



DIVERSITY OF INSECTS IN PULSES AT ARUNACHAL PRADESH

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ABSTRACT

Surveys were conducted during 2018-19 and 2019-20 for evaluating the abundance and diversity of insect pests and foragers in Namsai District of Arunachal Pradesh from pulse crops (black gram, green gram and pigeonpea). The data on species richness, dominance and distribution of insects revealed a total of 38 insect pests belonging to 6 orders, 26 families and 38 species. Of these 12 species were observed as foragers. Coleoptera was the most dominant group followed by Lepidoptera, Hemiptera, Hymenoptera, Mantodea and Araneae (Arachnida). Among the observed foragers *Polistes* sp. was found to be dominant followed by *Apis dorsata* (F).

Key word: Insects, pulses, greengram, blackgram, pigeon pea, diversity, pests, foragers, pollinators, abundance, Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Mantodea, Araneae

Pulses are important food crops and in India, their productivity, in general, is poor due to many constraints. Of these, insect pests are important, of which the most serious are- the pod borer *Helicoverpa armigera* (Hubn.), pod bug *Clavigralla gibbosa* (Spinola), pod fly *Melanagromyza obtusa* (Malloch), blister beetle *Mylabris* spp., hairy caterpillars *Spilosoma obliqua* (Walker) and *Amsacta moorei* (Butler), cut worms *Agrotis ipsilon* (Hufnagel) and *A. flammatrix* (F.), semilooper *Autographa nigrisigna* (Walker), bean aphid *Aphis craccivora* (Koch), termites *Odonototermes obesus* (Rambur) and *Microtermes obesi* (Holmgren), pod borer *Etiella zinckenella* (Treitschke) and whitefly *Bemisia tabaci* (Gennadius). Pulse crops are open pollinated to varying degrees, which means in order to achieve seed set pollen must be transferred between flowers. In these, cross pollination is up to 48.0% (Howard et al., 2019) and yield increases by bee pollination is known (Abrol and Shanker, 2015). *Megachile* spp., *Xylocopa tenuiscopa*, *Amegilla zonata* and *Nomia* sp. are known as true pollinators of pigeonpea (Singh, 2016). Insects and pollinators are highly responsive to environmental changes, including those resulting from anthropogenic activity. The present study was carried out to determine the diversity and the relative abundance of the insect pests and foragers in pulse (black gram, green gram and pigeonpea) ecosystems.

MATERIALS AND METHODS

The study was carried out in 2018-19 and 2019-20 in Namsai district of Arunachal Pradesh (95.45-

96.20 E, 27.30-27.55 N, 117 masl). All observations on the flower visitors and foraging behaviour were made on crops grown in kharif seasons, with all recommended package of practices followed including plant protection. Sweep sampling was done with sweep net, suiting the ground layer vegetation, in the morning hours. The collected insects (including hand collection) were processed and preserved before taxonomic study using appropriate diagnostic characters in a series of alternative choices with dichotomous characters (Mayr, 1976). The data obtained were analysed as depicted in the results.

RESULTS AND DISCUSSION

A total of 38 species of insect pests belonging to 26 families under 6 orders were observed in pulses ecosystem, of these 12 species were foragers belonging to 6 families under 3 orders (Table 1, 2; Fig. 1, 2). Among these Coleoptera was the most dominant (12 species) followed by Hemiptera (10), Lepidoptera (9), Hymenoptera (5), Aranea and Mantodea (1 each). Coleoptera comprised of seven families, Hemiptera with 8, Lepidoptera with 6, Hymenoptera with 3, Mantodea and Araneae (spider) with one each. Talekar (1990) observed 200 insect species under 48 families in greengram and blackgram in southern Rajasthan; while in pigeonpea in Tripura 64 insect pests belonging to 7 orders and 32 families were observed, of which maximum were Hemiptera (Nair et al., 2017). Pigeonpea is infested by insect pests belonging to 6 orders, of which Lepidoptera cause maximum damage (Laxmi and Paul, 2010). Foragers visiting the pulse flowers consist

Table 1. Diversity of insect pests in pulses (Namsai District, Arunachal Pradesh)

S. No.	Order	Families	Genus/ Species
1	Coleoptera	Coccinellidae	<i>Coccinella transversalis</i> (F.), <i>Menochilus sexmaculatus</i> (F.), <i>Brumoides suturalis</i> (F.), <i>Harmonia dimidiata</i> (F.), <i>Coccinella septempunctata</i> (L.)
		Curculionidae	<i>Monolepta signata</i> (Olivier), <i>Micrapis discolor</i> (F.)
		Scarabaeidae	<i>Anomala</i> spp.
		Apionidae	<i>Apion clavipes</i> (Gerst)
		Chrysomelidae	<i>Altica oleracea</i> (L.)
		Carabidae	<i>Ophionea</i> spp.
		Bruchidae	<i>Callosobruchus</i> spp.
2	Hemiptera	Delphacidae	<i>Sogatella furcifera</i> (Horváth)
		Coccoidea	<i>Parthenolecanium</i> sp.
		Pentatomidae	<i>Thyanta custator custator</i> (F.), <i>Nezara viridula</i> (L.)
		Aphidae	<i>Myzus persicae</i> (Sulzer), <i>Aphis fabae</i> (Scopoli)
		Aloycidae	<i>Leptocoris acuta</i> (Thunberg)
		Pseudococcidae	<i>Phenococcus</i> spp.
		Coreidae	<i>Acanthocephala</i> sp
		Reduviidae	<i>Zelus renardii</i> (Kolenati)
3	Lepidoptera	Pyalidae	<i>Scripophaga incertulas</i> (Walker), <i>Cepora nadina</i> (Lucas), <i>Anticarsia irrorata</i> (F.)
		Acrididae	<i>Oxyas</i> sp., <i>Melanoplus ponderosus</i> (Scudder)
		Noctuidae	<i>Helicoverpa armigera</i> (Hübner)
		Arctiidae	<i>Spilosoma obliqua</i> (Walker)
		Teltigoniidae	<i>Conocephalus congipennis</i> (Haan)
		Nymphalidae	<i>Melanargia russiae</i> (Esper)
4	Hymenoptera	Apidae	<i>Apis dorsata</i> (F.), <i>Apis indica</i> (F.)
		Vespidae	<i>Polistes</i> sp.
		Formicidae	<i>Camponatus</i> spp., <i>Lasius niger</i> (L.)
5	Araneae	Oxyopidae	<i>Oxyopes</i> spp.
6	Mantodea	Mantidea	<i>Sphodromantis viridis</i> (Forsk.)
7	Orthoptera	Acrididae	<i>Oxyas</i> sp., <i>Melanoplus ponderosus</i> (Scudder)
		Teltigoniidae	<i>Conocephalus congipennis</i> (Haan)

Table 2. Foragers in pulses (Namsai District, Arunachal Pradesh)

Sl. No.	Order	Families	Common name	Scientific name	Relative abundance (%)
1	Hymenoptera	Apidae	Indian bee	<i>Apis indica</i> (F.)	11.84
2	Hymenoptera	Apidae	Rock bee	<i>Apis dorsata</i> (F.)	16.93
3	Hymenoptera	Vespidae	Paper wasp	<i>Polistes</i> sp.	19.39
4	Hymenoptera	Formicidae	Carpenter ant	<i>Camponatus</i> spp.	8.02
5	Hymenoptera	Formicidae	Black garden ant	<i>Lasius niger</i> (L.)	5.74
6	Lepidoptera	Pyalidae	Owl moth	<i>Anticarsia irrorata</i> (F.)	4.10
7	Lepidoptera	Pyalidae	Lesser Gull	<i>Cepora nadina</i> (Lucas)	6.56
8	Lepidoptera	Nymphalidae	Esper's marbled white	<i>Melanargia russiae</i> (Esper)	7.38
9	Coleoptera	Coccinellidae	Transverse ladybird	<i>Coccinella transversalis</i> (F.)	4.92
10	Coleoptera	Coccinellidae	Six spotted zigzag ladybird	<i>Menochilus sexmaculatus</i> (F.)	4.10
11	Coleoptera	Coccinellidae	Ladybird	<i>Brumoides suturalis</i> (F.)	2.24
12	Coleoptera	Curculionidae	Ladybird	<i>Micraspis discolor</i> (F.)	5.50

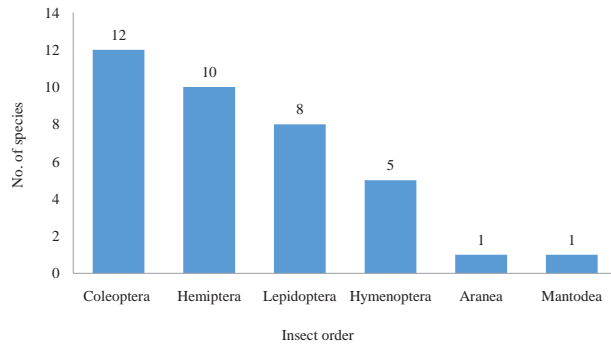


Fig. 1. Species distribution (orders)

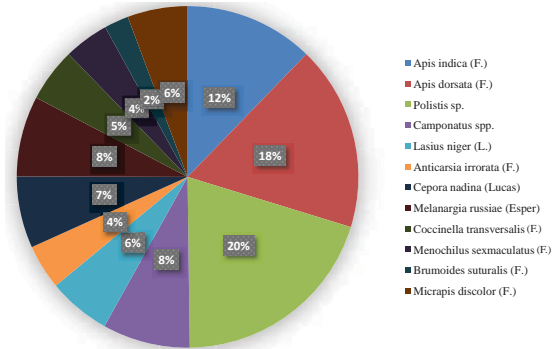


Fig. 2. Diversity of foragers in pulses

of 12 species under 6 families in 3 orders. *Polistes* sp, *Apis dorsata* (F.), *Apis indica* (F.), *Camponotus* sp, *Lasius niger* (L.), *Anticarsia irrorata* (F.), *Cepora nadina* (Lucas), *Melanargia russiae* (Esper), *Coccinella transversalis* (F.), *Menochilus sexmaculatus* (F.), *Brumoides suturalis* (F.), and *Micraspis discolor* (F.) have been recorded. Out of these, *Polistes* sp. was the dominant (19.39%). Pinjara et al. (2017) reported that the relative density of chrysomelids in black gram was maximum in Southern Rajasthan (38.56%). Singh et al. (2017) observed that pigeonpea flowers attracted 15 species of insects belonging to five families, 7 genera and three orders, with Hymenoptera being the abundant. Compared to honey bees *A. dorsata*, *A. mellifera*, *A. cerana*, *A. florea*, solitary bees, *Xylocopa latipes*, *X. pubescence*, *Amegilla azonata*, *Megachile bicolor*, *M. lanata*, *M. hera*, *M. cephalotes* and *M. disjuncta* were observed; and megachile bees were the most abundant (50%) followed by honey bees (39.4%). In the order Lepidoptera and Diptera, the field was visited by *Danaus plexippus*, *Pieris rapae* and *Musca* spp. (Pinjara et al., 2017). The agroecosystem, though man-made, thus exhibit diverse entomofauna with high level of distribution.

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