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# Relative abundance of composite insect pests infestation led by white fly, *Bemisia tabaci* on the sunflower plant *Helianthus annuus* L.

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**Abstract :** In addition to the common sunflower pest, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) it has been observed that several other insects also attack this host plant such as *Empoasca* spp. (Lepidoptera:Noctuidae), *Thysanoplusia orichalce* (Lepidoptera:Noctuidae), *Helicoverpa armigera* (Lepidoptera:Noctuidae) *Nezara viridula* (Heteroptera:Pentatomidae) thus reflecting composite pest infestation. These insects are taxonomically represented by the Hemipterans, Lapidopteran and Heteropterans. The reason of such composite insect pest infestation is non else than availability of variety of food resource in the sunflower plant palatable to these insects for their survival. In the present article, standard statistical tools like Relative Abundance % of all the members of insect pest complex causing composite infestation has been statistically computed from the random sampling raw data of above five pests including *Bemisia tabaci.* The results are very significant and meaningful suggestive of several singular and plural pest protection strategies for sunflower plant related to the differential degree of insect pest attack on the sunflower.

**Key words: Composite insect pest infestation, Lapidoptera, Heteroptera, Hemiptera, sunflower plant *Bemisia tabaci*, (*Helianthus annuus* L.), Statistical diversity tools**

## INTRODUCTION

One of the major competitors of human beings is insects that may be both harmful and beneficial. Nevertheless the harmful impact of insects outweigh the beneficial one, therefore, insects are our rivals, because most of them lead pest life feeding on plants and crops. As such they are major threat to crop production and human survival. Some of them serve as vector for virus and other diseases. Some of the severe infestation on sunflower by insects pests are leaf curling, chlorosis and premature senescence in addition to nematodes infestation that also result a wide range of loss in production and yield of sunflower crop. Nelson (2008)[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. Holt (2001)[2] reported the insect pests attack on sunflower are *Bemisia tabaci*, *Empoasca* spp., *Thysanoplusia orichalce, Diacretia obliqua*, *Nezara viridula*, *Helicoverpa armigera* and *Nysius inconspicuus*.

In the present article, statistical approach has been taken to evaluate the proportionate attack and damage to sun flower caused by five more insect species other than *Bemisia tabaci.*

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As regards the host plant-Sunflower, *Helianthus annuus* (L.) popularly known as "Surajmukhi" belongs to the family Asteraceae and genus *Helianthus* is one of the most important oil crops throughout the world grown on over 22 million hectares worldwide, with a production of 26 million tones per year. The name has its origin in Greek "Helios" means "Sun" and "Anthois" means "flower". Sunflower is an important oilseed crop in India. It is also cultivated for edible seed (Khan *et al*., 2007)[4].

## MATERIAL & METHODS

Selection of the sampling site as follows up schedule of our study was done randomly and the sites were located in the northern zone of Madhepura district. Madhepura is located at 25°34'-26°07' North Latitude & 86°19'-87° 07' East Longitude. It is surrounded by Araria & Supaul in the North and Khagaria & Bhagalpur in the South, Purnea district in the East and Saharsa in the West. It is situated in the plains of river Koshi & located in the Northeastern part of Bihar. The primary occupation of the people of the district is agriculture. The total geographical area of the district is 1788 Sq. Km.

The field experiment was laid in randomized block design during 2018 in four different areas of Madhepura where the production was very high. The observation data of degree of infestation of the fly with respect to the four different sampling areas- Gwalpara, Puraini, Bihariganj and Shankarpur chosen for the observation of incidence as well as quantum of damage caused by the whiteflies have been given in Table 1-4 along with geographical map of the sampling sites. These places were visited weekly after 15 days of germination to record the insect infestation till the maturity of the plant of sunflower. Observations of infestation on randomly selected plants from each plot by whitefly and other allied species were made on leaves shoot and flower rosette. The mean population of each pest species was worked out numerically which were subjected to statistical analysis.

**Data Recording**

Five plants were randomly selected for data recording and data regarding all the insect pest infestation was recorded weekly on per plant basis; (upper, middle and lower leaves of plants were examined) in case of whitefly larvae of Head moth were counted when founded in the heads of sunflower plants already selected.

## RESULT & DISCUSSION

**Table 1: Random sampling data of five different species of insect pests including *B. tabaci* thriving on sunflower plant with their average adults per plant in the plots of Gwalpara site during summer of 2018**

| Sl. No. | Common Name of the insect pest sampled | Scientific name as per the key | Taxonomic position | Number of adults per plant(n) | Relative abundance % (n/N* 100) |
|---|---|---|---|---|---|
| 1 | Whitefly | *Bemisia tabaci* | Hemiptera : Aleyrodidae | 12 | 36.3 |
| 2 | Leaf hopper | *Empoasca* | Lepidoptera Noctuidae | 04 | 12.1 |
| 3 | Flower Moth | *Thysanoplusia* | Lepidoptera Noctuidae | 02 | 6 |
| 4 | Bollworm | *Helicoverpa* | *Lepidoptera* Noctuidae | 06 | 18.1 |
| 5 | Stink bug | *Nezara* | Heteroptera: Pentatomidae) | 09 | 27.2 |
| | Total | | | N =33 | |

**Table 2: Random sampling data of five different species of insect pests including *B. tabaci* thriving on sunflower plant with their average adults per plant in the plots of Puraini site during summer of 2018**

| Sl. no | Common Name of the insect pest sampled | Scientific name as per the key | Taxonomic position | Number of adults per plant (n) | Relative abundance %(n/N* 100) |
|---|---|---|---|---|---|
| 1 | Whitefly | *Bemisia tabaci* | Hemiptera : Aleyrodidae | 10 | 31.2 |
| 2 | Leaf hopper | *Empoasca* | Lepidoptera Noctuidae | 05 | 15.6 |
| 3 | Flower Moth | *Thysanoplusia* | Lepidoptera Noctuidae | 08 | 25 |
| 4 | Bollworm | *Helicoverpa* | *Lepidoptera* Noctuidae | 02 | 6.2 |
| 5 | Stink bug | *Nezara* | Heteroptera: Pentatomidae) | 07 | 21.8 |
| | Total | | | N=32 | |

**Table 3: Random sampling data of five different species of insect pests including *B. tabaci* thriving on sunflower plant with their average adults per plant in the plots of Bihariganj site during summer of 2018**

| Sl. no | Common Name of the insect pest sampled | Scientific name as per the key | Taxonomic position | Number of adults per plant (n) | Relative abundance %(n/N* 100) |
|---|---|---|---|---|---|
| 1 | Whitefly | *Bemisia tabaci* | Hemiptera : Aleyrodidae | 9 | 31 |
| 2 | Leaf hopper | *Empoasca* | Lepidoptera Noctuidae | 03 | 10.3 |
| 3 | Flower Moth | *Thysanoplusia* | Lepidoptera Noctuidae | 08 | 27.5 |
| 4 | Bollworm | *Helicoverpa* | *Lepidoptera* Noctuidae | 05 | 17.2 |
| 5 | Stink bug | *Nezara* | Heteroptera: Pentatomidae) | 04 | 13.7 |
| | Total | | | N=29 | |

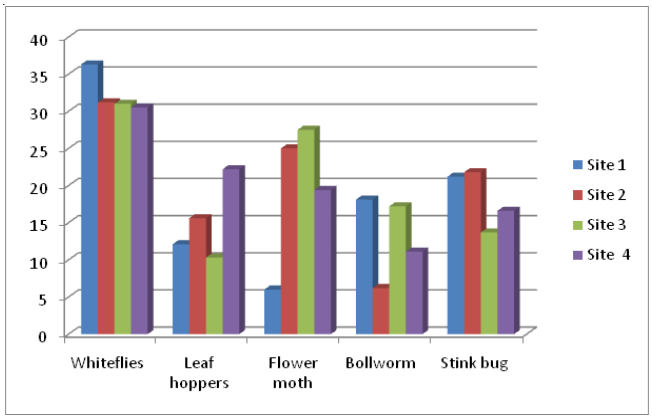
**Table 4: Random sampling data of five different species of insect pests including *B. tabaci* thriving on sunflower plant with their average adults per plant in the plots of Shankarpur site during summer of 2018**

| Sl. no | Common Name of the insect pest sampled | Scientific name as per the key | Taxonomic position | Number of adults per plant (n) | Relative abundance %(n/N* 100) |
|---|---|---|---|---|---|
| 1 | Whitefly | *Bemisia tabaci* | Hemiptera : Aleyrodidae | 11 | 30.5 |
| 2 | Leaf hopper | *Empoasca* | Lepidoptera Noctuidae | 08 | 22.2 |
| 3 | Flower Moth | *Thysanoplusia* | Lepidoptera Noctuidae | 07 | 19.4 |
| 4 | Bollworm | *Helicoverpa* | *Lepidoptera* Noctuidae | 04 | 11.1 |
| 5 | Stink bug | *Nezara* | Heteroptera: Pentatomidae) | 06 | 16.6 |
| | Total | | | N=36 | |

The above data shows that the population of the randomly sampled insect pest species as observed on the sunflower plant was having staggered picture showing mosaic composite infestation of high degree affecting the production of the sunflower crop.[5] There are many studies that show the attack of insect on the sunflower crops in India (Sandhu *et al.*, 1973)[6] This finding is also in line with (Makhdoomi *et al*., 1984)[7] who also reported that 43 insect species attack this crop whereas (Hassan *et al*., 1984)[8] identified 19 insect species for the same. There is an evidence of several insects forming pest complex which invade the sunflower crop plants significantly thereby causing composite infestation. *Helicaverpa armigera*, *Aphis gossypii* (Glover), *Bemisia tabaci* (Gennadius), *Amrasca devastans* (Ishida) and *Atractomorpha crenulata* (Fabricius) are also reported to attack the sunflower crop.[8] Among the species identified *B. tabaci* attack on sunflower has been seen to be the highest while the Bollworm was observed throughout the cropping season but its population remained low.

In the present studies the damage caused by the white flies & four other species was observed on sunflower in the four different areas of northern parts of Madhepura throughout the summer seasons including the month of April, May and June. During the research period it was found that the Gwalpara was highly infested by the whiteflies (Table 1). While Bihariganj showed the lowest infestation of whiteflies followed by differential degree of infestation by remaining four species as depicted in the comparative RA % graph.

**Fig : Site specific comparative RA % graph of five insect pests causing composite infestation on the sunflower plant dominated by the white fly *Bemisia tabaci***




## CONCLUSION

Whitefly (*Bemisia tabaci)* has been found to be the most dominant pest in the composite infestation of group of five insect on the sunflower plant, although Jassid/Leaf Hopper (*Amrasca biguttula*) and Head moth (*Helicoverpa armigera*) are also notorious pests of the sunflower crop. In this investigation the area that was highly infested by the whiteflies was Gwalpara area (S 1) of Madhepura, while Bihariganj (S 3) had the lowest infestation caused by the insect pest complex led by whiteflies. Screened sunflower hybrids showed significant susceptibility to the whiteflies and other species in the complex which were responsible for the colossal loss in the yield. Therefore it is recommended to plant the hybrid species over the normal sunflower strain to minimise the huge expenditures likely to be met by the farmers concerned in order to adopt measures to control them.

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