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Survey of Insect Fauna in Paddy Field at Managaseri Village, Virudhunagar District, Tamil Nadu

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Abstract

Agricultural systems are a complex balance of biological, agronomic and economic factors with agricultural producers closely managing crop-pest interactions. Climate change will fundamentally alter the underlying agro-ecosystems through elevated temperatures and CO_2 levels, leading to changes in pest activity and population levels. Higher temperatures will increase rates of development and the number of pests surviving the winter temperatures. Geographic distributions of crops, pests, and predators are expected to shift, with pests extending to higher latitudes. Climate-induced changes in pest activity are likely to affect agricultural production in several ways. Increased pest populations will stress crop plants and increase the risk of crop loss, reducing yield and/or quality of harvest. Worldwide food plants are damaged by more than 10,000 species of insects. The yield loss by insects reaches as high as 60-70%. In India agriculture is currently suffering an annual loss of about Rs. 8, 63, 884 million due to insect pests. Therefore the present study makes a modest attempt to explore the existing occurrence of insect pests and diversity of their associated insects in agriculture field at Managaseri Village, Virudhunagar district. During the study periodOdonata, Orthoptera, Lepidoptera, Coleoptera, Diptera and Homoptera insects were identified and the results are discussed.

Keywords: Insect, Managaseri Village

Introduction

Agriculture is the life line of the National Economy and its growth is very vital for sustainable food security and wellbeing of its citizen. Agriculture has been the backbone of

the Indian economy and it will continue to remain so for a long time. It has to support almost 17 percent of world population from 2.3 percent of world geographical area and 4.2 percent of world's water resources. The degradation of land and surface as well as ground water resources results in fast deterioration of soil health. Losses due to biotic (insect-pests, diseases, weeds) and abiotic (drought, salinity, heat, cold, etc.) stresses account for about one-fourth of the value of agricultural production (Thangalakshmi and Ramanujan, 2015). Agricultural production continues to be constrained by a number of biotic and abiotic factors. For instance, insect pests, diseases and weeds cause considerable damage to potential agricultural production. Evidences indicate that pests cause 25 percent loss in rice, 5-10 percent in wheat, 30 percent in pulses, 35 percent in oilseeds, 20 percent in sugarcane and 50 percent in cotton (Dhaliwal and Arora, 1996). Insects have great potential for understanding ecosystem as measures of ecosystem health, but the incompleteness of knowledge and the limitation of resources increase the difficulty of work on insect biodiversity. The formal treatment of biodiversity and its measures is complex. Despite considerable interest in this subject, the use and application of measurement indices is heterogeneous (Williamson, 1995). The losses due to hazardous organisms and micro-organisms like plant diseases, insects and weeds cause 33.7% economic damage before and after the harvesting season. The distribution of this damage could be broken down into due to 12% plant diseases, 12% to insects and 10% to weeds. This ratio makes up about one third of the world's plant production potential including ornamental plants. The economic losses due to plant diseases in the Unites States reached 9.1 billion dollars. The insects caused 7.7 billion dollars and weeds caused 6.2 billion dollars of damage (Ecevit *et al*., 2002). Crop monitoring practices are essential for successful pest management, while scouting of field crops for pests and identifying their natural enemies can be easily integrated into an existing scouting program. There is a range of natural enemies which can contribute to reduce the numbers of pests and their contribution to pest control could be significant. As a consequence, there seems to be potential for the development of more sustainable biological control methods by learning more about generalist predators (Sarwar, 2013). Today the pest becomes major concern for the farmers across the world. In world food plant are damaged by more than 10,000 species of insects. Sometimes the yield loss by insects reaches as high as 60-70% (Dhaliwal *et al.*, 2007). Frequent sprays of pesticides lead to insecticide resistance, thereby decreasing the efficacy of pesticides. Pesticides kill insects and also natural enemies. Reduction in the natural enemy populations can allow minor pest populations to explode, leading to secondary pest outbreaks. Hence, present study has been carried out survey of insects in selected agricultural

crops (Sugarcane, Paddy and groundnut) of Managaseri Village, SrivilliputhurTaluk, Virudhunagar District, Tamil Nadu.

Methodology

Insect collection was done in the paddy field at Managaseri village, Srivilliputhur taluk, Virudhunagar District during October 2015 to February 2016. The insects collections were carried out in the early hours of the day because insect are usually active at early sun rise, therefore, it was easy to observe and collect them. Some of the plant feeder insects (phytophagous) were easy to locate on their hosts during sun rise (Thamariselviand Dayana, 2015). The collected insects were stored in vial containing formalin 70% solution. Collected insects were identified with the help standard taxonomic keys and some online resources.

Results and Discussion

A total of 20 species of insects representing 11 families belonging to 6 orders of insects were observed paddy field at manageseri village during Oct 2015 to Feb 2016 (Table 1). The Lepidoptera insects are appeared in maximum (6) followed by Coleoptera (5) Odonata (4) and least in Diptera (1) and Homoptera (1). Similarly Elfaki *et al.*, (2015) reported that a total of 1142 individuals representing 17 orders and 54 families were recorded inMusawwarat area. The dominant order was Diptera, which had 248 individuals and 12 families when compared with other insect orders. Table 2 shows that phenology or appearance of insects was studied in Five months (October 2015 to February 2016). The maximum insects were appeared in the month of December 2015 and January 2016 and minimum number of insects appeared in the month of October 2015 and November 2015. The appearance of insects fluctuates during the study period.The abundance of insects in paddy fields of Managaseri Village during October 2015 to February 2016 (Table 3). The maximum insect species were observed in the month of December 2015 and January 2016 and minimum number of insects species were observed in the month of October and November 2015. A total of 1181 individuals belongs to 11 familys were identified during the study period. *Melanitisleda, Plopidasmathias, Sesamiainferens, Mythimnaloreyi, Psalispennatula, Coccinellaseptempunctata, Coccinellanovemnotata, Cheilomenessexmaculata, Aulacophorafoveicollis, Aulacophorasimilis, Orthetrumsabina, Pantalaflavescens* were not observed in the month of October and November 2015 and Mealy bugs only observed in the month of January and February 2016 and slender skimmer only observed in the month of December 2015 and January 2016 from this study the seven Spotted ladybird beetle and Golden dartled were present in maximum when compared with other insect species. A total

of 1111 individuals of family Acrididaewere collected during the study period, which constituted 87.54% of the total Orthopterans. *Xenocatantopskarnyi* was the most dominant species of this family in terms of number of individuals and constituted 17.82% of the total individuals, very closely followed by *Aulacobothrusiuteips* (17.02%), *Oedipodahimalayana* (15.93%), *Oedipoda*sp. (14.3%), *Chorthippus*sp. (13.95%), *Paraconophymascabra* (12.33%), *SpathosternumPr.prasiniferum* (4.86%) and *Gastrimargus transverses* (3.78%). Family Tettigonidae was represented by 158 individuals and constituted 12.45% of the total Orthopterans. *Mecapoda*sp. was the most dominant species of this familyand constituted 25.94% of the total individuals followed by *Conocephalusmaculatus* (20.25%), *Phaneropteragracilis (17.08%), Himertulakinneari* (14.56%), *Elimaea*sp. (13.29%) and *LatanaIinearis* (8.87%) (Arya *et al.,* 2015).The total number of species, Density and Percentage were recorded in six insect orders in the paddy field during October 2015 to February 2016. Among the six orders, the percentage was higher in order Lepidoptera (30%) followed by Coleopteran (25%) Odonata (20%) Orthoptera (15%) Diptera and Homoptera (5%) respectively. Similarly the density pattern of insects was higher in order Coleoptera (32.09) and Lepidoptera (28.53) and very least density was observed in the order Homopter (0.68) (Table 4). Ali *et al*., (2015) reported that insect species population and density of the insects were studied in seven months. The density of insects per every month were 3252, 2961, 2895,2509 , 2124,1826 and 1403 in August, July, September, Jun , May, April and September respectively. Maximum density of insects were in August, *Eusericamurzka*has the highest number of individuals flowed by *OchrilidiaGemculata*in July, *CharysopaSpp*in August and *ChaerocaunpaCelerio*in August with 950, 705, 621 and 420 respectively.Proportionally, IPM and SRI Fields represented 25% and 23% of the collected natural enemy population. This was followed by conventionally cultivated fields (21%), transplanted fields (17%) and randomly transplanted fields (17%) in descending order (Figure 1). In predatory guild, spiders were dominant group occupied over 41% which was followed by Coleoptera (29%), Hemiptera (8%), Odonata (8%), Diptera (5%), Hymenoptera (6%) and Neuroptera (2%) in descending order (Figure 2). Variability was noted in the guild composition in relation to the seasons (Chakraborty *et al*., 2015). These findings determine that agriculture fields are dominated by insects. From these records it is obvious that the agroecosystem, even though it is a man-made one, it had diverse entomofauna with high level of distribution of the insects. It is clear fact that insects subsidize much to the ecological prosperity and insect conservation has been recognized as vital for sustainable world in view of their critical role in conservation of ecosystem.

Table 1.List of insects were indentified on paddy agro-ecosystem during Oct. 2015 to Feb. 2016

S.No	Common Name	Zoological Name	Family	Order
1	Slender Skimmer	*Orthetrum Sabina*	Libellulidae	Odonata
2	Globe skimmer	*Pantalaflavescens*	Libellulidae	Odonata
3	Golden dartlet	*Ischnura aurora*	Coenagrionidae	Odonata
4	Pygmy wisp	*Agriocnemispygmaea*	Coenagrionidae	Odonata
5	Leaf grasshopper	*Oxyahyla intricate*	Acrididae	Orthoptera
6	Shorthorned grasshopper	*Oxyanitidula*	Acrididae	Orthoptera
7	Shorthorned grasshopper	*Oxyahylahyla*	Acrididae	Orthoptera
8	Plain tiger	*Danauschrysippus*	Nymphalidae	Lepidoptera
9	Common evening brown	*Melanitisleda*	Nymphalidae	Lepidoptera
10	Pink rice stem borer	*Sesamiainferens*	Noctuidae	Lepidoptera
11	Cosmopolitan	*Mythimnaloreyi*	Noctuidae	Lepidoptera
12	Skipper butterflies	*Plopidasmathias*	Hesperiidae	Lepidoptera
13	Yellow hairy caterpillar	*Psalispennatula*	Erebidae	Lepidoptera
14	Seven spottedLady bird beetle	*Coccinellaseptempunctata*	Coccinellidae	Coleopteran
15	Lady bird beetle	*CoccinellaNovemnotata*	Coccinellidae	Coleopteran
16	Lady bird beetle	*Cheilomenes sexmaculata*	Coccinellidae	Coleopteran
17	Orange coloured beetle	*Aulacophorafoveicollis*	Chrysomelidae	Coleopteran
18	Curcubit beetle	*Aulacophorasimilis*	Chrysomelidae	Coleopteran
19	Rice gall midge	*Orseoliaoryzae*	Cecidomyiidae	Diptera
20	Mealy bug	*Brevenniarehi*	Pesudococcidae	Homoptera

Table 2. Appearance of insects in paddy agro eco-system during the study period Oct 2015 to Feb 2016

S.No	Common Name	Zoological Name	Study period				
			Oct	Nov	Dec	Jan	Feb
1	Slender Skimmer	*Orthetrum Sabina*	-	-	+	+	-
2	Globe skimmer	*Pantalaflavescens*	-	-	+	+	+
3	Golden dartlet	*Ischnura aurora*	-	+	+	+	+
4	Pygmy wisp	*Agriocnemispygmaea*	-	+	+	+	+
5	Leaf grasshopper	*Oxyahyla intricate*	+	+	+	+	-
6	Shorthorned grasshopper	*Oxyanitidula*	+	+	+	+	-
7	Shorthorned grasshopper	*Oxyahylahyla*	+	+	+	+	-
8	Plain tiger	*Danauschrysippus*	-	+	+	+	-
9	Common evening brown	*Melanitisleda*	-	-	+	+	-
10	Pink rice stem borer	*Sesamiainferens*	-	-	+	+	+
11	Cosmopolitan	*Mythimnaloreyi*	-	-	+	+	-
12	Skipper butterflies	*Plopidasmathias*	-	-	+	+	+
13	Yellow hairy caterpillar	*Psalispennatula*	-	-	+	+	+
14	Seven spotted Ladybird beetle	*Coccinellaseptempunctata*	-	-	+	+	+
15	Lady bird beetle	*CoccinellaNovemnotata*	-	-	+	+	+
16	Lady bird beetle	*Cheilomenes sexmaculata*	-	-	+	+	-
17	Orange coloured beetle	*Aulacophorafoveicollis*	-	-	+	+	+
18	Curcubit beetle	*Aulacophorasimilis*	-	-	+	+	+
19	Rice gall midge	*Orseoliaoryzae*	-	-	+	+	-
20	Mealy bug	*Brevenniarehi*	-	-	-	+	+

Table 3. Abundance of insects in paddy agri eco system during the study period Oct 2015 to Feb 2016

S.No	Common Name	Zoological Name	Study period					Total
			Oct	Nov	Dec	Jan	Feb	
1	Slender Skimmer	*Orthetrum Sabina*	-	-	7	3	-	**10**
2	Globe skimmer	*Pantalaflavescens*	-	-	9	6	5	**20**
3	Golden dartlet	*Ischnura aurora*	-	18	58	46	22	**144**
4	Pygmy wisp	*Agriocnemispygmaea*	-	15	37	21	11	**84**
5	Leaf grasshopper	*Oxyahyla intricate*	20	11	7	4	-	**42**
6	Shorthorned grasshopper	*Oxyanitidula*	15	8	25	13	-	**61**
7	Shorthorned grasshopper	*Oxyahylahyla*	25	14	27	18	-	**84**
8	Plain tiger	*Danauschrysippus*	-	12	18	11	-	**41**
9	Common evening brown	*Melanitisleda*	-	-	37	24	-	**61**
10	Pink rice stem borer	*Sesamiainferens*	-	-	21	32	16	**69**
11	Cosmopolitan	*Mythimnaloreyi*	-	-	12	5	-	**17**
12	Skipper butterflies	*Plopidasmathias*	-	-	36	27	18	**81**
13	Yellow hairy caterpillar	*Psalispennatula*	-	-	27	22	19	**68**
14	Seven spotted Ladybird beetle	*Coccinellaseptempunctata*	-	-	67	43	21	**131**
15	Lady bird beetle	*CoccinellaNovemnotata*	-	-	38	27	8	**73**
16	Lady bird beetle	*Cheilomenes sexmaculata*	-	-	16	13	-	**29**
17	Orange coloured beetle	*Aulacophorafoveicollis*	-	-	28	23	18	**69**
18	Curcubit beetle	*Aulacophorasimilis*	-	-	36	27	14	**77**
19	Rice gall midge	*Orseoliaoryzae*	-	-	8	4	-	**12**
20	Mealy bug	*Brevenniarehi*	-	-	-	5	3	**8**
Total			**60**	**78**	**514**	**374**	**155**	**1181**

Table 4.Total number of species and percentage recorded in the paddy field atManagaserivillage.

Orders	Total no. of species	Percentage %	Density
Odonata	4	20	21.85
Orthoptera	3	15	15.83
Lepidoptera	6	30	28.53
Coleoptera	5	25	32.09
Diptera	1	5	1.02
Homoptera	1	5	0.68
Total	**20**		

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