

## “Seasonal Incidence of Citrus Butterfly, *Papilio Demoleus* Linnaeus (Lepidoptera: Papilionidae) on Curry Leaf, *Murraya Koenigii* at Raipur (C.G.)”

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**ABSTRACT:** The Citrus Butterfly, *Papilio demoleus* Linnaeus is a major pest of Curry leaf, *Murraya koenigii* (Rutaceae) plantations at multitier agro-forestry field, IGKV, Raipur. It is one of the economically important pests whose larval forms cause serious damage by devouring large quantity of foliage during the later stages of their development. Population density was determined on randomly selected ten plants of curry leaf at fortnightly interval. Population of citrus butterfly larvae was observed maximum during the month of September which was recorded to be 0.87 larvae/twig and the minimum population of 0.13 larvae/twig during the month of January. The correlation analysis of the population of *P. demoleus* with weather parameters showed that the butterfly population was highly significant and negatively correlated with maximum temperature (-0.146\*\*) and non significant and positively correlation with minimum temperature (0.080).

**Key words:** Citrus Butterfly, Curry leaf, Population, Weather parameters.

### INTRODUCTION

The curry leaves or meetha neem, *Murraya koenigii* is a tropical to sub-tropical tree in the family Rutaceae, which is native to India and Sri Lanka. These leaves are almost used or added in almost all dishes to give a nice aroma and also used in Ayurvedic medicine. In all curry leaf, *M. koenigii* was found to be attacked by four species of insect pest. They were cowbug, *Tricentrus bicolor*, citrus black fly, *Aleurocanthus woglumi*, caterpillar, *Tonica zizyphi*, Coccids (unidentified) were recorded [1] and similar finding reported [2] *M. koenigii* was found to be attacked by three species of insect pests. They were Citrus black fly (*A. woglumi*), leaf twister caterpillar (*T. zizyphi*) and coccid (unidentified). Among the insect pest recorded on curry leaves the major were citrus butterfly, black flies, white flies, mealy bugs, psyllids and aphids but citrus butterfly, *P. demoleus* observed a major defoliator on curry leaves.

*P. demoleus* Linnaeus, the Citrus Butterfly (also commonly known as the Lime Swallowtail), is a major pest of Citrus sp. (Citrus) and *M. koenigii* (Curry Leaf) plantations [3, 4, 5]. It is one of the economically important pests whose larval forms cause serious damage to citrus family by devouring large quantity

of foliage during the later stages of their development. whose larval forms cause serious damage by devouring large quantity of foliage with Special preference towards both wild and cultivated species the later stages of their development. The genus *Papilio* is widely distributed all over the world. [6] Among the various insect pests that attack lemon, curry leaf, orange and other plants of rutaceae, the *P. polytes polytes* is a serious and regular pest [7, 8, 9]. The caterpillars feed voraciously and cause extensive damage to nurseries and young seedlings. They are foliage feeders, prefer blossoms and young nurseries of citrus and curry leaf. Severe pest attack resulted in entire defoliation of the tree and leads to retardation of plant growth [10].

### MATERIALS AND METHODS

In this experiment three tree species and one shrub was planted in multi-tier system consisting of four species namely Mangium (*Acacia mangium*), curry leaf (*Murraya koenigii*), Aonla (*Emblia officinalis*), and Turmeric (*Curcuma longa*). Turmeric was grown as an under-storey crop as a part of multi-tier system. The experiment was conducted in Split-split plot design. Surveys of insect pests of the curry leaf were done for

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a period of 2013-14 in the at agro-forestry field, IGKV, Raipur. Insect pest incidence and their seasonality in curry leaf was recorded. Population density was determined on randomly selected plants of curry leaf at fortnightly interval and recorded on the basis of number of larvae per plant. Observations were recorded 10 plants were randomly selected and observed for incidence under two canopy levels viz., upper and lower. The data thus collected were correlated with the meteorological parameters.

**RESULTS AND DISCUSSION**

*P. demoleus* is a major pest of the plant family Rutaceae [11, 12, 13, 14] and can breed on all varieties of wild and cultivated Citrus. This species is found throughout the tropical and subtropical regions. This butterfly ranges widely and is an extremely successful invader. During the present investigation, it seen that the freshly hatched caterpillars were dark brown and soon developed irregular white markings on their body resembling bird’s drop which gradually changes to green in later instar. This fleshy, forked, yellowish orange coloured structure called osmaterium that occurs just above the head on larvae which emitted a distinct smell. It is normally hidden when the caterpillars were disturbed; it pushed out from the top of its prothorax.

**Nature of Damage:** Citrus butterfly, *P. demoleus* was one of the most destructive pests of curry leaf, *M. koenigii*. Caterpillar nibble at first, later become fed voracious on tender leaves that cause severe defoliation of plants.

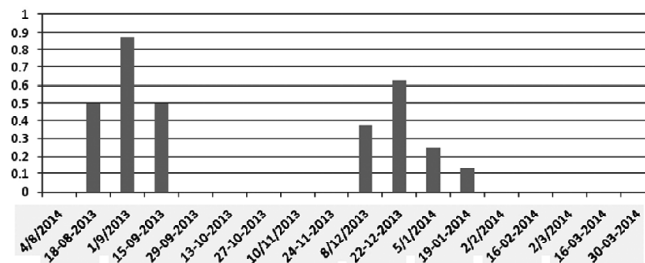


Figure 1: Seasonal incidence of *Papilio demoleus* on *Murraya koenigii*



Plate 1: Damage caused by the larvae of *P. demoleus*

**Table 1**  
Population of citrus butterfly, *Papilio demoleus* recorded on curry leaf, *Murraya koenigii*

Date	SMW	Citrus butterfly Larva/twig	Weather Parameters				
			Temperature(°C)		Rainfall(mm)	RelativeHumidity(%)	
			Max.	Min.		Morn.	Even.
04-08-2014	31	0.00	28.3	23.9	255.8	95	84
18-08-2013	33	0.50	31.3	24.3	177	95	80
01-09-2013	35	0.87	29.3	24.5	120.8	95	80
15-09-2013	37	0.50	31.9	25.2	11.6	92	73
29-09-2013	39	0.00	32.0	24.9	28.6	93	68
13-10-2013	41	0.00	30.2	23.3	8.6	89	71
27-10-2013	43	0.00	28.8	22.6	32.6	96	73
10-11-2013	45	0.00	30.0	16.7	0.00	91	37
24-11-2013	47	0.00	30.3	16.7	0.00	87	40
08-12-2013	49	0.37	28.1	11.8	0.00	91	31
22-12-2013	51	0.62	28.1	11.7	0.00	90	34
05-01-2014	1	0.25	28.6	13.6	0.00	90	48
19-01-2014	3	0.12	29.0	16.1	0.00	89	46
02-02-2014	5	0.00	28.8	10.1	0.00	86	28
16-02-2014	7	0.00	27.9	15.4	20.4	83	39
02-03-2014	9	0.00	27.9	17.7	45.8	91	61
16-03-2014	11	0.00	33.3	19.5	2.0	89	38
30-03-2014	13	0.00	38.4	22.2	0.00	67	24

(SMW = Standard meteorological week).

**Seasonal incidence:** Maximum population of citrus butterfly larvae was observed during the month of September which was recorded to be 0.87 larvae/ twig and the minimum population of 0.13 larvae/ twig during the month of January. (Table 1 & Fig. 1) similar findings, the seasonality of 6 Papilionids; *Pachliopta hector*, *Pachliopta aristolochiae*, *Papilio polytes*, *Graphium agamemnon*, *Papilio demoleus* and *Graphium doson* and their host plants in a year-long study in Visakhapatnam, India [15]. All species occurred throughout the year except *P. demoleus* which was present during July to February and *Graphium doson*, which was present during April to October. Citrus lemon, *C. aurantium* and *M. koenigii* served as host plants for *P. polytes* and *P. demoleus*.

The pest *P. polytes* is found throughout the year. The population density was at the peak during June to September i.e. in rainy season [10]. The maximum population density was recorded with an average of 25 larvae/curry leaf plant and 19.75 larvae/acid lime plant in the month of July. The population density declined gradually till the end of May with an average population density of 24, 16, 7.5, 5.5, 4.5, 3.5, 1.75, 1.25, 1 and 1 larvae/curry leaf plant respectively. Similarly *P. polytes* were abundant during the month of March - November in India. More or less similar results were recorded in the present study [16]. The larval population density will be high during October to December months and July to December is the most favourable period of its activity in general. *P. demoleus* Linnaeus was able to survive during the winter even though temperatures dropped below 0°C. The total life period varied between 21-50 days and with 3-9 generations per year depending on the weather at various locations [6].

The correlation analysis of the population of *P. demoleus* with weather parameters showed that the butterfly population was highly significant and negatively correlated with maximum temperature (-0.146\*\*) and non significant and positively correlation with minimum temperature (0.080) but highly significant and positively correlated with rainfall (0.216\*\*) and relative humidity I (0.331\*\*) & II (0.259\*\*). Similar to other taxa, butterfly species richness depends on abiotic factors and varies with environmental gradients on continental mainlands [17, 18, 19].

## CONCLUSION

Citrus butterfly, *P. demoleus* was one of the most destructive pests of curry leaf, *M. koenigii* that caused as defoliater. Peak population of this pest was noticed

during the month of August to September and December to January. The incidence of insects was correlated with weather parameters. It was highly significant and positively correlated with rainfall and relative humidity I (Morning).

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## REFERENCES

- Soman D., (2005), "Studies on Insect pest of multi-tier agro-forestry system with special reference to Insect Pest of Turmeric", *M.Sc.(Ag) Thesis*, Indira Gandhi agricultural University, Raipur. 87p.
- Tamrakar E., (2006), "Studies on insect pests of multi-tier agro-forestry system with special reference to screening of various provenances of *Jatropha curcas* against major insect pests", *M.Sc.(Ag) Thesis*, Indira Gandhi agricultural University, Raipur. 64p.
- Duport L., (1913), Notes on certain diseases and enemies of cultivated plants in the Far East, *Rev. Entom. Series A*, **2**: 490.
- Malik J. M., (1970), Notes on the butterflies of Pakistan in the collection of Zoological Survey Department Karachi, Part I, *Rec. Zool. Surv. Pakistan*, **2(2)**: 25-54.
- Badawi A., (1981), Studies on some aspects of the biology and ecology of the citrus butterfly *Papilio demoleus* L. in Saudi Arabia (Papilionidae, Lepidoptera), *Zeit. Angew. Entomol.*, **91(3)**: 286-292.
- Sarada G., Gopal K., Ramana K. T. V., Lakshmi L. M. and Nagalakshmi T., (2013), Citrus Butterfly (*Papilio demoleus* Linnaeus), Biology and Management: A Review, *Journal of Agriculture and Allied Sciences*. e-ISSN: 2319-9857, p-ISSN: 2347-226X.
- Wynter-Blyth M. A., (1957), Butterflies of the Indian Region, Bombay Natural History Society, Bombay.
- Antram C. B., (1986), Butterflies of India, Periodical expert book agency, Delhi.
- Gunthigalraj K., (1998), Some South Indian Butterflies, Nilgiri Wild Life and Environment Association, Tamil Nadu.
- Gaikwad S. M., Muniv Y. S., Chavan J. A. and Bhawane G. P., (2011), Population Density and Natural Enemies of *Papilio polytes polytes* L., (Lepidoptera: Papilionidae), *Biological Forum-An International Journal*, **3(1)**: 41-43, (2011).
- Fletcher T. B., (1917), Report to the Imperial Pathological Entomologist, *Scientific Reports, Agricultural Research Institute Pusa (Calcutta)*, **9**: 64.

- Pipatwatankul A., (1979), Ecological investigation on the Lemon Butterfly *Papilio demoleus* L., (Lepidoptera: Papilionidae) and its natural enemies in Thailand., M.S. Thesis., Kasetsart University, Bangkok, Thailand, 50pp.
- Khan A. R., (1940), Insect Pest number, Punjab Agricultural College, Lyallpur. Punjab Fru 41.
- Atwal A. S., (1976), Agricultural pests of India and South East Asia, Kalyani Publishers, New Delhi, India, 479pp.
- Raju A. J. S. and Naidu S. A., (2000), Seasonality and egg and larval host plants of some papilionod butterflies, Department of Environmental Sciences, Andhra University, Vishakhapatnam, *Insect-Environment*, India, **6(1)**: 43.
- Rajasekhar B., (1995), Study on butterfly populations at Guindy National Park, Madras, *Journal of Bombay Natural History Society*, **92**: 275-278.
- Kerr J. T., (2001), Butterfly Species Richness Patterns in Canada: Energy, Heterogeneity, and Potential Consequences of Climate Change, *Conservation Ecology*, 5.
- Kerr J. T., Southwood T. R. E. and Cihlar J., (2001), Remotely Sensed Habitat Diversity Predicts Butterfly Species Richness and Community Similarity in Canada, *Proceedings of the National Academy of Sciences, USA*, **98**: 11365-11370.
- Choi S. W., (2004), Trends in Butterfly Species Richness in Response to the Peninsular Effect in South Korea, *Journal of Biogeography*, **31**: 587-592.