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Research Article

Monitoring of Scarab Beetles using Light Trap in Horticulture Field of Paklihawa Campus, Rupandehi, Nepal

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Abstract

An experiment was conducted in Horticulture field of Institute of Agriculture and Animal Science (IAAS), Paklihawa, Nepal to know the status of Scarabaeid beetle species and population by using light trap. Weekly monitoring of scarabaeid beetles adults with 85 watt vapor lights run from dawn to dusk during April, May, June and July in a field with multiple crops in 2014 showed that beetle populations were higher in May and June than in April and July. Overall, 227 specimens of Scarabaeid beetles were collected and 36% were *Coprius indicus* (Blanchard), 18% were *Anomala mongiloca* (Faldermann), 11% were *Holotrichia* spp., 9% were *Cyclocephala* spp., 8% were Phyllophaga spp., 6% were *Heteronuchus lioderes* (Redtenbachen), 5% were *Onthophagus madoqua* (Arrow), 5% were *Alissonotum binodulum* (Fairmaire), 2% were *Maladera castanea* (Arrow), and 0.5% (1 beetle) was *Popillia birmaniaca* (Arrow).

Keywords coleoptera, phytophagous insects, sampling insects, scarabaeidae

Introduction

Scarabaeid beetles are adult beetles of white grub. White grubs are economically important pest in Nepal, while their management strategy is limited (Yubak Dhoj and Keller, 2002). Scarabaeid beetles (Coleoptera: Scarabaeidae) are pest as larvae in the soil cause damage to plant roots and as adults feeding on leaves and fruits of plant. The subterranean larvae are difficult to control because of the underground feeding habits. White grubs are more difficult to detect and control than many of the pests that feed on the above ground portion of the plants. Detection, identification and measurement of relative abundance of beetles through sampling will facilitate the application of effective control measures. According to Yubak Dhoj and Keller [1], several species of beetles are involved in crop damage but to date there is no study conducted for the identification of beetle species in Paklihawa.

The adults of white grubs can be monitored using light traps. Light traps are useful tools for monitoring the phototropic insects including adult beetles of white grubs. Monitoring primarily gives the basis for deciding and formulating management strategy against pest insects. Pandey et al. [2] reported *Phyllophaga* spp are the major component of white grubs in Nepal based on the monitoring works conducted at Lumle Centre (1675 MASL; 28° 18' N and 83° 49' E).

The objective of this study is to determine the species of Scarabaeid beetles in the IAAS Paklihawa Field and measure their relative abundance during summer by systematically collecting adults with a light trap.

Material and Methods

The research site is Paklihawa, Rupandehi of Nepal within 270 3’0” N latitude and 830 27’0” E longitude at 116 m height from sea level. The district lies on the southern part of Nepal. On the East, it shares border with Nawalparasi District, on West with Kapilvastu District, on North with Palpa District and on South with India. Soil type of research site was clay and day length was of approximately 14 hr (dawn 5am to dusk 7pm).

One light trap with an 85W vapor light was installed at the site for trapping purpose. It was installed in about the middle of field, standing alone

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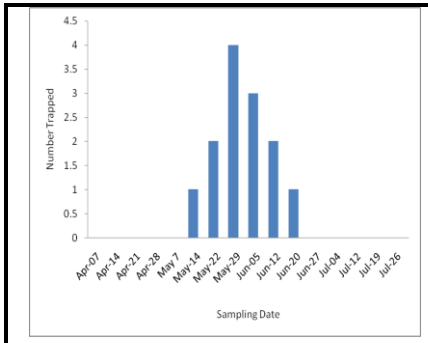

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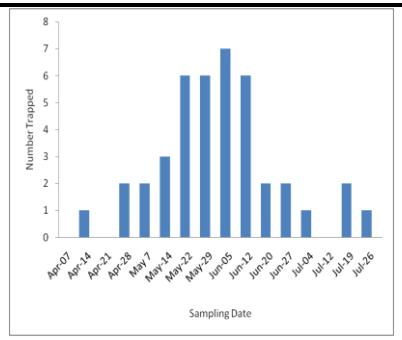

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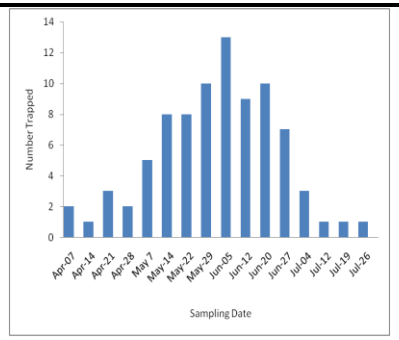

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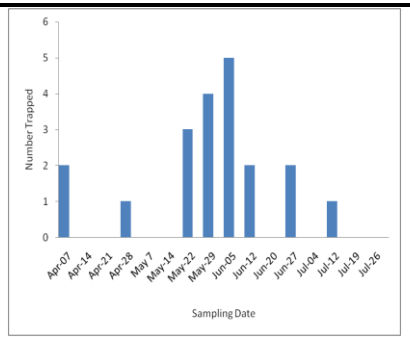

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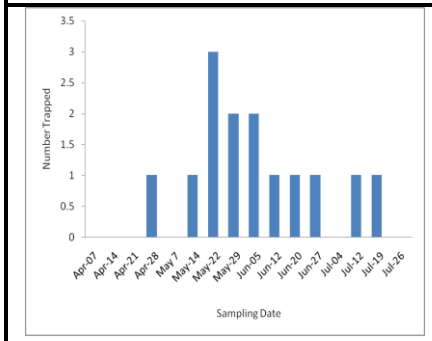

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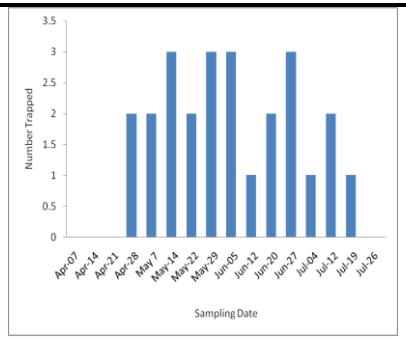

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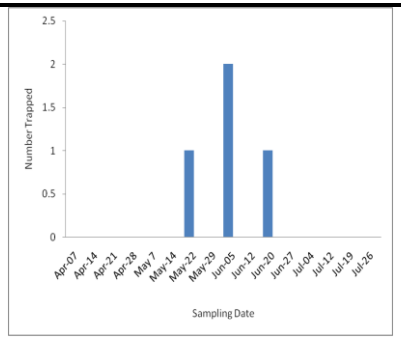

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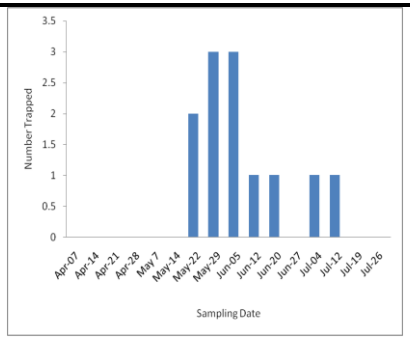

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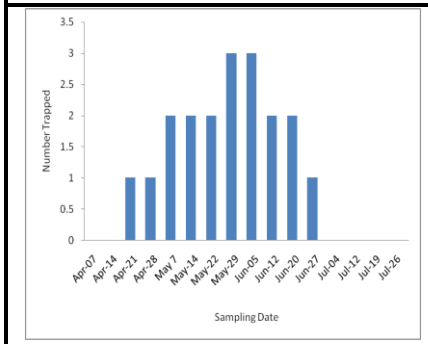

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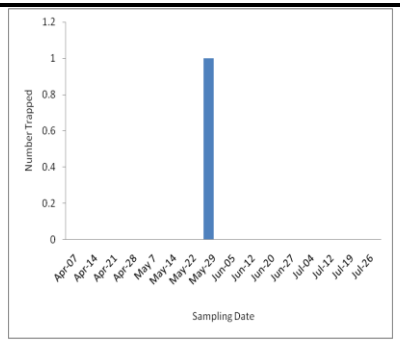


1.10

1.1. *Alissonotum binodulum* (Fairmaire)
1.2. *Anomala mongiloca* (Faldermann)
1.3. *Coprius indicus* (Blanchard)
1.4. *Cyclocephala spp*
1.5. *Heteronuchus liioderes* (Redtenbachen)
1.6. *Holotrichia spp.*
1.7. *Maladera castanea* (Arrow)
1.8. *Onthophagus madoqua* (Arrow)
1.9. *Phyllophaga spp.*
1.10. *Popillia birmaniaca* (Arrow)

Figure 1. Beetle species and graph showing number of beetles trapped on sampling date through light traps from April- July 2014 in IAAS Paklihawa.

without any provision of shade. Maize, cowpea, tomato and brinjal had been grown in the field at the time of monitoring. Scarabaeid beetles were collected at weekly interval to record the status of beetle and occurrence of different species. Light trap was operated from dusk (~5 PM) of previous day to dawn (~6 AM) of next day. When power failure occurred in the day of light trap operation, light trap in such situation was run immediately for the next day as compensation. Insects attracted to the light traps were collected into nylon net through a funnel trap fitted just beneath the vapor light. Insects were separated into Scarabaeid beetles and other insects. Scarabaeid beetles were then kept in small vial containing small cotton piece soaked with formalin. Beetles were then exposed to sunlight to remove odour of formalin and pinned properly to store in insect collection box. Collected beetles were then brought to Entomology Division under Nepal agriculture Research Council (NARC), Khumaltar for identification based on the reference insect maintained there. Then data were analyzed by calculating the percentages of each beetle species in the total trap catch over the season and during each month of trapping.

Results

The result of monitoring of Scarabaeid beetle conducted at IAAS Paklihawa Horticulture field from April-July shows the highest number of *Coprius* sp. followed by *Anomala* sp. and then *Cyclocephala, Holotrichia, Phyllophaga, Heteronychus, Alissonotum, Onthophagus, Maladera* respectively. All together 10 different species of Scarabaeid beetle have been recorded from horticulture field of IAAS Paklihawa. This study showed that population of *Coprius sp*. was always highest during monitoring period which was followed by *Anomala sp.* Study revealed that activity of beetles was high during May-June. The number of beetles collected at weekly interval from April-June, 2014 through light trap in horticulture field of IAAS, Paklihawa Campus is given in Figure 1.

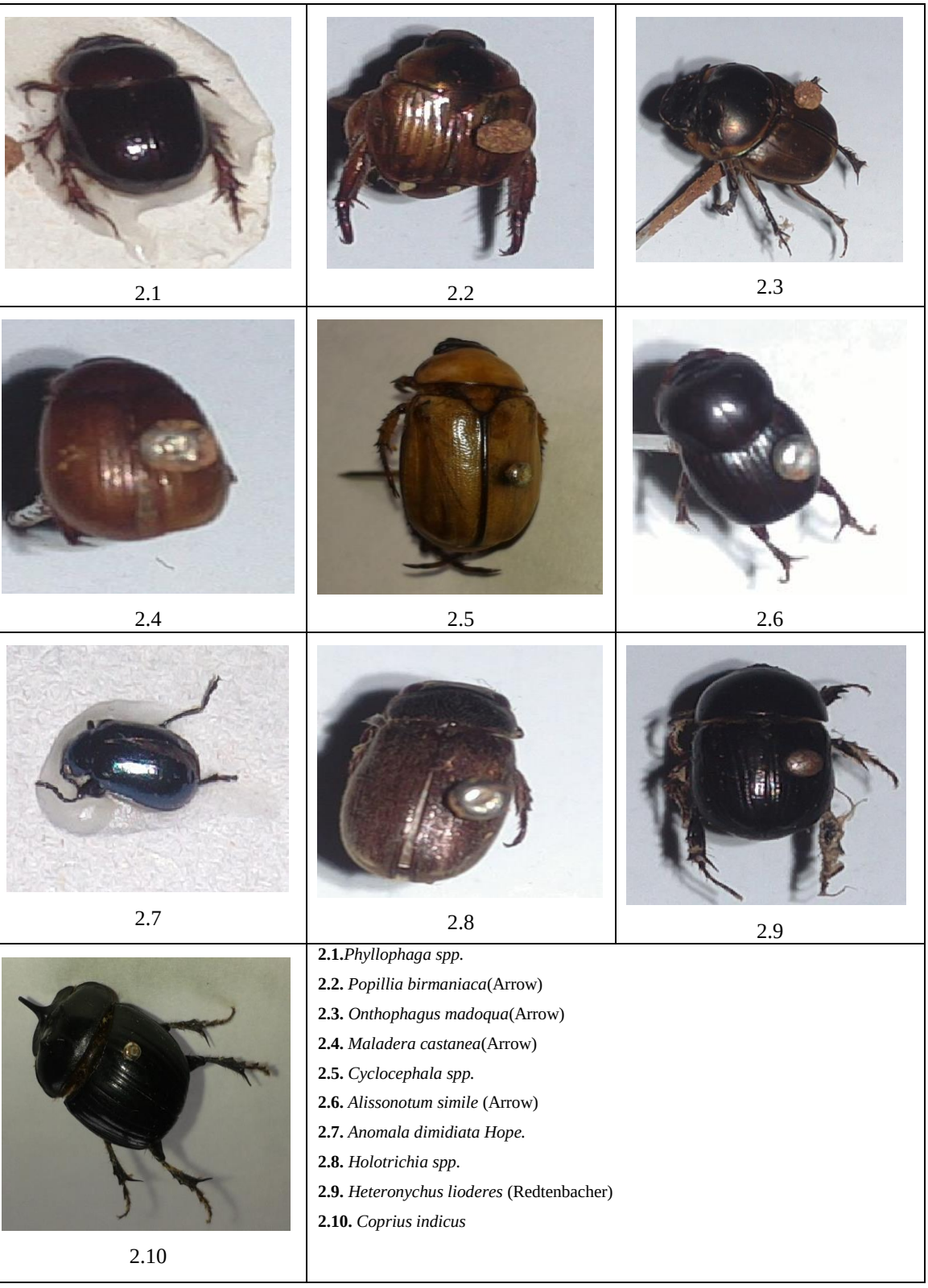
Analysis of the data for monitoring Scarabaeid beetles at the Horticultural Field of the IAAS Paklihawa indicated that 10 species were represented in the 227 specimens collected over the 4 month period (Figure 2). Among those, 36% were *Coprius indicus,* 18% were *Anomala mongiloca,* 11% were *Holotrichia* spp., 9% were *Cyclocephala* spp., 8% were *Phyllophaga* spp., 6% were *Heteronuchus lioderes,* 5% were *Onthophagus madoqua,* 5% were *Alissonotum binodulum,* 2% were *Maladera castanea,* and 0.5% (1 beetle) was *Popillia birmaniaca.*

Discussions

According to Yubak Dhoj [3], the species of scarabaeid beetles vary in different Agro-ecological site depending upon temperature, cropping pattern, host crop, soil type and other factors. Emergence of adult beetles takes place after the first rain in May and infests the field till heavy monsoon. There is some indication that early season (April-June) temperature and rainfall may determine survival of adult beetles, however, higher temperature as well as heavy rain is detrimental for adult flights according to Yubak Dhoj [3].

The present findings of experiment show the prevalence of 10 scarab beetle in field of IAAS Paklihawa. The dominating species were *Coprius indicus* (Blanchard), *Anomala spp., Holotrichia spp.,* and *Phyllophaga spp.* Other species recorded are *Heteronuchus lioderes* (Redtenbachen), *Onthophagus madoqua* (Arrow), *Maladera castanea* (Arrow) and *Popillia birmaniaca* (Arrow).The findings of this experiment with respect to beetle species were found in accordance with the previous finding of Khanal et al. [4] in three ecological domain of Nepal and with Yubak Dhoj [3], in different farming sites of Nepal.

High number and species of scarabs were collected after the occurrence of rain in the last week of April. This is due to positive impact of rain to break hard cover of pupae. The catches of beetle by light trap showed decreasing order after the start of heavy monsoon due to negative impact of heavy rainfall for adult flight. Study revealed that the activity of beetles was high during May-June. This result regarding emergence of adult of this experiment is supported by previous findings of the experiments conducted by Pandey et al. [2] in Lumle conditions.



2.1 2.2 2.3

2.4 2.5 2.6

2.7 2.8 2.9

2.10

2.1.*Phyllophaga spp.*

2.2. *Popillia birmaniaca*(Arrow)

2.3. *Onthophagus madoqua*(Arrow)

2.4. *Maladera castanea*(Arrow)

2.5. *Cyclocephala spp.*

2.6. *Alissonotum simile* (Arrow)

2.7. *Anomala dimidiata Hope.*

2.8. *Holotrichia spp.*

2.9. *Heteronychus lioderes* (Redtenbacher)

2.10. *Coprius indicus*

Figure 2 Scarabaeid beetles collected from light trap in HF of IAAS Paklihawa

Conclusion

Altogether, 10 different phototropic species of Scarabaeid beetle have been recorded from Horticulture field of IAAS Paklihawa. The monitoring of scarabaeid beetle has provided some basic information of their abundance and pest dynamics. This study measured the relative abundance of ten phototropic species of Scarabaeid beetles in the Horticultural Field of the IAAS Paklihawa during the summer months of 2014. The result of this experiment with respect to beetle species was found in accordance with the previous finding of Khanal et al. [4] in three ecological domain of Nepal and with Yubak Dhoj [3] in different farming sites of Nepal. The findings of this study reveal that several species of Scarabaeid beetle prevail in horticulture field of Paklihawa campus requiring effective management approaches.

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