WEATHER CORRELATION OF WHITE GRUB, *LEUCOPHOLIS CONEOPHORA* (BURMEISTER) INCIDENCE IN MID-HILLS OF MEGHALAYA

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Abstract: Weather plays a significant role in the occurrence and distribution of insect pests in various crops in different cultivated areas. Occurrence of the white grub species, *Leucopholis coneophora* adults was first recorded in the mid-hills of Meghalaya, India which is located at 25° 30' N latitude to 91° 51' E longitudes and at an altitude of 1000 m above mean sea level (msl). Soil type is loamy to fine loamy and annual rainfall is about 4800 mm. Beetle incidence was found to be more during the month of August when rainfall had declined after its onset in July last week. From the correlation studies, significant negative correlation (r = - 0.727) was observed between the adult beetle incidence and the maximum temperature.

Keywords: correlation, incidence, *L. coneophora,* meteorological parameters.

Introduction: White grub, *Leucopholis coneophora* Burm. is a polyphagous pest of coconut and intercrops grown in sandy loam soils in South India. It was first reported as a pest of coconut by Nirula *et al.* (1952). Adult beetles do not feed (Abraham, 1983) and only the grub stage damages seedlings and mature palms by feeding on roots, boring the bole and collar regions. This polyphagous pest also causes damage to rhizomatous and tuberous intercrops raised in fields showing the symptoms of wilting, yellowing and stunted growth. It has an annual life cycle and adult emergence coincides with the onset of monsoon (Abraham, 1983). In India, various ecological and behavioural studies of the Melolonthid root grubs are largely restricted to the species of the genus *Holotrichia* and little or scanty literatures are available on *L. coneophora*. The occurrence of this white grub species was recorded first time in the mid-hilly areas of Meghalaya, one of the states in North-eastern India. This necessitates the need to study their occurrence and the abiotic factors governing it. Therefore, attempts were carried out in order to study the incidence and its correlation with the prevailing meteorological parameters.

Materials and methods: A field experiment was conducted during June to October, 2011 at the Entomological field of ICAR-Research Complex (RC) for North-Eastern Hill (NEH) Region, Umiam, to study the incidence of adult white grub (*L. coneophora*) on groundnut (var. **JL-24**) sown in ten plots of size 4m x 3m adopting plant to plant and row to row spacing of 40cm-20cm with recommended agronomic practices.

Observations were taken during evening hours, between 5:30 to 6:30 p.m., initiating at seven days after sowing and continued till the harvest of crop at weekly intervals. The number of adult beetles per plot was statistically analysed and correlated with meteorological parameters *viz.*, maximum and minimum temperature (°C), morning and evening RH (%), wind speed (kmph) and rainfall (mm). The data on the prevailing weather parameters were collected from the Division of Agricultural Engineering, ICAR-Research Complex for NEH Region, Umiam, Meghalaya.

Results and discussion: The occurrence of *L. coneophora* in groundnut field in the NEH region of Meghalaya might have been due to the non-availability of its preferred host like coconut, palm, etc. The beetle appeared first on last week of July with an initial population of 0.2 beetles/plot which increased to 0.4 on August first week and reached the peak population of 1.1 beetles/plot on second week of August (Table. 1, Fig. 1). The low incidence of this particular white grub species may be attributed to the fact that the species has been newly introduced to this hilly terrain of Meghalaya, India. Thereafter, the population declined from August third week onwards. According to Prathibha *et al.,* (2013), scanty emergence of beetle was also reported in the month of July and August during 2011 in Kasaragod district of Kerala which supported the present investigation. The beetle incidence totally disappeared from second week of September which was in close conformity with Padmanaban and Daniel (2003), who studied the spatial and seasonal distribution of *L. burmeisteri* in Karnataka and reported that the first instar grubs were noticed in the soil up to 2nd week of September. The present findings were in agreement with Patil *et al.* (1991), who reported that all the stages of *L. lepidophora*, including adults were present in cultivated land in Maharashtra in August month. The results were also in close proximity with AINPWGOSA (2005) reports which stated that the emergence of *L. coneophora* adults was during June in both coconut and areca nut plantations in coastal Karnataka and Kerala. Abraham (1993) reported the emergence of *L .coneophora* in Alappuzha district even up to August and September during 1976 to 1978 and the active swarming period was prolonged for 60 days. No beetle incidence was observed till the harvest of crop.

The correlation studies between adult incidence and weather parameters showed that *L. coneophora* incidence was positively correlated with min. temperature (r = 0.333) however, it was not significant (Table. 1) whereas negative correlation was observed with other parameters *viz*. max. temperature, morning and evening RH, rainfall and wind speed. Among these, the beetle population exhibited significant correlation with max. temperature (r = - 0.727) and Fig. 2 showed the significant negative correlation. The present findings were in contrary to that of Mishra and Singh (1999) who reported that rainfall, temperature, atmospheric humidity and wind velocity largely govern the emergence, movement and distribution of predominant white grub species in Garhwal Region of Uttar Pradesh and also it was not in terms with Prathibha *et al.,* (2013) who studied that there is a correlation between beetle emergence and rainfall.

Conclusion: The present findings on the seasonal incidence of *L. coneophora* adults and their correlation with meteorological parameters will help to know their active periods in formulating their management practices and to predict their emergence from soil. Also, understanding the ethology of this pest would aid to develop an eco-friendly pest management strategy if it ever attains primary pest status in the near future in North-eastern India. Moreover, since the species is a newly recorded one in North-eastern India, it will pave the way for researchers and students to make further studies related to its biology, bionomics, management and others, both in field and laboratory conditions.

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Table 1: *Leucopholis coneophora* adult incidence and its correlation the weather parameters in mid-hills of Meghalaya, India							
Date of Obs.	No. of adults/plot	Temp. (°C)		RH (%)		Rainfall (mm)	W S (kmph)
		Max.	Min.	Mor.	Eve.		
22/07/2011	0	30.2	20.3	95	70	1.0	1.9
29/07/2011	0.2	30.4	19.2	96	75	19.9	1.5
05/08/2011	0.4	30.7	21.3	91	78	3.6	1.9
12/08/2011	1.1	28.2	20.0	93	78	5.0	1.3
19/08/2011	0.7	27.2	19.3	88	78	9.6	1.2
26/08/2011	0.3	29.0	18.9	86	73	6.6	1.3
02/09/2011	0.1	31.5	18.2	90	77	18.2	1.4
09/09/2011	0	30.0	18.3	88	91	0	2.1
Correlation co-efficient 'r'		**-0.727***	0.333	-0.016	-0.049	-0.046	-0.603
Calculated 't' value		**-2.596***	0.865	-0.039	-0.120	-0.113	-1.849

* Significant at p = 0.05, $t_{tab.}$ (p=0.05) = 2.45

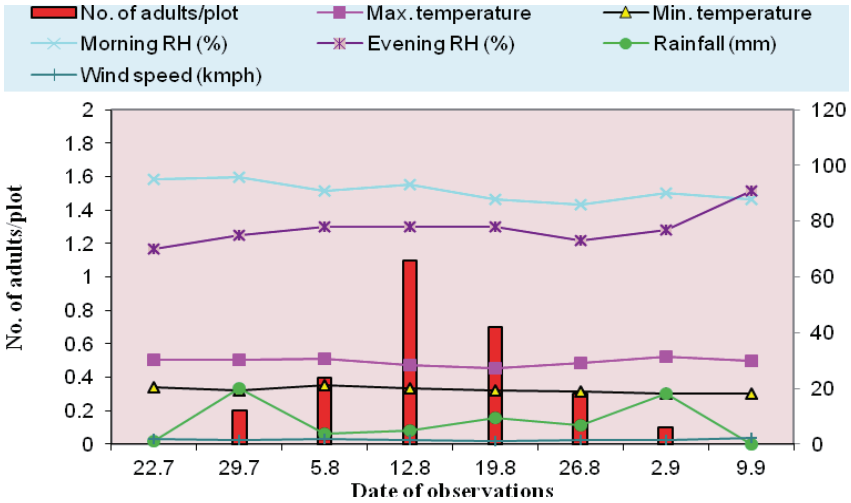

Fig. 1. Incidence of *L. coneophora* adults during July to September, 2011

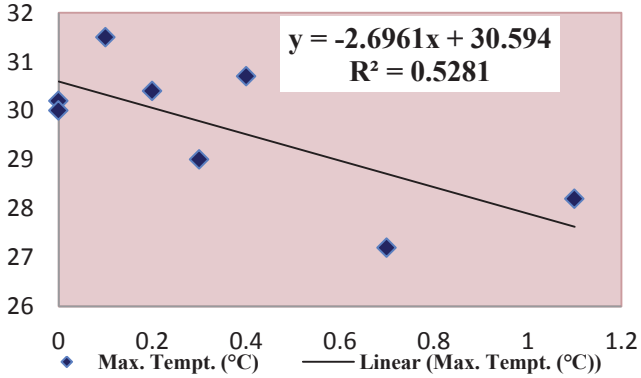

Fig. 2. Correlation between maximum tempt. and white grub incidence