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Insect pests complex and their predators on sunflower in the western undulating zone of Odisha

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Abstract

Field experiment was conducted at College of Agriculture, Bhawanipatna Odisha University of Agriculture and Technology to study the insect pest complex, their natural enemies and pollinators in the sunflower ecosystem during Rabi, 2019-20. The observations were recorded on attack by seventeen insect pests belongs to eight orders and thirteen families at different stages of crop growth. During the study period three non-insect pests i.e. Parakeet, Common mynah and Black drongo and pollinators like honey bee (*Apis dorsata*, *Apis cerana indica*) and bumble bee (*Xylocopa* sp) were recorded mostly during flowering period of sunflower. Ten spp. of predators and two insectivorous birds were also reported during different growth stages of sunflower in the Western undulating Zone of Odisha.

Keywords: Sunflower, insect pest complex, natural enemies

Introduction

Sunflower is the host plant for a wide number of insect pests and broadly classified as seedling pests, sucking pests, soil insects, defoliators and inflorescence pests (Basappa and Prasad 2005) [4]. As many as 251 insect and mite species have been reported on sunflower at global level (Rajmohan, 1974) [12]. More than 50 insect species have been reported to damage the sunflower crop at different growth stages of crop in India. Among them, nine are major pests and cause significant yield loss.

In order to develop an eco-friendly, economically viable, feasible and socially acceptable pest management system, detailed information of insect-pest association with a crop with respect to nature of damage and stage of crop. They cause damage and study of their natural enemies are very crucial. The incidence of different insect pest and natural enemies during different stages of the crop growth may be the right research tool for the development of an IPM programme. Keeping this point in view, the present investigation was carried out to study the insect pest association in the sunflower crop ecosystem, their natural enemies and pollinators in the western undulating zone of Odisha.

Materials and Methods

A field experiment was conducted at College of Agriculture, Bhawanipatna, Odisha University of Agriculture and Technology, Bhubaneswar to study the insect pests complex and their natural enemies of sunflower in the Western Undulating Zone of Odisha during Rabi, 2019-20. Sunflower, hybrid NSFH-145 (Swathi) of Nuziveedu seeds company was sown on 6th November, 2019 with 60 cm x 30 cm spacing. Fertilizer applications and agronomic practices were followed according to the standard recommendations. One hand weeding and earthing up was implemented at 45 days after sowing (DAS) in order to keep the field free from weeds. Crops were grown under insecticides free condition with an aim to allow them to increase the insect population in the prevailing climatic condition.

The insects were collected by sweep net with a 40 cm opening one months after germination of seeds till harvest of crops at weekly intervals during 8 to 10 AM. The insects were collected in the sweep net were immediately killed by placing them in a polythene bag containing ethyl-acetate soaked cotton. The dead insects were brought into the laboratory and they are finally identified by a taxonomist. The sap sucking insects like leafhopper, aphids, thrips and whitefly were also collected and identified.

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Results and Discussion

During the study period 17 insect pests belongs to eight orders and 13 families were recorded during different crop growth stages and three non-insect pests (Parakeet, Common mynah and Black drongo) were observed mostly during flowering to crop maturity period of sunflower crop. Geetha and Hegde (2018) [9] listed 14 insects pest and 10 natural enemies (Predators) in sunflower ecosystem at Dharwad, Karnatak. Sandhu *et al.*, (1973) [14] also reported 43 insects of sunflower in India and Hassan *et al.*, (1984) [10] listed 19 insect pests in Pakistan.

These insect pests attack the leaves, stems, flower heads as well as the seeds and cause economic loss in sunflower production. Jassids (*Amrasca biguttula biguttula*), whitefly (*Bemisia tabaci*), tobacco caterpillars (*Spodoptera litura*), bihar hairy caterpillars (*Spilosoma obliqua*), semiloopers (*Achaea janata*), capitulum borer (*Helicoverpa armigera*), pentatomid bugs (*Nezara viridula*) and red cotton bugs (*Dysdercus cingulatus*) were recorded higher in numbers during the study period. In the Indian subcontinent, Basappa (1998) [3] reported more than fifty insect species on sunflower i.e., cutworms (*Agrotis* spp.), sucking pests, leaf and plant hoppers (*Amrasca biguttula biguttula*, *Empoasca* spp.), thrips (*Thrips palmi*), whitefly (*Bemisia tabaci*), defoliators (*Spilosoma obliqua*, *Spodoptera litura*, and *Plusia orichalcea* Fab.) and capitulum borer (*Helicoverpa armigera*) are major pests of economic concern.

Kakakhel *et al.*, (2000) [11] identified the insect pests on sunflower were *Bemisia tabaci*, *Empoasca* spp., *Thysanoplusia orichalcea*, *Diacrisia obliqua*, *Nezara viridula*, *Helicoverpa armigera* and *Nysius inconspicuus*. Whitefly (*Bemisia tabaci*) infestation on sunflower crop has been reported earlier in India by Sethi *et al.*, (1978) [16], Sattar *et al.*, (1984) [15] and Aslam *et al.*, (2000) [1] reported the insect pests of sunflower as whitefly (*Bemisia tabaci*), Aphids (*Aphis gossypii*), jassids (*Amrasca devastans*) bud moth (*Heliothis armigera*) and surface grass hopper (*Chrotogonus* spp). Infestation of *H. armigera* on sunflower has been reported in India by Sing *et al.*, (1977) [17]. Different species of polyphagous pests i.e, capitulum borer (*Helicoverpa armigera*), green semilooper (*T. orichalcea*) Bihar hairy caterpillar (*S. obliqua*) tobacco caterpillar (*S. litura*) are reported earlier by Basappa (1995) [2] in sunflower crop.

The incidence of sucking pests like white fly, jassids and

aphids appeared at early stage of crop growth. Gradually these sucking insect pest population decreased towards fag end of crop growth period. This was contradictory of the finding by Basit *et al.*, 2016 [7], who reported that *B. tabaci* and *Empoasca* spp. were persisted in the crop throughout the cropping season. However, the bug population (red cotton and dusky cotton bug, pentatomid bug etc.) increased at the crop maturity stage. The larval population of lepidopteran pests were recorded highest at the far end of the crop, which was coincided with the flowering and seed maturity stage of the crop.

Ten spp. of predators and two insectivorous birds were reported during different growth stages of sunflower. The pollinators viz, honey bee (*Apis dorsata*, *Apis cerana indica*) and bumble bee (*Xylocopa* sp) were recorded during flowering period. Sajjad *et al.*, (2017) [13] have reported *Apis dorsata* and *A. florea* was the most abundant pollinators of sunflower in Pakistan. Present findings revealed parakeet (*Psittacula krameri*) is the major non-insect pest that caused severe damage to the seeds of sun flower and huge yield loss. Their damage to ripening heads was identified by Bashir (1980) [6] in different parts of Pakistan. Toor and Ramzan (1973) [18] estimated average loss of about 22% to sunflower by the rose-ringed parakeet in the Ludhiana, Punjab, India.

During crop period numbers of predators like coccinellids beetles, green lace wing, different spp. of spiders, preying mantids, assassin bus, syrphid larvae and ants were recorded. Among them the spiders and coccinellids beetles were the major predators in the sunflower ecosystem and same was also reported by Basit *et al.*, (2016) [7]. Coccinellids beetles were found throughout the crop season and major predators of white fly, jassids and aphids. The coccinellids beetles feed on a number of insect pests like aphids, whitefly and eggs and early stage larvae of lepidopteron as reported earlier by Basappa (2011) [5].

The predators population was increased during fag end of crop which coincide the increase incidence of insect pests complex. Besides entomophagous two vertebrate's predators i.e, Black drongo and common mynah were observed to feed on different insect pests. Basappa (1995) [2] have reported that the non-insect pests i.e, rabbits, parakeets, doves, house sparrows, crows, rats, etc. causes severe damage on sunflower.

Table 1: List of sucking pests, defoliators, natural enemies, non-insect pests and pollinators recorded in the Western Undulating Zone of Odisha on sunflower during 2019-20.

Sl. No.	Insect pests	Scientific name	Taxonomic position
Sucking Insect pests			
1	Leaf hopper	<i>Amrasca biguttula biguttula</i>	Hemiptera: Cicadellidae
2	Whitefly	<i>Bemisia tabaci</i>	Hemiptera: Aleyrodidae
3	Thrips	<i>Thrips palmi</i>	Thysanoptera: Thripidae
4	Mealy bug	<i>Phenacoccus solenopsis</i>	Hemiptera: Pseudococcidae
5	Green stink bug	<i>Nezara viridula</i>	Heteroptera: Pentatomidae
6	Aphids	<i>Aphis craccivora</i>	Hemiptera, Aphididae
7	Red cotton Bug	<i>Dysdercus cingulatus</i>	Hemiptera: Pyrrhocoridae
8	Dusky Cotton Bug	<i>Oxycarenus hyalipennis</i>	Hemiptera: Lygaeidae
Defoliators and head borers			
9	Tobacco Caterpillar	<i>Spodoptera litura</i>	Lepidoptera: Noctuidae
10	Semiloopers	<i>Achaea janata</i>	Lepidoptera: Noctuidae
11	Bihar hairy Caterpillar	<i>Spilosoma obliqua</i>	Lepidoptera: Arctiidae
12	Cut worm	<i>Agrotis ipsilon</i>	Lepidoptera: Noctuidae
13	Capitulum borer	<i>Helicoverpa armigera</i>	Lepidoptera: Noctuidae
14	Ash Weevils	<i>Myllocerus</i> spp.	Coleoptera: Curculionidae
15	Grasshoppers	Unidentified	Orthoptera: Acrididae

16	Flower beetle	<i>Aulacophora sp.</i>	Coleoptera: Chrysomelidae
17	Termite	<i>Odontotermes obesus</i>	Isoptera: Termitidae
Predators			
18	Lady bird beetle	<i>Coccinella spp.</i>	Coleoptera: Coccinellidae
19	Green lace Wing	<i>Chrysoperla carnea</i>	Neuroptera: Chrysopidae
20	Spider	Unidentified	Arachnida: Arachnidae
21	Preying mantid	<i>Mantis religiosa</i>	Mantodea: Mantidae
22	Ants	Unidentified	Hymenoptera: Formicidae
23	Assassin bug	Unidentified	Hemiptera: Reduviidae
24	Syrphid fly	Unidentified	Diptera: Syrphidae
25	Pentatomid bug	<i>Nezara viridula</i>	Hemiptera: Pentatomidae
26	Wasp	<i>Vespa spp.</i>	Hymenoptera, Vespidae
27	Ground beetle	Unidentified	Coleoptera, Carabidae
28	Common mynah	<i>Acridotheres tristis</i>	Passeriformes: Sturnidae
29	Black drongo	<i>Dicrurus macrocercus</i>	Passeriformes: Dicruridae
Pollinators			
30	Honey bee	<i>Apis dorsata Apis cerana indica</i>	Hymenoptera, Apidae
31	Bumble bee	<i>Xylocopa sp.</i>	Hymenoptera, Apidae
Non insect pests			
32	Parrots (Parakeets)	<i>Psittacula krameri</i>	Psittaciformes: Psittacidae
33	Common mynah	<i>Acridotheres tristis</i>	Passeriformes: Sturnidae
34	Black drongo	<i>Dicrurus macrocercus</i>	Passeriformes: Dicruridae

Conclusion

From this study, it may be concluded that seventeen numbers of insect pests were recorded during the different growth stages of Sunflower. Among them, the jassids, white fly, tobacco caterpillar, Bihar hairy caterpillar, capitulum borer and bugs were major insect pests during the study period. Present findings revealed that major pest infestation was recorded during the flowering and seed maturity stage. So, farmers are advised to use the chemicals and pesticides during this growing season.

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