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Diversity of weed associated insects in vegetable and paddy fields of Narendrapur campus of Ramakrishna Mission, West Bengal, India

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Abstract
The present communication documents the occurrence of a total of 34 species of insects under 22 families and 5 orders from different weed species in the vegetable and paddy of Narendrapur campus during May,2022 to October, 2022.These includes 26 pest insects under 19 families and 4 orders, 4 predatory insects under 2 families and 2 orders and 4 pollinator insects under 2 families and 1 order. All the species are listed along with their hosts, habitats (for predatory group) giving biological information, as recorded in the field during the study period.

Keywords: diversity, insects, weeds associated vegetable and paddy crops, Narendrapur Ramkrishna Mission, West Bengal, India

Introduction

Weeds are the undesirable and unwanted plants which grows along with the crops with the same resources which are provided for the crops. Weeds are very important for the ecosystem as they provide protection and restoration to the exposed and degraded soils. Weeds provide habitat for many insects and animals. Weeds serve as hosts for some beneficial insects (Eg. Providing nectar for bees). Weeds are an important plant resource for many insects. Weeds are also closely related to crops as they harbour many insects that attack on crops [1,4,6]. Weeds also act as an alternate host of the crop pest [8]. Weeds can be a factor in increasing effectiveness of biological control of pests and reducing pest damage [2]. Several researchers have pointed out the important role of weeds in integrated pest management. There also exists a lot of beneficial interactions between weeds and pollinators to improve crop production [7]. Research on weeds is very important to know the abundance of weed species in crop areas, to know the insect pest species which are found on these weeds and how they are associated with these weeds.

Narendrapur campus of Ramakrishna Mission is very rich in agri-horticultural crops, medicinal plants etc. and also has several kinds of weeds. Earlier very limited work was done on the weed associated insects in vegetable and paddy fields from West Bengal and from India [3]. So, to fulfill this lacunae, the present study on different types of insects which occur on weed plants associated vegetable and paddy crops Narendrapur, Ramakrishna Mission Ashrama, West Bengal, was conducted.

Material and methods

The survey was conducted to observe different insects associated with weeds on various plots of Narendrapur campus of Ramakrishna Mission during May,2022 to October, 2022. The insects Collection was done by using Hand picking and Sweep net method. For storage and preservation, the killing jars with nail polish remover were used to killed large insects.

All insects collected were preserved in glass vials consisting of 70-90% ethyl alcohol and were taken to the laboratory of PG Department of Vidyasagar College for identification upto species level. The identified species were documented given the respective insect species name, name of host weed plant, number of species observed and remarks or status of occurrence on that weed plant. Moreover the insect species occurring on different weeds were categorized according to their functional groups (in terms of feeding behaviour) was done. The Relative abundance were calculated in percentage using the following formula:

Relative abundance (%)= (Total number of individual insect species/ Total number of insect species recorded)X100

Results

The identification of the insect specimens collected from different weed plants at Narendrapur campus of Ramakrishna Mission reveals the occurrence of 34insect species under 22 families and 5 orders. The variety of the insect species which were recorded in the field were of three types - pest insects, predatory insects and pollinator insects. Among those, 26 species under 19 families and 4 orders belonged to pest insect group, 4 species under 2 families and 2 orders belonged to insect predatory group and 4 species under 2 families and 1 order belonged to insect pollinator group. Among the insect pests, the insect population which was found to be high in number was *Phenacoccus parvus* belonging to the family Pseudococcidae on the weed plant *Lantana camara*. Among the predator insects *Coccinella transversalis* population belonging to the family Coccinellidae was found high on the host weed plant *Andrographis paniculate* and whereas, among the pollinator insects *Eurema laeta* insect population belonging to the family Pieridae was found higher on the weed plant *Lantana camara*. The detail study of insect diversity on host weed plants along with their status is listed in Table – I.

Table 1: List of diversity of insect species collected at Narendrapur campus of Ramakrishna Mission along with their remarks or status on their respective weed plants.

S.No.	Family I Erebidae	Host /Habitat (Weed Plant)	No. of individuals observed	Status
	ORDER LEPIDOPTERA			
1	*Achaea janata* (Linnaeus, 1758)	*Clerodendrum viscosum*	03	PEST
	FAMILY II PIERIDAE			
2	*Eurema laeta* (Boisduval, 1836)	*Lantana camara*	08	POLLINATOR
3	*Catopsilia Pomona* (Fabricius, 1775)	*Leonurus sibiricus*	06	POLLINATOR
4	*Pieris brassicae* (L.)	*Eclipta prostrate*	02	PEST
	FAMILY III NYMPHALIDAE			
5	*Danaus genutia* (Cramer, 1779)	*Calotropis* gigantea	06	POLLINATOR
	ORDER THYSANOPTERA			
	FAMILY IV THRIPIDAE			
6	*Scirtothrips dorsalis* Hood	*Ricinus communis*	25	PEST
7	*Scolothrips* sp.	*Euphorbia triplinerve*	02	PREDATOR
	ORDER HEMIPTERA			
	FAMILYV CICADELLIDAE			
8	*Empoasca flavescens* Gillette	*Amaranths spinosus*	15	PEST
	FAMILY VI TINGIDAE			
9	*Urentius sentis* Distant	*Amaranthsspinosus*	07	PEST
	FAMILY VII SCUTELLERIDAE			
10	*Chrysocoris stolli* Wolf	*Cynodon dactylon*	10	PEST
	FAMILY VIII PYRRHOCORIDAE			
11	*Dysdercus cingulatus* (Fabricius, 1775)	*Bixa orellana*	20	PEST
	FAMILYIX PSEUDOCOCCIDAE			
12	*Phenacoccus parvus* Morrison	*Lantana camara*	28	PEST
13	*Bemisia tabaci* (Gennadius)	*Lantana camara*	10	PEST
14	*Pseudococcus* sp.	*Cymobopagon martini*	06	PEST
15	*Nezara viridula* (Linnaeus)	*Sida cordifolia*	05	PEST
	FAMILY XIALYDIDAE			
16	*Leptocorisaacuta* (Thunberg)	*Cyperus rotundus*	20	PEST
	FAMILY XIIAPHIDIDAE			
17	*Aphis gossypii*Glover	*Cyperus rotundus*	26	PEST
18	*Aphis craccivora* (Koch)	*Cyperus rotundus*	12	PEST
	FAMILY XIII DIASPIDAE			
19	*Diaspis sp.*	*Desmodium gangeticum*	02	PEST
	FAMILY XIV PANTATOMIDAE			
20	*Bagrada cruciferum* (F.)	*Andrographis paniculate*	12	PEST
	FAMILY XVAPHROPHORIDAE			
21	*Poophilus costalis* Walker	*Ocimum gratissium*	04	PEST
	FAMILY XVI MONOPHLEBIDAE			
22	Labioproctus polei (Green, 1896)	*Ocimum gratissium*	06	PEST
	FAMILY XVIILYGAEIDAE			
23	Lygaeus hospes Fabricius	Calotropis *gigantea*	08	PEST

Sl.No.	Family xviii coccinellidae	Host weed plant	No. of individuals observed	Status
	ORDER COLEOPTERA			
24	*Epilachna vigintioctopunctata*Auctt.	*Sida cordifolia*	14	PEST
25	Coccinella transversalis (Fabricius, 1781)	*Andrographis paniculate*	08	PREDATOR
26	*Cheilomenes* sexmaculata (Fabricius)	*Oxalis corniculate*	04	PREDATOR
27	*Aspidimorpha miliaris* Fabricius, 1775	*Sida cordifolia*	02	PREDATOR
	FAMILY XIX MELOIDAE			
28	*Mylabris pustulata* Thunberg	*Lantana camara*	02	PEST
	FAMILY XX CHRYSOMELIDAE			
29	*Podagrica fuscicornis* (Linnaeus)	*Andrographis paniculata*	09	PEST
30	*Aulacophora foveicollis (Lucas)*	*Sida cordifolia*	12	PEST
31	Phyllotreta cruciferae Goeze,	*Eclipta prostrate*	05	PEST
32	Corynodes peregrinus (Fuessly)	Calotropis *gigantea*	03	PEST
	ORDER HYMENOPTERA			
	FAMILY XXI VESPIDAE			
33	*Polistes olivaceus* Geer, 1773	*Lantana camara*	03	PREDATOR
	FAMILY XXII APIDAE			
34	*Apis cerana* Fabricius, 1793	Calotropis *gigantea*	02	POLLINATOR

The present study also observed that the relative abundance of Order Hemiptera was 47.05% and significantly higher than that of Order Coleoptera (26.47%) and Order Lepidoptera (14.70%). However, the relative abundance of the orders Thysanoptera and Hymenoptera was found to be same that is, 5.88%, the lowest relative abundance.

Thus, the percent relative abundance of Hemiptera was highest followed by Coleoptera which is again followed by Lepidoptera. Order Thysanoptera and Hymenoptera relative abundance was found to be the lowest among the other three orders (Table: 2; Fig. 1).

Table 2: List of the insects order, family and calculation of relative abundance based on number of individual species along with percentage of total species that were observed.

Insect order	Insect family	No. of individuals	Relative abundance (%)	No. of species observed	Percent of total species (%)
LEPIDOPTERA	EREBIDAE	03	0.97	1	2.94
	PIERIDAE	16	5.21	3	8.82
	NYMPHALIDAE	06	1.95	1	2.94
THYSANOPTERA	THRIPIDAE	27	8.79	2	5.88
HEMIPTERA	CICADELLIDAE	15	4.88	1	2.94
	TINGIDAE	07	2.28	1	2.94
	SCUTELLERIDAE	10	3.25	1	2.94
	PYRRHOCORIDAE	20	6.51	1	2.94
	PSEUDOCOCCIDAE	44	14.33	3	8.82
	PENTATOMIDAE	05	1.62	1	2.94
	ALYDIDAE	20	6.51	1	2.94
	APHIDIDAE	38	12.37	2	5.88
	DIASPIDAE	02	0.65	1	2.94
	PANTATOMIDAE	12	3.90	1	2.94
	APHROPHORIDAE	04	1.30	1	2.94
	MONOPHLEBIDAE	06	1.95	1	2.94
	LYGAEIDAE	08	2.60	1	2.94
COLEOPTERA	COCCINELLIDAE	28	9.12	4	11.76
	MELOIDAE	02	0.65	1	2.94
	CHRYSOMELIDAE	29	9.44	4	11.76
HYMENOPTERA	VESPIDAE	03	0.97	1	2.94
	APIDAE	02	0.65	1	2.94
TOTAL		307		34	

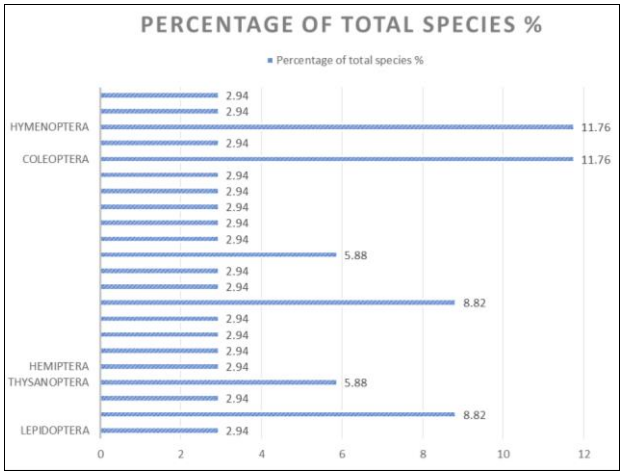

Fig 1: Percentage composition of insects sampled from some weeds at Narendrapur campus of Ramakrishna Mission, West Bengal.

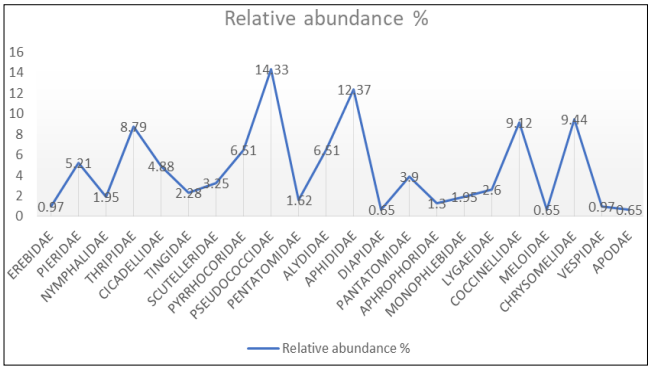

Fig 2: Relative abundance of insect families found on some weeds at Narendrapur campus of Ramakrishna Mission, West Bengal.

The insects recorded during the survey were further divided into 3 categories according to their functional status which are pests, pollinators and predators (Table: 1&3; Fig: 4). Of these3 different insect groups, insect pests were found very high (26 in number) in comparison to insect predators and insect pollinators (both 4 in number).

Table 3: List showing insect diversity in terms of their feeding types which was recorded during the survey period.

S. no.	Type of insects diversity recorded	No. of species observed
1	PEST INSECTS	26
2	PREDATOR INSECTS	4
3	POLLINATOR INSECTS	4

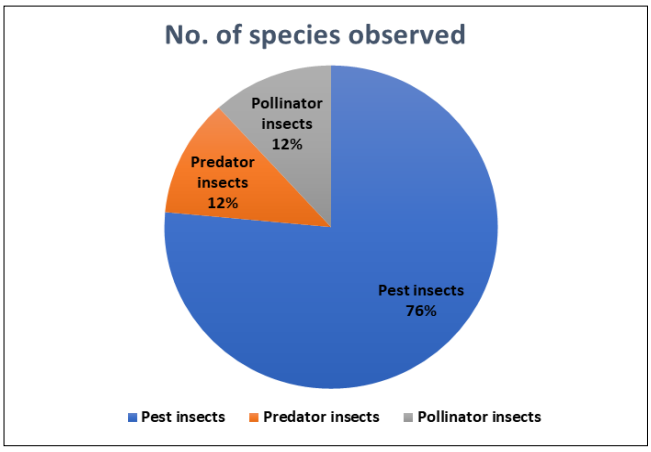

Fig 3

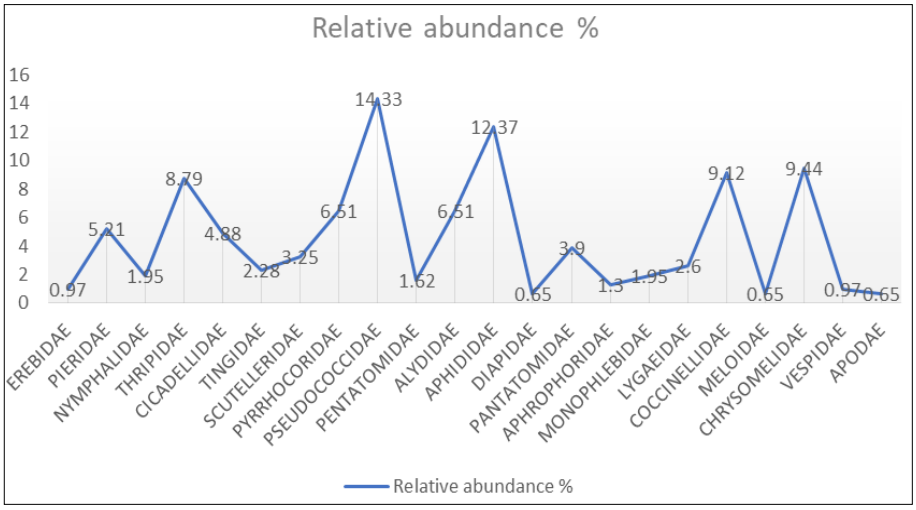

Fig 4: Diversity of insects based on their functional group observed at Narendrapur campus of Ramakrishna Mission, West Bengal.

The number of species which were recorded in terms of family were mostly 1 in number whereas, some insects family like Thripidae and Aphididae were 2 in number. Family's like Pieridae and Pseudococcidae were 3 in number whereas, some family species like Coccinellidae and Crysomelidae were 4 in number i.e., the highest insect species recorded.

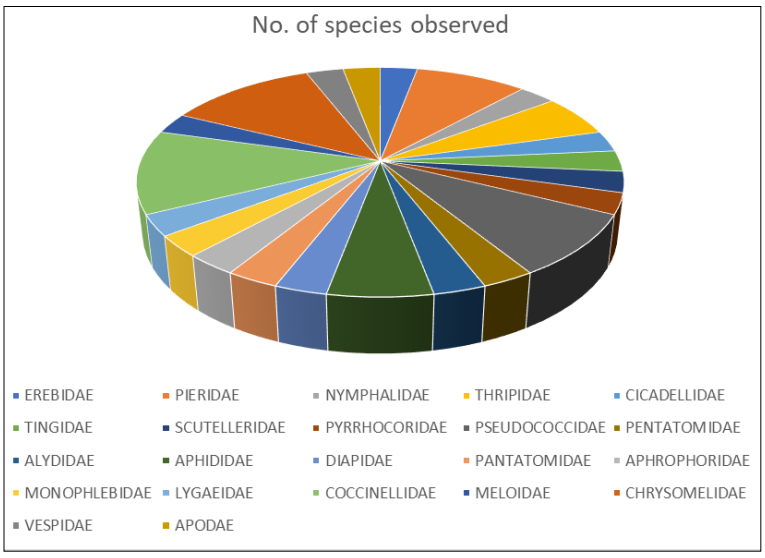

Fig 5: Family wise insect species diversity recorded at Narendrapur campus of Ramakrishna Mission, West Bengal.

Discussion

A total of 34 species of insects under 22 families and 5 orders were reported in this present study of insect diversity which included 26 pest insects under 19 families and 4 orders, 4 predatory insects under 2 families and 2 orders and 4 pollinator insects under 2 families and 1 order.

The pest insects which were recorded included *Achaea janata* under family Erebidae, *Pieris brassicae* under family Pieridae, *Scirtothrips doralis* and *Scolothrips* sp. under family Thripidae, *Empoasca flavescens* under family Cicadellidae, *Urentius sentis* under family Tingidae, *Crysocoris stolli* under family Scutelleridae, *Dysdercus cingulatus* under family Pyrrhocoridae, *Phenacoccus parvus, Bemisia tabaci* and *Pseudococcus* sp. under family Pseudococcidae, *Nezara viridula* under family Pentatomidae, *Leptocorisa acuta* under family Alydidae, *Aphis gossypii* and *Aphis craccivora* under family Aphididae, *Diaspis* sp. under family Diaspidae, *Bagrada cruciferum* under family Pantatomidae, *Poophilus costalis* under family Aphrophoridae, *Labioproctus polei* under family Monophlebidae, *Lygaeus hospes* under family Lygaeidae, *Epilachna vigintioctopunctata* under family Coccinellidae, *Mylabris pustulata* under family Meloidae, *Podogrica fuscicornis, Aulacophora foveicollis, Phyllotreta cruciferae* and *Corynodes peregrinus* under family Chrysomelidae.

The predatory insects which were recorded included *Coccinella transversalis, Cheilomenes sexmaculata* and *Aspidimorpha miliaris* under family Coccinellidae, *Polistes olivaceus* under family Vespidae.

The pollinator insects which were recorded included *Eurema laeta* and *Catopsilia pomona* under family Pieridae, *Danaus genutia* under family Nymphalidae and *Aphis cerana* under family Apidae.

Among the pest insects in the present study a total of 26 species were reported. Among them, *Phenacoccus parvus* population was found higher i.e., 28 species on the host plant *Lantana camara*, followed by *Aphis gossypii* i.e., 26 species on the weed host plant *Cyperus rotundus*, followed by *Scirtothrips dorsalis* i.e., 25 species on the host plant *Ricinus communies*. Other insect population like *Dysdercus cingulatus* on *Bixa orellana* and *Leptocorisa acuta* on *Cyperus rotundus* was also found to be 20.The lowest species number i.e., 2 has been recorded in *Pieris brassicae* on the host plant *Eclipta prostrate, Scolothrips* sp. On the host plant *Euphorbia triplinerve, Diaspis* sp. On the host plant *Desmodium gangeticum* and *Mylabris pustulata* on the host plant *Lantana camara*.

Among the insect predators and insect pollinators 4 species from both groups were reported. The insect predators and the insect pollinators were not found high as in case of pest insects, among the predatory insects *Coccinella transversalis* population was found higher i.e., 8 species on the host plant *Andrographis paniculate,*followed by *Cheilomenes sexmaculata*i.e., 4 species on the host plant *Oxalis corniculate,*followed by *Polistes olivaceus* i.e., 3 species on the host plant *Lantana camara*. The insect species *Aspidimorpha milaris* was found to be lowest i.e., only 2 species recorded on the host plant *Sida cordifolia.*

Among the insect pollinators *Eurema laeta* population was found high i.e., 8 species were reported on the host plant *Lantana camara,* followed by *Catopsilia pomona* on the host plant *Leonurus sibiricus* and *Danaus genutia* on the host plant *Calotropis gigantea* i.e., 6 species. The insect species *Aphis cerana* was found to be lowest i.e., 6 species recorded on the host plant *Calotrophis gigantea*.

The occurrence of the above insect species with different feeding habits from weeds were also reported by earlier workers from India as well as Abroad [5, 9, 10].

Quite a good number of research work have been carried out to find out the diversity and abundance of insect species on weeds. The present study recorded that the Order Hemiptera abundance was found to be the highest. The second most abundant order was Coleoptera and the third abundant was order Lepidoptera. However, the orders Thysanoptera and Hymenoptera abundance was found to be the lowest. In terms of diversity the pest population was found to be the highest whereas, in terms of family the diversity of insects of the family Coccinellidae and Chrysomelidae was found to be the highest and are also reported from various studies[5,11]

The present survey report on the occurrence of different insects associated with different weed plants growing near the crop fields of Narendrapur Ramakrishna Mission Ashrama is one of the first kind as this kind of work was not done from the said area. Lastly this study also shows thatthe weeds of Ramakrishna Mission harbours more pest insect species than the beneficial ones so, the management of the weeds are very much necessary.

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References

1. Buhler DD. Weed biology, cropping systems, and weed management, Journal of Crop Production, 2003:8:245-270.
2. Capinera JL. Relationships between insect pests and weeds: an evolutionary perspective, Weed Science Society of America and Allen Press,2005:53(6):892-901.
3. Dubey D, Mondal S, Gupta SK. Mites and insects occurring on some weeds in the cropfields of Narendrapur campus of Ramakrishna Mission, West Bengal. Bionotes,2022:24(1&2):191-18.
4. Fernandez Quintanilla, Quadranti C, Kudsk M, Barberi P. Which future for weed science? Weed Research,2008:48:297-301.
5. Ghani A, Maalik S. Assessment of diversity and relative abundance of insect fauna associated with Triticum aestivum from district Sialkot, Pakistan, Journal of King Saud University Science,2020:32(1): 986-995.
6. Harper JL. The Biology of Weeds. Blackwell Scientific, Oxford, 1960, 256.
7. Kleiman B, Koptur S, Jayachandran K. Beneficial Interaction of Weeds and Pollinators to Improve Crop Production. Journal ofResearch in Weed Science,2021:4(2):151-164.
8. Kumar S, Bhowmick MK, Ray P. Weeds as alternate and alternative hosts of crop pests. Indian Journal of Weed Science,2021:53(1):14-29.
9. Mathew K. Insects Associated With Some Weeds In South India, Bull, Zool, Surv, India,1981:8(1-3):165-175.
10. Radzikowski P, Matyka M, Berbe´c AK. Biodiversity of Weeds and Arthropods in Five Different Perennial Industrial Crops in Eastern Poland, Agriculture,2020:10(12):636.
11. Travlos IS, Cheimona N, Roussis I, Bilalis DJ. Weed Species Abundance and Diversity Indices in Relation to Tillage Systems and Fertilization. Frontiers in Environmental Science,2018:6:1-10.