

## Biodiversity of Insects in Some Areas of District Rawalakot, Azad Jammu and Kashmir (Pakistan)

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### Cover Page Footnote

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## **BIODIVERSITY OF INSECTS IN SOME AREAS OF RAWALKOT VALLEY, AZAD JAMMU & KASHMIR (PAKISTAN)**

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### **ABSTRACT**

The present study was designed to find species composition and diversity of insects existing at different trophic level of food chain in coniferous forest of Rawalakot valley. The study was conducted from November, 2016 to September, 2017. The researcher recorded 53 species of insects belonging to 42 families. The herbivorous insect species feed on 134 plant spp. of the study area. The greater population density of herbivores indicates that plants are under more threat to insect pests. The present study provides base line information about the insect community of forest and need further screening of insect pest species to control pest out break for conservation of coniferous forests of Rawalakot.

**Keywords:** Trophic level, insect, predator, carnivore, herbivore

### **INTRODUCTION**

Natural ecosystems provide a variety of services, as provisions (production of food, fiber, water), culture (recreation, spiritual and aesthetic), supporting (pollination, decomposition and soil formation) and regulation (biological control). However, aspects of ecosystems such as pests, litter, diseases, animal attacks, allergenic and poisonous organisms can be unfavorable (Zhang et al., 2007). The negative aspects of ecosystem are exacerbated by anthropogenic destabilization of food webs, ecosystem structures and appear in the form of floods, storms and weather events (Ratcliffe et al., 2011). The insects ensure sustainability of ecosystem services and minimize induction of adverse effects such as famine, water shortages, threats to human health and economic disruption (Lentz and Hockaday, 2009). The unsustainable exploitation of ecosystem produces risk of human health in the form of epidemics of crow-diseases, often vectored

by insects (Brouqui et al., 2011). Insects deserve particular attention because they play dual role in ecosystem services and disservices of significant economic value (Wegier et al., 2017). A significant number of studies on Lesser Himalayas have been done (Faiz et al., 2014; Faiz and Fakhar 2015a, 2015b, 2015c). The present study has been organized to provide a state-of-the-art perspective on insect checklist as predator, herbivore and carnivore

### **MATERIALS AND METHODS**

The study was carried out in cultivated, suburban and wild areas of Rawalakot valley, Azad Jammu and Kashmir (AJK) from November 2016 to September 2017 (during day from 09:00 am to 02:00 pm). Rawalakot is a mountainous area from northeast to south-west with elevation between 1500 and 2500 meters Above sea level. It lies in the lesser Himalayan zone of Pir-Panjal. The main eastern part of the district is very cold in winter and moderate in summer. The

specimens were collected from wild areas, cultivated and suburban areas of Rawalakot, AJK during their active season by light-trap, pit fall, sweep-net and hand-picking method by taking 12 transects on each study site. The collected specimens were killed in killing bottle containing formalin. The specimens were then kept in insect boxes. The specimens were identified with the help of available literature.

## RESULTS AND DISCUSSION

A total of 53 species belonging to 42 families were recorded in the study area. In family Attelabidae, the herbivorous species, Leaf-rolling weevil (*Apoderus sp.*) was collected from sub-urban areas, cultivated areas and wild study sites. The geographic distribution of this species is worldwide (Linnaeus et al., 1758). In family Acrididae, one herbivorous species, Short-horned Grasshopper (*Chorthippus*) was collected from sub-urban areas and cultivated areas. The geographic distribution of this species was worldwide (Coelho et al., 1971). In family Apidae, two herbivorous species, Giant honey bee (*A. dorsata*) and European honey bee (*A. mellifera*) was collected from all study sites. The geographic distribution of this species was reported by (Paar et al., 2006). In family Buprestidae, species Jewel/Metallic Wood-boring Beetle (*Sternocera*) was collected from cultivated areas and wild study site. In family Cerambycidae, two species (*B. rufomaculata*) and (*A. serraticornis*) were recorded. Both species were present at sub-urban and wild area and cultivated area. The geographic distribution of these species is worldwide (Degeer et al., 1775). In family Chrysomelidae, only one species (*Raphidopal* sp.) was recorded. This species was present at all three study sites (cultivated, sub-urban and wild area). In family Scarabaeidae, only June Beetle (*Phyllophaga sp.*) and Dung beetle (*Coprisrepertus sp.*) was recorded and

present at all three study sites. In family Tenebrionidae, only Darkling Beetle (*Stenochinus sp.*) was recorded at all three study sites. In family Carabidae, only one species, Ground Beetle (*C. auratus*) was recorded at all three study sites. In family Coccinellidae, only one species Ladybird Beetle (*C. septempunctata*) was recorded at one study site. In family Elateridae, only one species, Click Beetle (*Pyrophorus sp.*) was recorded at all three study sites. In family Oedemeridae, only one species (*Ananca*) was recorded at all three study sites. In family Lucanidae, only one species, stag beetle (*Lucanus sp.*) was recorded at all study sites. In family Braconidae, only barconid wasp (*Microgastrinae sp.*) was recorded at all three study sites. In family Geometridae, two species (*Rhodometra*) and (*Scopul*) were present at all three study sites. In family Gryllotalpidae, only mole cricket (*Gryllotalpa sp.*) was present at all three study sites. In family Tettigoniidae, only one species Leaf-mimicking katydid (*Amblycorypha sp.*) was recorded at all three study sites.

In family, Lygaeidae, only Lygaeidae bug (*Spilostethus sp.*) was recorded. This species was present at all study sites. In family Largidae, only *Physopelta sp.* was recorded. This species was present at all three study sites. In family Tessaratomidae, only one species, nymph of Giant shield bug (*T. javanica*) was recorded at all study sites. In family, Oniscidae only one species (*Oniscus*) was recorded at cultivated, sub-urban area and wild area. In family Nabidae, only the Damsel bug (*N. ferus*) was recorded and present at all study sites. In family Reduviidae, only Nymph of assassin bug (*Rhynocoris sp.*) was recorded at all three study sites. In family Cicadidae, only one herbivore specie (*Cicada*) was recorded at sub-urban, wild area cultivated area. The geographic distribution of this specie was reported by (Coelho et al., 2011). In family

Nymphalidae, two species *D. chrysippus* and *A. hyperbius* were recorded at all three study sites.

In family Pieridae, only the Cabbage butterfly (*P. brassicae*) was recorded at all three study sites. In family Papilionidae, only the Common peacock (*P. bianor*) was recorded at all three study sites. In family Keroplatidae, only the glow worm (*A. luminosa*) was recorded at all study sites. In family Noctuidae, only the cut worm (*Noctuapronuba*) was recorded at cultivated, wild area and in sub-urban area. In family Buthidae, only the scorpion (*Hottentotta sp.*) was recorded at all three study sites. In family Salticidae, two species *Plexippus sp.* and *T. dimidiata* were recorded at all three study sites. In family Amorphoscelidae, only one species, Bark mantis (*H. ceylonica*) was recorded at all two study sites but was absent in the wild area.

In family Erebididae, two species *E. confinis* and *E. spilosoma sp.* were recorded. Both species were present at all three study sites. In family Hersiliidae, only one species, Two-tailed spider (*Hersilia sp.*) was recorded at all study sites. In family Lycosidae, *Alopecosa sp.* and Wolf spider (*Lycosa sp.*) was recorded at all three study sites. In family Thomisidae, only one species, crab spider (*Pistius sp.*) was recorded at all three study sites. In family Libellulidae, the Blue marsh hawk was found in all sites except sub-urban areas and red marsh hawk was recorded at all three study sites. In family Formicidae, *C. compressu*, *Dorylinae sp.* and *Lasiusniger* were present at all three study sites. In family Anisolabididae, the herbivorous species Earwig (*Euborellia sp.*) was collected from sub-urban areas, and wild study sites. The geographic distribution of this species was worldwide (Steinmann et al., 1990).

**Table1: Check list of invertebrates observed in study area**

Family	Scientific name	Local Name	Sub-urban	Cultivated	Wild
<b>Weevil</b>					
Attelabidae	<i>Apoderus sp.</i>	Leaf rolling weevil	✓	✓	✓
<b>Grasshopper</b>					
Acrididae	<i>Chorthippus sp.</i>	Short horned Grasshopper	✓	✓	✓
<b>Bees</b>					
Apidae	<i>A. Dorsata</i>	Giant honey bee	✓	✓	✓
	<i>A. mellifera</i>	European honey bee	✓	✓	✓

<b>Beetles</b>					
Buprestidae	<i>Sternocera sp.</i>	Jewel Beetle / Metallic Wood-boring Beetle	✓	X	✓
Cerambycidae	<i>B. rufomaculata</i>	Mango Stem Borer beetles	✓	✓	✓
	<i>A. serraticornis</i>	Long horn beetle	✓	✓	✓
Chrysomelidae	<i>Raphidopalpa sp.</i>	Leaf beetle	✓	✓	✓
Scarabaeidae	<i>Phyllophaga sp.</i>	June beetle	✓	✓	✓
	<i>Coprisrepertus sp.</i>	Dung beetle	✓	✓	✓
Carabidae	<i>C. auratus</i>	Ground Beetle	✓	✓	✓
Coccinellidae	<i>C. septempunctata</i>	Ladybird Beetle	✓	✓	✓
Elateridae	<i>Pyrophorus sp.</i>	Click Beetle	✓	✓	✓
Oedemeridae	<i>Ananca sp.</i>	Red-black oedemerid	✓	✓	✓
Lucanidae	<i>Lucanus sp.</i>	Stage beetle	✓	✓	✓
Tenebrionidae	<i>Stenochinus sp.</i>	Darkling Beetle	✓	✓	✓
<b>Wasps</b>					
Braconidae	<i>Microgastrinae sp.</i>	Braconid wasp	✓	✓	✓
<b>Moth</b>					
Erebidae	<i>E. confinis</i>	Wasp Moth	✓	✓	✓
	<i>Spilosoma sp.</i>	Tiger Moth	✓	✓	✓
Geometridae	<i>Rhodometra sp.</i>	Geometer Moth	✓	✓	✓
	<i>Scopula sp.</i>	Emerald moth	✓	✓	✓
<b>Crickets</b>					
Gryllotalpidae	<i>Gryllotalpa sp.</i>	Mole cricket	✓	✓	✓
Gryllidae	<i>Gryllus sp.</i>	Cricket	✓	✓	✓
Tettigoniidae	<i>Amblycorypha sp.</i>	bush cricket	✓	✓	✓

<b>Bugs</b>					
Lygaeidae	<i>Spilostethus sp.</i>	Lygaeidae bug	✓	✓	✓
Largidae	<i>Physopelta sp.</i>	Largidae bug	✓	✓	✓
Tessaratomidae	<i>T. javanica</i>	Giant shield bug	✓	✓	✓
Oniscidae	<i>Oniscus sp.</i>	Sow bug	✓	✓	✓
Nabidae	<i>N. ferus</i>	Damsel bug	✓	✓	✓
Reduviidae	<i>Rhynocoris sp.</i>	Nymph of assassin bug	✓	✓	✓
Cicadidae	<i>Cicada sp.</i>	True bugs	✓	✓	✓
Anisolabididae	<i>Euborellia sp.</i>	Earwig bugs	✓	✓	✓
<b>Butterflies</b>					
	<i>D. chrysippus</i>	Plain tiger (Butterfly)	✓	✓	✓
Nymphalidae	<i>A. shyperbius</i>	Tropical or Indian fritillary	✓	✓	✓
Pieridae	<i>P. brassicae</i>	Cabbage butterfly	✓	✓	✓
Papilionidae	<i>P. bianor</i>	Common peacock	✓	✓	✓
<b>Glow-Worm</b>					
Keroplastidae	<i>A. luminosa</i>	Glow worm	✓	✓	✓
Noctuidae	<i>A. ipsilon</i>	Cutworm	✓	✓	✓
<b>Scorpions</b>					
	<i>Hottentotta</i>	Indian red scorpion	✓	✓	✓
	<i>Scorpiops</i>	Fattail scorpion	✓	✓	✓
Buthidae	<i>Chaerilus celebensis</i>	Speckled bush scorpion	✓	✓	✓
Mantidae	<i>M. religiosa</i>	European mantis	✓	✓	✓
Amorphoscelidae	<i>H. ceylonica</i>	Bark mantis	✓	✓	✓

<b>Spiders</b>					
Lycosidae	<i>Lycosa sp.</i>	Wolf spider	✓	✓	✓
Hersiliidae	<i>Hersilia sp.</i>	Two-tailed spider	✓	✓	✓
Lycosidae	<i>Alopecosa sp.</i>	Wolf Spider	✓	✓	✓
Thomisidae	<i>Pistius sp.</i>	Crab spider	✓	✓	✓
Salticidae	<i>Plexippus sp.</i>	Jumping spider	✓	✓	✓
	<i>T. dimidiata</i>	Araneomorph spider	✓	✓	✓
<b>Dragonfly species</b>					
Libellulidae	<i>O. glaucum</i>	Blue marsh hawk	x	✓	✓
	<i>O. chrysis</i>	Red marsh hawk	✓	✓	✓
<b>Ants</b>					
Formicidae	<i>C. compressus</i>	Carpenter Ant	✓	✓	✓
	<i>Dorylinae sp.</i>	Male Doryline ant	✓	✓	✓
	<i>L. niger</i>	Alate ant	x	✓	✓

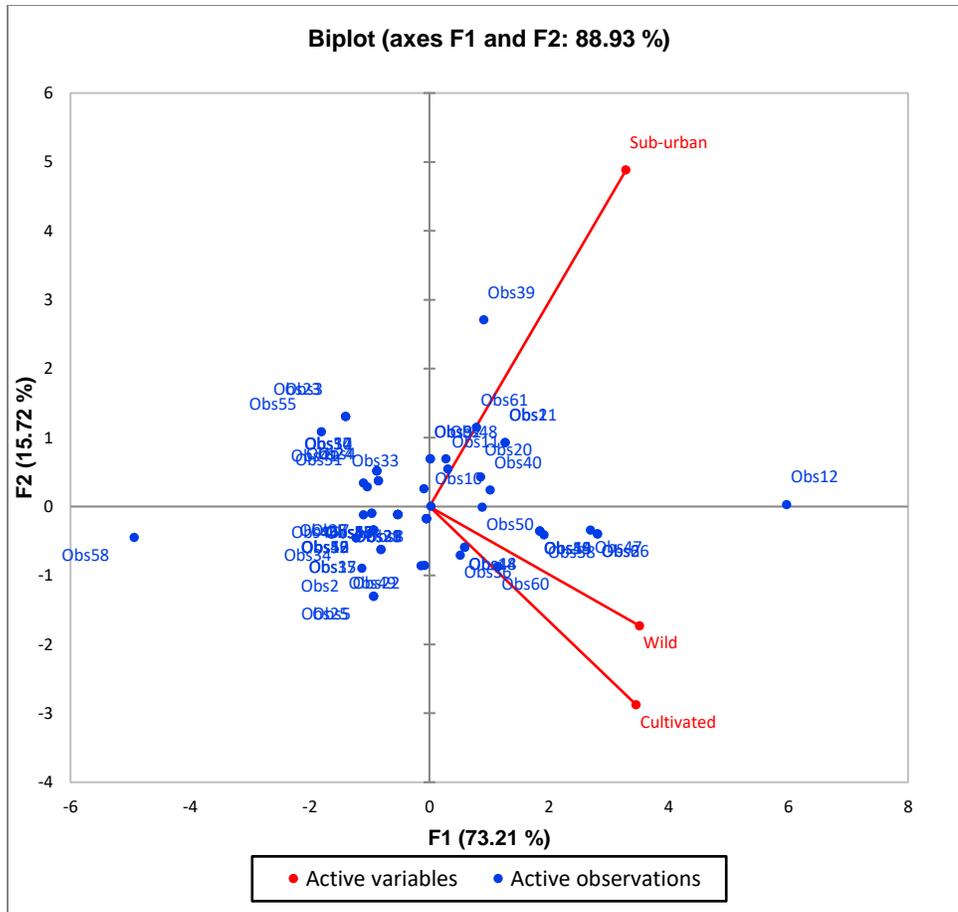


Figure 1. Distribution of species in study area

## CONCLUSION

The present study documents species composition, diversity of insects existing at different trophic level of food chain in coniferous forest of District Rawalakot. The recorded 53 species of insects belonging to 42 families. The herbivore insect species feed on 134 plants spp. of the study area. The greater population density of herbivore indicate that plants are under more threat to insect pests. The present study provides base line information about the insect community of forests and needs further screening of insect pest species to control pest out break for conservation of coniferous forests of District Rawalakot.

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