



Studies on diversity of natural enemies in brinjal crops

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Abstract

Natural pest of cotton diversity is found in standing commercial crops growing by farmer and due this pest huge loss in their production as well as productivity of crops. This research article help for diversion of natural pest by intercropping and border crop plantation during or before inter plantation of commercial crops help in diversion of pest for their survive. In paper total number of pest identified with their family found in brinjal vegetable field in washim district. Also mentioned alternate crop growing for source of food for pest and this crop protect from microclimate, provide shelter and breeding platform to pest.

Keywords: brinjal, pest, biodiversity, intercrop and recommendation etc.

Introduction

Living beings are broadly classified into three forms: the producers, the consumers and decomposers. Each of the three forms encompasses numerous varieties of organisms which differ from each other in colour, size, shape, weight, structure, chemical composition, habits, habitats, feeding styles, etc. Above all, the genetic characters of one organism cannot match with another organism. In this way the earth is supporting a diversity of life forms. Biodiversity considered for insect pest and microorganism interaction within ecosystem (Vandermeer and Perfecto, 1995). Some researchers have suggested the mixed cropping or intercropping method to encourage the natural enemies. The presence of weeds in an agricultural field could influence the abundance and distribution of natural enemies (Tooker and Hanks, 2000). Intercrops or border crops provide breeding grounds, pollen and nectar to adult natural enemies. They also give suitable microclimate to the natural enemies. This chapter deals with the diversity of natural enemies in brinjal and okra fields and the impact of intercropping on the diversity indices is analyzed by comparing with the monocrop ecosystem.

Biodiversity

Biodiversity or biological diversity refers to the variety within the living world. The term biodiversity is defined as 'the variety of genetically distinct populations and species of plants, animals, and micro-organisms with which *Homo sapiens* shares the Earth, and the variety of ecosystems of which they are a part' (Ehrlich and Ehrlich, 1992). In addition, biodiversity can also be defined in terms of assemblage of species in space, such as in beta-diversity (species composition along an environmental gradient) and in gamma diversity (Species composition within similar habitats at different sites) (Whittaker, 1965). Species richness provides an extremely useful measure of diversity when a complete catalogue of species in the community is obtained (Magurran, 1988). Biodiversity is important in the view point of environmental stability, sustainability, economy and aesthetic values. It is also recognized that loss of biodiversity is mainly due to man-made activities and is

taking place at an alarming rate in most parts of the world (Anura Wijesekara and Wijesinghe, 2003).

Sustainable use for conservation of biodiversity important. Less than 2 million flora and fauna have been described and named. These include 3 lakh species of green plants and fungi, 8 lakh species of insects, The comparable figures of described species in India are 15,000 species of flowering plants, 67,000 insects, 4000 species of molluscs, 6,500 species of invertebrates, 2000 fishes, 140 amphibians, 420 reptiles, 1200 birds and 340 mammals. From the above figures it is quite obvious that up to 75% of the species do not even have a name. Over the years, various catastrophes like drastic changes in climate brought about by continental drift, massive volcanic eruptions or asteroid impacts have caused mass extinction of life on various parts of the globe.

Importance of biodiversity

Biodiversity is importance because to maintain the balance of environment. Interaction pest and insect between human from ancient for their livelihood. Another ways biodiversity importance because of some pest and insect are beneficial for breeding of plants carried out by insect and pest. Also, some product produced by insect and pest like gums, honey for human need his diet.

Diversity in Agro ecosystems

Conservation and sustainable use of biodiversity has been given prime importance throughout the world mainly due to the fear that the rapid alteration of the earth's environment may lead to a loss of stability of the ecosystems. This will be detrimental to the survival of mankind in this universe (IGBP, 1990).

Factors affecting insect diversity

Dempster (1968) demonstrated the effect of pesticides on natural predators of *Pieris rapae* (Lepidoptera: Pieridae) resulting in a long term net increase in the pest population. Because of the fragile nature, insects are easily affected by even minor perturbations in the environment, so much so, they have been considered as indicators of disturbance (Majer, 1983; Disney, 1986; Rosenberg *et al.*, 1986) Claasen (1933) documented the changes that happened to the insect fauna as a result of industrial activities in the United States.

Insect diversity in India

The insect diversity in India as compared to the world fauna is as follows: Of the 29 insect orders, 27 orders are known from India. The *Coleoptera* has been so far recorded by 103 families, followed by *Diptera* 87 families, *Lepidoptera* 84 families, *Hemiptera* 77 families and *Hymenoptera* 57 families (ZSI, 1991). Ghosh (1994) reported in the Island ecosystem of Andaman and Nicobar, as many 1747 species of insects belonging to 22 orders showing a fairly well spread entomofauna. The *Lepidoptera* represents nearly 50 percent of species that occur on mainland India. On the other hand, in Lakshadweep island group, only 113 species belonging to 7 insect orders have been recorded.

Species composition of brinjal field

Brinjal, called in scientific name is *Solanum melongena* L., is one of the three most important vegetables in South Asia (India, Bangladesh, Nepal and Sri Lanka), which accounts for almost 50% of the world's area under cultivation (Alam *et al.*, 2003) [2]. In the brinjal field, various arthropod species, both pests and natural enemies, prevail during seedling to harvesting stage. El-Shafie (2001) observed 28 species of insect pests under seven different insect orders from the brinjal ecosystem while Nayar *et al.* (1995) reported 53 species of insect pests of brinjal. Latif *et al.* (2009) [8] observed 20 species of harmful arthropods under 17 families belonging to 6 different orders. *Leucinodes*

orbonalis (Guenee) is a serious brinjal shoot and fruit borer pest.

In Chhattisgarh, the most common pests recorded were *Atractomorpha crenulata*, *Oxya velox*, *Mocis* sp. and *Taeniothrips* sp. (Bhardwaj, 1986).

Materials and methods









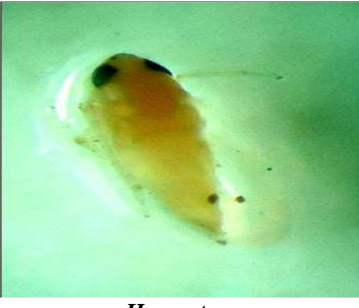
Collection of pest in morning and evening time from brinjal crop field at Washim district area Maharashtra, India during July- in. Insect sampling was done in villages of Washim district, the details related collection of insects of study sites and total area covered for sampling are given in sampling method. where castor, roselle, cowpea and agathi were grown as intercrops or border crops.

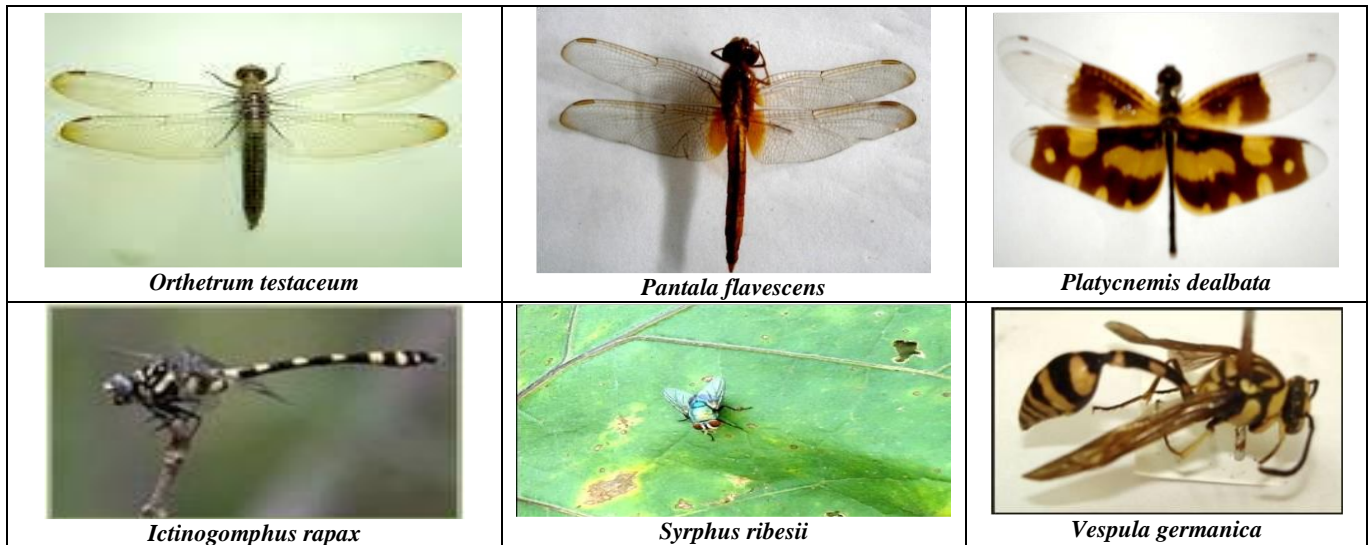
Sampling methods

Several methods of sampling such as visual observation, net sweeping, baiting and Pit-fall trapping are available for assessment of the arthropod population in vegetable ecosystems (Latif *et al.*, 2009) [8]. The method of sampling will vary according to the insect group to be collected. All the collected pest and insect identified by babar hussain chang *et al*, 2018 and sort out their order, family and species.

Result and conclusion

Some phytophagous and entomophagous insects recorded in brinjal crops

| | | |
|---|---|--|
|  <p><i>Epilachna vigintioctopunctata</i></p> |  <p><i>Leucinodes orbonalis</i></p> |  <p><i>Cyrtacanthacris tatarica</i></p> |
|  <p><i>Oxya nitidula</i></p> |  <p><i>Eyeprepocnemus alacris alacris</i></p> |  <p><i>Poekilocerus pictus</i></p> |
|  <p><i>Trigonodes hyppasia</i></p> |  <p><i>Margaronia indica</i></p> |  <p><i>Homoptera</i></p> |



Photograph of brinjal crops field in the study areas



Fig 1: Brinjal field

Table 1: List of some phytophagous insects recorded in brinjal in washim districts.

| Order | Family | Name of the insect |
|-------------|----------------------------|--|
| Orthoptera | Acrididae | <i>Oxya nitidula</i> (Walker) |
| | | <i>Eyeprepocnemus alacris alacris</i> (Serville) |
| | Pyrgomorphidae | <i>Poeciloceris pictus</i> |
| | | <i>Orthacris</i> sp |
| Lepidoptera | Noctuidae | <i>Trigonodes hyppasia</i> (Cramer.) |
| | | <i>Margarona Indica</i> |
| | Crambidae | <i>Leucinodes orbonalis</i> |
| Odonata | Libellulidae | <i>Orthetrum testaceum</i> (Burmeister) |
| | | <i>Pantala falvescens</i> (Fabricius) |
| | | <i>Diplocodes trivialis</i> |
| | | <i>Trithemis festiva</i> |
| | Platynemidae | <i>Platynemis dealbata</i> |
| | | <i>Rhyothemi svariegata</i> (Linn) |
| | Gomphidae | <i>Ictinogomphus rapax</i> (Rambur) |
| | <i>Heliogomphus selysi</i> | |
| Coleoptera | Coccinellidae | <i>Epilachna vigintioctopunctata</i> (Fab) |
| | Chrysomelidae | <i>Diapromopha</i> sp. |
| | | <i>Galeruca indica</i> (Baly.) |
| Hymenoptera | Vespidae | <i>Vespa germanica</i> |
| | | <i>Vespa analis</i> (Fab.) |
| | | |
| Diptera | Syrphidae | <i>Dideopsis aegrota</i> (Fabricius) |
| | | <i>Ischiodons cutellaris</i> (Fabricius) |
| | | <i>Citrogramma flavigenum</i> Wyatt |
| | | <i>Eupeodes corollae</i> (Fab.) |
| | | <i>Syrphus ribesii</i> |

Table 2: List of neutral insects recorded from brinjal field

| Order | Family | Name of the Insect |
|-------------|----------------|--|
| Hymenoptera | Megachilidae | <i>Megachile lanata</i> (Fab.) |
| Diptera | Drosophilidae | <i>Drosophila melanogaster</i> (Meigen) |
| | Tabanidae | <i>Chrysops</i> sp |
| | | <i>Tabanus tenebrosus</i> (Walker) |
| | Muscidae | <i>Hydrotaea dentipes</i> (Fab.) |
| | | <i>Heliographa insignis</i> (Stein.) |
| | | <i>Limnopho rafallax</i> (Stein) |
| | | <i>Neomyia flavidi pennis</i> (Macquart) |
| Coleoptera | Scarabaeidae | <i>Onitis</i> sp. |
| Phasmida | Heteronemiidae | <i>Oreophoetes parwana</i> |
| Mecoptera | Panorpidae | <i>Panorpa appendiculata</i> |

In the present studies of pest and insect on brinjal crops field and border crops were collected and identified in two season mentioned photo graph and table no. 1 and 2.

Conclusion

Natural pest of cotton diversity is found in standing commercial crops growing by farmer and due this pest huge loss in their production as well as productivity of crops. Diversion of natural pest by intercropping and border crop plantation during or before inter plantation of commercial crops help in diversion of pest for their survive. In paper total number of pest identified with their family found in brinjal vegetable field. Alternate crop growing for source of food for pest and this crop protect from microclimate, provide shelter and breeding platform to pest. Also, pest and insect can survive on border crop all necessary food required to pest and insect produced by it. So, pest and insect diversity studies in commercial crops and available alternate source of food to pest and insect always better for farmer to avoid huge loss of crops.

Recommendation

1. Planting border crop for alternate source to pest and insect.
2. Adaptation of crop rotation
3. Use of insect and pest resistance variety.
4. Install insect and pest trap in field.
5. Conserve bio control agent like spider survive on feeding of pest and insect.

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