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# Incidence And Damage By *Agrotis ipsilon* (Hfn) on Different Genotypes of *Helianthus annuus* Linnaeus at Early Stages of Plants Under Field Conditions

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**Abstract**: To observe the incidence and damage of *Agrotis ipsilon* on different sunflower genotypes (Hysun-777, XF-263, Award, T-562, 9706, 9705, 9707, PSF-025, Parsun-1, 1435, $JH_1$ 99S, $JH_2$99S, PNSF1 and Hysun-33) a field experiment was conducted under UGC/UAAR Sunflower Project.Sunflower genotypes, 9706, $JH_2$ 99S and PNSF 1 showed somewhat partial resistance to *A ipsilon*. XF 263 and 9707 showed somewhat more susceptibility than Hysun-33.All other genotypes did not differ from Hysun-33 and thus were susceptible to *A. ipsilon*. The number of larvae of *A. ipsilon* and damage done by them were significantly and positively correlated. The genotypes which showed some resistance to the attack of *A. ipsilon* could be included in the programmes evolving genotypes resistant to the attack of this pest and thus pollution problems due to heavy use of insecticides could be minimized.

**Key words:** Incidence, *A. ipsilon*, host plant resistance, damage, cutworm, sunflower genotypes, pollution problems

## Introduction

Rohilla *et al.* (1980) and Khan and Aslam (1981) reported incidence of *Agrotis ipsilon*, cutworm (CW) on sunflower and indicated that caterpillars cut the young plants at night just above the ground level. Hashmi (1994) and Hatam (1994) declared CW as pest of sunflower. Aslam *et al.* (2000) reported that *A. ipsilon* damages the sunflower plants at the germinating and early stages of the crop when the plants are tender and soft. It is a nocturnal insect and generally damages the plants during night. Sometimes, when weather is cloudy, it continues damaging the plants thinking such type of weather as similar to night environment. It cuts the plants at the junction of the root and shoot (Aslam, 1994) and inflicts heavy damage to the sunflower which is an important oil seed crop and is also grown as an ornamental plant since ancient times. In Russia, Canada, Hungary, Yugoslavia, Romania and Chile, it is grown as ornamental as well as oil seed crop (Ram,1980). It is photo and thermo insensitive crop; therefore it can be planted twice a year i.e in spring and autumn.It can be fed as sillage and fodder, used as litter, fuel and soil improver. It has great importance for medicinal actions. The seeds have diuretic properties and contain 40-50 % oil. The oil is quite palatable, contains soluble vitamins A, D, E, K and is used in salads, cooking and margarines and as a lubricant. Singh *et al.* (1994) showed the incidence of Bihar Hairy Caterpillar on different genotypes of sunflower. They worked on 23 varieties of sunflower (*Helianthus annuus* Linnaeus) in Ludhiana, Punjab and other parts of India during 1990-1991. The cultivars CO-2, MSFH-32, MSFH-34, CSFH-292, CSFH-1, MSFH-30, PSFH-2 and PSFH-16 had the lowest infestation level of pest. Rafiullah *et al.* (1998) conducted experiment for screening of sunflower genotypes against different insect pests. They screened 23 genotypes for the presence of looper, whitefly and jassid at seedling and anthesis stages. Among the hybrids studied, Peshawer-28 and parental line RHA-274 showed resistance to whitefly at both stages of growth. Inayatullah and Busacca (1987) reported that at the density of 0.25, 4th instar larvae of *Feltia jaculifera,* the Dingy Cutworm per plant 6.74 % plants of sunflower were cut off, whereas at the larval density of 2/plant, 42.91 % plants were cut off. The experiment was conducted to observe the incidence and damage of CW on different sunflower genotypes so that appropriate control may be suggested against this pest including also the selection of some genotypes somewhat resistant against this pest. This study was also aimed to enhance the cultivation of sunflower in the area by demonstrating such research trials to the growers of the area through discussing with them the problems pertaining to insect pests and their proper solutions.

## Materials and Methods

The study was conducted to know about the incidence and damage by CW on different sunflower genotypes and to determine the resistance of sunflower genotypes against this insect pest under field conditions at Pind Gondal. The seed of fourteen genotypes of sunflower (Hysun-777, XF-263, T-562, Award, 9706, 9705, 9707, PSF-025, Parsun-1, 1435, $JH_1$ 99S, $JH_2$ 99S, PNSF1, Hysun-33) were collected from UGC/UAAR Sunflower Project and NARC, Islamabad.

The genotypes were planted in Randomized Complete Block Design during autumn, 2000 at Pind Gondal. The experimental plot was 150x300 $cm^2$ with 25 cm plant to plant and 75 cm row to row distance. Planting was done by dibbling with three seeds per hill. After germination of all genotypes one plant per hill was maintained by manual thinning. All the intercultural practices required for sunflower crop including thinning, hoeing, weeding out and earthing up etc. were also carried out at appropriate timings.

For data collection,the number of plants damaged by the CW per plot (Fig.1) were counted in the mornings at weekly basis and the per cent damage was computed for each plot. For the record of CW, the cracks and crevices of the soil around the damaged/cut plants were searched out with the help of small hoeing equipment (khurpa) and the number observed per plot was recorded. The data recorded were compiled and analyzed statistically using SPSS 7.5 for Windows (1996). Following Aslam, 1999, the level of resistance of different genotypes against this insect pest was also worked out keeping into view Hysun-33, a susceptible cultivar as a standard.

## Results and Discussion

There were great variations in the incidence and damage by *A. ipsilon* (Hfn) on different sunflower genotypes (Table 1 and 2). Rohilla *et al.* (1980) and Khan and Aslam (1981) also reported incidence of *A. ipsilon*, cutworm (CW) on sunflower and indicated that caterpillars cut the young plants at night just above the ground level. Hashmi (1994) and Hatam (1994) declared CW as pest of sunflower. Table 1 revealed that genotypes 9706, $JH_2$ 99S and PNSF1 attracted less number of CW larvae but this number did not differ significantly from that on 1435, Hysun-33, $JH_1$ 99S, Hysun-777, Parsun-1, PSF 025, 9705 and Award. XF 263 although attracted least number of CW, but the number was not different from those on 9705, Award, T562 and 9707.

Table 1 Average number of larvae of *A. ipsilon* found per plot in different sunflower genotypes at Pind Gondal

| Sunflower Genotypes | No. of Larvae Per Plot | Duncan Test |
|---|---|---|
| 9706 | 1.7500 ± .9574 | a |
| $JH_2$ 99S | 1.7500 ± .9574 | a |
| PNSF 1 | 1.7500 ± .5000 | a |
| 1435 | 2.2500 ± 1.2583 | ab |
| Hysun-33 | 2.5000 ± .5774 | abc |
| $JH_1$ 99S | 2.7500 ± .9574 | abc |
| Hysun-777 | 2.8750 ± 1.5478 | abc |
| Parsun-1 | 3.0000 ± .8165 | abc |
| PSF 025 | 3.5000 ± 1.7321 | abc |
| 9705 | 4.0000 ± 2.8284 | abcd |
| Award | 4.2500 ± 2.2174 | abcd |
| T 562 | 4.7500 ± 2.6300 | bcd |
| 9707 | 5.0000 ± 1.4142 | cd |
| XF 263 | 6.2500 ± 1.5000 | d |

Means followed by the same letters are not significantly different from one another at P=0.05

Table 2: Percent Plants of Sunflower Damaged by *A. ipsilon* per plot in different genotypes of sunflower at Pind Gondal

| Sunflower Genotypes | % Damaged Plants | Duncan Test |
|---|---|---|
| 9706 | 4.7500 ± 3.0957 | a |
| PNSF 1 | 4.7500 ± 1.2583 | a |
| $JH_2$ 99S | 5.2500 ± 4.5735 | a |
| 1435 | 6.7500 ± 3.7749 | ab |
| $JH_1$ 99S | 6.7500 ± 3.8622 | ab |
| Hysun-33 | 7.0000 ±1.8257 | ab |
| Hysun-777 | 7.2500 ± 2.2174 | ab |
| Award | 7.5000 ± 1.9149 | ab |
| T 562 | 8.2500 ± 2.8723 | ab |
| PSF 025 | 8.5000 ± 4.3589 | ab |
| 9705 | 9.2500 ± 5.9652 | ab |
| Parsun-1 | 9.5000 ± 2.0817 | ab |
| XF 263 | 12.0000 ± 2.1602 | bc |
| 9707 | 14.75 ± 1.7078 | c |

Means followed by the same letters are not significantly different from one another at P=0.05

Table 3: Correlation between Number of *A. ipsilon* per plot and % Plants of Sunflower Damaged by *A. ipsilon* per plot in different genotypes of sunflower at Pind Gondal

| | | Number | %Damage |
|---|---|---|---|
| Pearson Correlation | Number | 1.000 | 0.840** |
| | %Damage | 0.840** | 1.000 |
| Sig. (1 tailed) | Number | | 0.000 |
| | Damage | 0.000 | |

** Correlation is significant at the 0.01 level.

%damaged plants by CW in 9706, PNSF1, and $JH_2$ 99S was lowest but did not differ significantly from all others except XF 263 and 9707. In 9707 the number of per cent damaged plants was the highest but did not differ significantly from that on XF 263 (Table 2).

It could be concluded that the sunflower genotypes 9706, $JH_2$ 99S and PNSF 1 showed somewhat partial resistance against CW. XF 263 and 9707 showed somewhat more susceptibility than Hysun-33 and all other genotypes did not differ from Hysun-33 and thus were susceptible to CW. Inayatullah and

Fig 1: Sunflower Plant Damaged/Cut off by Cutworm at the Germinating Stage

Busacca (1987) reported different extent of damage to the sunflower at different density of Dingy cutworm. The number of larvae of CW and damage done by them were significantly correlated (Table 3).

The results also concluded that the genotypes which showed some resistance to the attack of *A. ipsilon* could be included in the programmes evolving genotypes resistant to the attack of this pest and thus pollution problems due to heavy use of insecticides could be minimized.

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