. *Annual Report of Plant Protection Research and Development Office. Department of Agriculture, Ministry of Agriculture and Cooperatives. Bangkok, Thailand. [in Thai]*, 1554-1558.

Tigvattnanont, S. (1990). Studies on biology of the ocimum leaf folder, *Syngamia abruptalis* Walker and its host plants. *Kaen Kaset Khon Kaen Agriculture Journal*, *18*(6), 316-324.

Wierdak, R. N. and Borowski, B. (2011). Dynamics of sweet basil (*Ocimum basilicum* L.) growth affected by cultivar and foliar feeding with nitrogen. *Acta Scientiarum Polonorum Hortorum Cultus*, *10*(3), 307-317.

How to cite this article: Amit Kumar, Manoj Kumar and Heenashree Mansion (2023). Study the Weather Parameters Affecting Amplitude Fluctuation in the Population Dynamics of Ocimum Leaf Folder, *Orphanostigma abruptelis* on Sweet Basil in Bihar. *Biological Forum – An International Journal, 15*(9): 74-79.