

A short-term study on insects documented on okra crop at an agro-ecosystem near Bikaner, Rajasthan, India

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Abstract

Okra or ladies finger is a plant belonging to family Malvaceae. It is one of the most favourite vegetables for growing in kitchen gardens. India is the world's largest producer of okra with over 60% of the global production. India produces approximately 6 million tons of okra per year. Ecologically, insects occupy diverse niches and play many different roles important in sustaining the dynamics of ecosystem process. The present work was therefore undertaken to study the insects on okra crop in relation to their diversity and density in some agro-ecosystems in and around Bikaner, Rajasthan. In all, 41 insects belonging to 7 orders and 26 families were collected from the crop, of which based on density 6 were dominant, 32 frequent and 3 were rare forms. The maximum density was noted in the month of September, while, diversity in the month of October. Minimum density as well as diversity was noted in the month of December.

Introduction

Okra or ladies finger is a plant belonging to family Malvaceae. It is one of the most favourite vegetables for growing in kitchen gardens. The place of its origin is Ethiopia and the crop is mainly grown in tropical and sub-tropical regions. In India, although the major states growing okra are U.P., Bihar, W.B. and Orissa, but nevertheless is cultivated in all the states including Rajasthan. Fresh okra fruits are important and used as vegetable in India, Brazil, Africa and many other countries. Dried fruits and skin are also useful in paper industry and fibre extraction. The vegetable is rich in vitamins, protein, calcium and other minerals. The root and stem are useful for clearing cane juice in preparation of jaggary. Okra is said to be very useful against genitor-urinary disorders and chronic dysentery. India is the world's largest producer of okra with over 60% of the global production. India produces approximately 6 million tons of okra per year. Okra is grown throughout the year. Fresh okra is an important vegetable which is exported from India to Middle East U.K., Western Europe and USA.

An ecosystem is a natural system that is formed by dynamic interactions between biotic and non-biotic elements in a defined area. Biodiversity is indeed an important regulator of agro-ecosystem functions, not only in the strictly biological sense of impact on production, but also in satisfying a variety of needs of the farmer and society at large. Ecologically, insects occupy diverse niches and play many different roles important in sustaining the dynamics of ecosystem process (Walker, 1992). They could be herbivores (some are pests), predators and parasites (maintaining the population dynamics of herbivore insects), pollinators, decomposers and scavengers- each group or species within groups have distinct feeding habit. As such they are closely associated with the habitat and factors within it.

The present work was therefore undertaken to study the insects on okra crop in relation to their diversity and density in some agro-ecosystems in and around Bikaner, Rajasthan.

Material and method

The agro-ecosystem in the form of crop fields studied lie about 10 to 15 km away from the Bikaner city (between 27°11' and 29°03' North latitudes and 71°52' and 74°12' East longitudes), covering an area of 6 hectares each. In all six crop fields were covered during the present survey from September to December when one of the crops cultivated was Okra.

An indigenously designed cage (net) of 1m×1m×1m of nylon mesh was used for the purpose as also used by Saigal (2002). The cage covered the 1m³ volume while holding the crop inside. The fauna trapped within the cage was mechanically picked up. Using cage-net the insects were collected between 7A.M to 11A.M, and again in the afternoon from 5pm. to 7 p.m. Sampling was done fortnightly. One sampling site from each field comprising of okra crop was selected at random, during each collection at a time. The insects collected by the above method were transferred to killing bottles and the killed insects were preserved. Large winged insects were put to dry preservation by pinning them in insect boxes, while, smaller insects were preserved in 70% alcohol.

The fauna was sorted out group-wise and identifications were made following pertinent literature. The count of insect fauna collected using cage was averaged for each month and expressed as no/m³.

Observation and result

Okra was cultivated during September to December in the agro-ecosystem. The insect fauna collected from this crop has been presented in Table 1.

In all, 41 insects belonging to 7 orders and 26 families were collected from the crop, of which based on density 6 were dominant, 32 frequent and 3 were rare forms. The maximum density was noted in the month of September, while, diversity in the month of October. Minimum density as well as diversity was noted in the month of December.

D. chrysippus, *Zizina*sp., *C. pomona*, *C. vestalis*, *H. recurvalis*, *Tephri*sp., *H. peltigera* and *S. exigua* were frequently noted lepidopterans, while, *A. styx* was the only one rarely observed lepidopteran species on the crop.

The frequently observed coleopterans were *Cicindella*sp., *A. bengalensis*, *O. catta*, *O. bonasus*, *P. nasutus*, *A. ferruginea*, *M. sexmaculatus* and *C. pictus*, while, the rarely observed insect included *Melanotus*sp. only.

Of the total eleven hymenopteran species recorded three viz., *X. fenestrata*, *A. cerana* and *A. mellifera* were dominant and eight *Pepsis* sp., *P. carolina*, *Prionyx*sp., *Halictus*sp., *A. florea*, unidentified species A, B and C were frequent.

No hemipteran was observed as a dominant species, five species which included *D. cingulatus*, *Clavigrella*sp., *Piezodorus*sp., *Oncocephalus*sp. and unidentified species B were frequently noted on the crop, while, only one *D. koenigi* was rarely documented.

S. gregaria and *Atractomorpha*sp. were the orthopteran insects which were frequently noted.

Only one frequently visiting odonate was *A. femina*.

C. quinquefasciatus, *S. peregrina* and *M. domestica* were the three dipteran species and all were dominantly observed.

Discussion

In all, 41 insects belonging to 7 orders and 26 families were collected from the crops, of which 9 lepidopterans included *D. chrysippus*, *Zizina* sp., *C. pomona*, *C. vestalis*, *H. recurvalis*, *Tephri* sp., *A. styx*, *H. peltigera* and *S. exigua*; 9 coleopterans viz., *Cicindella* sp., *A. bengalensis*, *O. catta*, *O. bonasus*, *P. nasutus*, *A. ferruginea*, *Melanotus* sp., *M. sexmaculatus*, *C. pictus*; 11 hymenopteran species collected were *Pepsis* sp., *P. carolina*, *Prionyx* sp., *Halictus* sp., *X. fenestrata*, *A. cerana*, *A. mellifera*, *A. florea*, unidentified species A, B and C; 6 hemipteran noted were *D. cingulatus*, *D. koenigii*, *Clavigrella* sp., *Piezodorus* sp., *Oncocephalus* sp. and unidentified species B; 2 orthopteran species noted on this crop were *S. gregaria* and *Atractomorpha* sp.; Only 1 odonate collected was *A. femina* while, 3 dipteran species reckoned were *C. quinquefasciatus*, *S. peregrina* and *M. domestica*.

Most of the earlier studies have been done on pests of okra. Srinivasan & Narayanaswamy (1961), Rawat & Sahu (1973), Krishniah et al. (1976) and Radke & Undirwade (1981) found that *Abelmoschus esculentus* is subject to attack by many insect pests of which the fruit borer *Earias* sp. is a major one, the larvae of which bore into the growing shoots, buds and tender fruits resulting in their shedding and consequently affecting the fruit quality and yield to a considerable extent. *Nezaraviridula* also called green stink bug damages okra (Butcher, 1981; Hill, 1975 and Swain, 1971), *Dysdercus cingulatus* (Kranz, 1977; Frohlich 1970), *Spodopteralitura*, *H. armigera* (Hick, 1980 and Hill, 1975) and *Earias vitella* also called cotton bollworm (Kalshoven, 1981 and Kranz, 1977) have been reported to damage okra. Mathur & Singh (1986) recorded *Aphis craccivora*, *Achrythosiphon kondoi*, *Aphis gossypii*, *Hydaphis corinadri* and *Rhaphalosiphum maidis* infesting ladyfinger. Mishra et al. (1988) observed various bees, flies and beetles on okra flowers. *Earias fabia*, *Pectinophora gossypiella*, *Syleptaderogata*, *Dysdercus koengii*, *Empoasca devastans*, *Bemisia tabaci*, *Pemphres affinis*, *Amrascabiguttula* and *Aphis gossypii* have been reported to be pests of okra by Kumar & Nigam (1989). Pests attacking lady's finger included, *Oxya japonica*, *Poeciloceruspictus*, *Amrascabiguttulabiguttula*, *Bemisia tabaci*, *Aphis gossypii*, *Dysdercus koengii*, *Thrips tabaci*, *Haplothrips gowdeye*, *Syleptamderogata*, *Earias vitella*, *Mylabris pustulata*, *Oxycetonia versicolor*, *Mylocerus maculatus*, *Tetranychus* spp. etc. as suggested by Kumar & Nigam (1991). *Abelmoschus esculentus* (lady's finger) has been found to be attacked by different pests which included *Dysdercus cingulatus*, *Earias insulana*, *Agrotis ipsilon*, *Heliothis armigera* and *Mylocerus* sp. as reported by Nayar et al. (1998) and support the present findings. Earlier, Sima

(2011) also in the study conducted at Jhunjhunu in Rajasthan has reported the presence of *Eariasinsulana*, *Dysdercuscingulatus* and *Heliolithispeltiger* avising the crop.

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Table 1. Entomo-faunal diversity and density (number/trap*) on okra during the period of study

	Sep	Oct	Nov	Dec	Status
Order:Lepidoptera					
Family:Danaidae					
<i>Danauschrysisippus</i> Linn.	8	5	-	-	F
Family:Lycaenidae					
<i>Zizinasp.</i>	12	4	-	-	F
Family:Pieridae					
<i>Catopsilapomona</i> Cramer	7	6	-	-	F
<i>Colotisvestalis</i> Butler	6	5	3	-	F
Family:Crambidae					
<i>Hymenia recurvalis</i> Fab.	11	-	-	-	F
Family:Geometridae					
<i>Tephrinasp.</i>	-	10	7	-	F
Family:Spingidae					
<i>Acherontia styx</i>	-	-	-	2	R
Family:Noctuidae					
<i>Heliothispeltigera</i> Schiff	4	3	4	2	F
<i>Spodoptera exigua</i> Hubner	7	5	2	3	F
Order:Coleoptera					
Family:Cicindelidae					
<i>Cicindellasp.</i>	12	-	-	-	F
Family:Scarabaeidae					

	Sep	Oct	Nov	Dec	Status
<i>Anomalabengalensis</i> Blanch.	-	-	7	5	F
<i>Onthophagus catta</i> Fab.	7	4	4	-	F
<i>Onthophagus bonasus</i> Fab.	-	-	13	-	F
<i>Peltonotus nasutus</i> Arrow	12	-	-	-	F
<i>Apogonia ferruginea</i> Fab.	-	13	-	-	F
Family: Elateridae					
<i>Melanotus</i> sp.	-	-	-	2	R
Family: Coccinellidae					
<i>Menochilus sexmaculatus</i> Fab.	18	-	-	-	F
Family: Meloidae					
<i>Cylindrothorax pictus</i> Fab.	12	6	-	-	F
Order: Hymenoptera					
Family: Pompilidae					
<i>Pepsis</i> sp.	-	11	-	-	F
Family: Vespidae					
<i>Polistes carolina</i>	7	6	-	-	F
Family: Sphecidae					
<i>Prionyx</i> sp.	8	5	-	-	F
Family: Halictidae					
<i>Halictus</i> sp.	7	6	3	-	F
Family: Apidae					
<i>Xylocopa fenestrata</i> Fab.	26	10	-	-	D
<i>Apis cerana</i> Fab.	28	21	-	-	D

	Sep	Oct	Nov	Dec	Status
<i>Apismellifera</i> Linn.	22	25	28	-	D
<i>Apisflorea</i> Fab.	12	6	-	-	F
Unidentified sp. A	11	4	-	-	F
Unidentified sp. B	5	4	4	-	F
Unidentified sp. C	-	8	6	-	F
Order:Hemiptera					
Family:Pyrrhocoridae					
<i>Dysdercuscingulatus</i> Fab.	-	-	-	14	F
<i>Dysdercuskoenigii</i> Fab.	-	-	2	2	R
Family:Coreidae					
<i>Clavigrellasp.</i>	-	5	7	6	F
Family:Pentatomidae					
<i>Piezodorussp.</i>	9	8	-	-	F
<i>Oncocephalussp.</i>	7	3	4	-	F
Unidentified sp. B	4	9	-	-	F
Order:Orthoptera					
Family:Acrididae					
<i>Schistocercagregaria</i> Forsk	9	9	-	-	F
Family:Pyrgomorphidae					
<i>Atractomorphasp.</i>	7	7	-	-	F
Order:Odonata					
Family:Coenagrionidae					
<i>Agriocnemisfemina</i> Brauer	-	-	-	12	F

	Sep	Oct	Nov	Dec	Status
Order:Diptera					
Family:Culicidae					
<i>Culexquinquefasciatus</i> Say	26	23	24	25	D
Family:Sarcophagidae					
<i>Sarcophagaperegrina</i>	-	15	21	28	D
Family:Muscidae					
<i>Musca domestica</i> Fab.	15	18	21	19	D

* Average of all the six crop fields

D-Dominant, F-Frequent, R-Rare
 D>25 25 >D>10 R≤10