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Biology And Stage-Specific Variations Of *Cnaphalocrocis Medinalis* (Guenée) In Barpeta District, Assam.

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Abstract:
The rice leaf folder, *Cnaphalocrocis medinalis*, is a widespread pest in Assam's rice-growing areas. The pest activity was detected in the rice field of Barpeta district during the month of August, with clear white parallel strips on rice hill. For the study eggs and larvae of rice leaf folder were collecting. Larvae were reared in three replicas; 12 female and 13 males were kept in oviposition cage. The larval length was found to be significantly reduced. The weather condition of Assam may have contributed to the variability in larval length. Understanding the biology of the pest enable the formulation of effective and sustainable control method.

Keywords: Assam, Barpeta, *Cnaphalocrocis medinalis,* oviposition cage, sustainable, white parallel strips.

Introduction:

Assam known for its breathtaking natural beauty, is also the heartland of paddy cultivation in India. Paddy cultivation is the backbone of Assam economy, with agriculture being the prime source of income for a majority of population. Rice is the staple crop of assam providing carbohydrates, proteins, and other vital nutrients. Rice contains 87% carbohydrates, 7-8% proteins, and very little fat (Selvakumar *et al*., 2014). In Assam *Ahu* or autumn rice, *Sali* or winter rice and *Boro* or summer rice is grown all year round (Ahmed *et al*, 2011; Rehman and Tanti, 2021). Rice production is assam is affected by excessive rain resulting in flood during monsoon, apart from that rice fields are attacked by numerous pest population causing major yield loss. Pathogens and pests cause an estimated 10%–30% yield loss annually (Douglas, 2018; Savary *et al*., 2019). One such pest gaining much importance is *Cnaphalocrocis medinalis* (Guenée), the rice leaf folder. The larvae cause significant damage to the green photosynthetic leaves turning it dry with white longitudinal patches. 30 to 80 per cent yield loss is recorded due to leaf folder damage (Rajendran *et al*., 1986; Maragesan & Chellish, 1987; Nanda and Bisoi, 1990; Shah, *et. al*., 2008). As countless number of white parallel patches are also seen in the rice fields of Assam, hence an attempt has been made to study the biology of rice leaf-folder to put forward ideas in order to limit its population.

Materials and Method:

Cnaphalocrocis medinalis larvae were collected from rice fields of Barpeta district of lower Brahmaputra valley zone, Assam, in the month of August when the rice plants are in vegetative stage. Larvae were reared on potted rice plants covered with mesh sleeves. Rice plants were grown on earthenware pots, 18 cm tall with a 20 cm diameter top. Each pot held 15 plants and gave about 62 tillers (Senthil Nathan *et al*, 2004). The culture was initiated with partly grown larvae from the field. Thereafter, newly hatched larvae were placed on 50-days old rice plant of Bangabandhu variety. After pupation, adults emerged on plants in the sleeves. To

maintain the culture, 12 female and 13 male moths were placed in an oviposition cage containing one potted plant. After two days, the potted plants were removed from the oviposition cage. The leaf portions containing the eggs were used to maintain the culture (Senthil Nathan *et al*, 2006) in three replicas.

Result and Discussion:

The leaf-folder larvae complete its lifecycle in 27 to 36 days. Thus, it can complete 3 to 4 generation in the rice fields during one season. The larval period is the longest phase of its lifecycle as it comprises five larval stages. The shortest period is the incubation period of the eggs which last for about 3 days. (Table 1).

Table 1: Number of days to complete a stage:

Life Stage	Mean with SD
Incubation Period	3.3 ± 0.57
Larva	14.66 ± 2.08
Pupa	6.6 ± 1.5
Adult	7.3 ± 1.15
Life cycle	31.86

**SD stands for standard deviation*

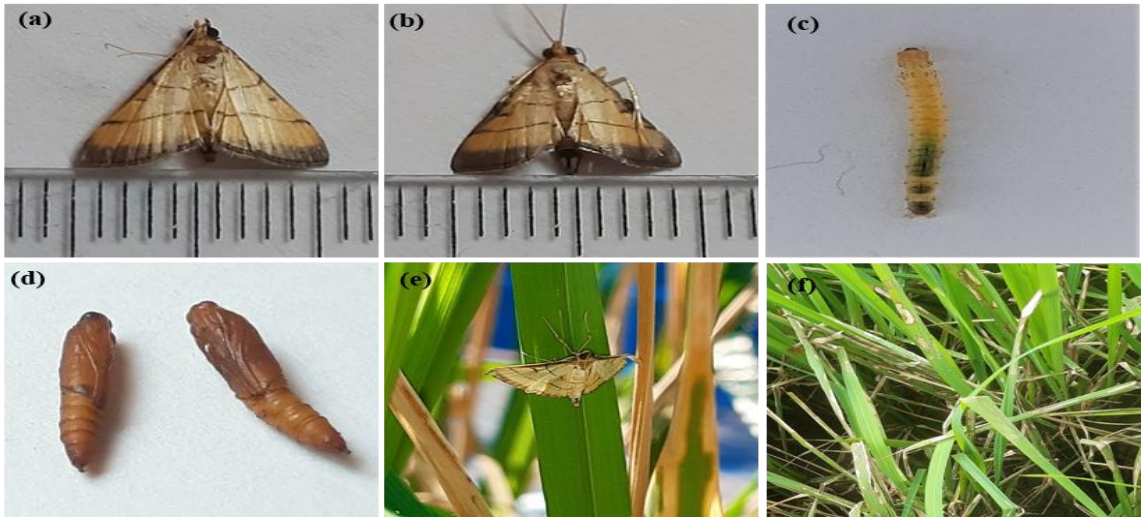
After hatching the first instar larvae move towards the midrib, it is very minute and transparent, on careful examination it is easily visible with a length of 0.75mm. As the larvae feeds vigorously a change in body length and instar is also observed (Table 2). The fifth instar larvae mature completely, on any kind of disturbance it moves very fast to hide itself on rice leaf close to the midrib. The mature larvae move towards the base of a single leaf, cut the leaf margin transversely up to the midrib, folds the cut portion of the leaf lamina over the other half and pupates inside the fold. The newly emerged pupa is light brown in colour but later turns reddish brown (fig 1).

Table 2: Body Length of Larvae and Adult

Life Stage	Body length with SD
1st Instar	1.3 ± 0.55
2nd Instar	3.8 ± 0.72
3rd Instar	6 ± 0.5
4th Instar	9.1 ± 1.2
5th Instar	13.5 ± 1.3
Pupa	7.2±0.7
Adult Female	9.5 ± 0.5
Adult Male	8.5± 0.5

**SD stands for Standard deviation *length in mm.*

Fig 1: Represent six images: (a) adult female (b) adult male (c) larvae (d) pupa (e)adult moth siting on ventral portion of leaf (f) damaged rice leaves.



Adult female moth is golden yellow with brown margin on both the wings and one short and two long bands transversing the forewing. The male moth is slightly smaller in size but have a broad abdomen tip, while females have a pointed tip (fig 1) this finding is similar with that of (Karim S and Riazuddin S; 1999) The adult leaf folder fly for a short distance, usually from one hill to another hill. They prefer to sit or rest on the ventral side of the leaf avoiding the tip. The first instar is transparent to yellowish in colour, after hatching they start feeding but were unable to fold the leaves. However, the second instar starts folding the leaves by stitching with silken threads keeping open both the ends, the fold generally starts from the apex of the leaf. The full-grown larva is yellowish green with a dark brown head. The results regarding the body length of larvae differs with that of Gangwar, 2015 where the mature larvae are 20 -25 mm in length this may be due to the variation in biotic factors like rainfall, temperature, bright sunshine hours as well as relative humidity. Hot and humid climate, soil status, nutritional value of Assam is quite different from other parts of the country, these conditions may play crucial role in the larval growth.

Conclusion:

Monitoring the life history of *C. medinalis* in Barpeta district of Assam was helpful to find out its first appearance which is on 33rd Standard Meteorological Week of *Kharif* season. Clear appearance of the white parallel strips in rice field is the period of availability of their eggs and larvae. The farmers of Assam still use traditional method of cultivation, majority of the farmers were unaware about the cause behind the white parallel strips. The farmers use pesticide in order to control the population without knowing the recommended dose and ill effect of it. A change in transplantation period of rice crop might help in the control of leaf folder population. A thorough study and proper interventions are required for the control of *C. medinalis* in rice growing areas of Assam.

Conflict of Interest: The authors declare no conflict of interest.

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