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## Response of advanced sunflower hybrids to head moth infestation

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**Abstract**

Sunflower is achieving the status of major oilseed crop of Pakistan. Nutritional profile of Sunflower oil ensures its safety for the humans. Insect pests are responsible for severe damage of quantity and quality of produce. A better strategy to cope with this menace is to develop hybrids which are less susceptible to the insects and tolerant to the ever-changing environment which imparts significant impact on insect population buildup. Aim of the study was to evaluate the fifteen newly developed sunflower hybrids for their susceptibility status to head moth. The tested sunflower hybrids showed variation in susceptibility to insects. However, it is concluded that all sunflower hybrids expressed less susceptible response to head moth. Incidence of head moth was minimum in case of three hybrids; FH-713, FH-743 and FH-744. Potential of these advanced hybrids should be further explored to strengthen their existing resistance capability.

**Keywords:** Sunflower, head moth, susceptibility, hybrid, evaluation

**1. Introduction**

Sunflower (*Helianthus annuus* L.) is an important oilseed crop in Pakistan and is regarded as a good source of edible vegetable oil in the world. Its nutritional value is widely accepted which ensures its safety for human consumption [9]. Pakistan is not self-sufficient in producing the edible oil in required quantity. So, the remaining required quantity of oil is imported which implies high costs and eventually impacts balance of trade [6]. Many insect pests infest sunflower and cause significant decrease in sunflower yield. Head moth is responsible for considerable losses [1, 7, 10, 11]. To save the crop from considerable losses and ensure the availability of edible oil in required quantity, it is need of the hour to study insect pests infesting sunflower and to find less susceptible germplasm for enhanced production. A major tool of keeping the insect pest population below Economic Threshold Level (ETL) is to use the healthy and less insect pest susceptible germplasm [11]. The present study was conducted to evaluate the inherent ability of these advanced sunflower hybrids against head moth so that these hybrids may be explored further if viable.

**2. Materials and Methods****2.1 Collection and sowing of germplasm**

15 sunflower hybrids viz; FH-712, FH-713, FH-714, FH-722, FH-723, FH-728, FH-734, FH-735, FH-739, FH-742, FH-743, FH-744, FH-747, FH-749 and FH-750 were obtained from experts working on development of sunflower hybrids in Oilseeds Research Institute (ORI), Ayub Agricultural Research Institute (AARI) Faisalabad, Punjab, Pakistan and was sown at Research Farm of ORI, AARI, Faisalabad. Randomized complete block design (RCBD) was adopted and hybrids were sown in three replicates. Appropriate as well standardized agronomic practices e.g. hoeing, thinning and weeds removal etc. except plant protection measures were carried out as and when required.

**2.2 Data Recording**

Five plants were randomly selected for data recording. Head moth larvae were counted when found in the heads/flowers of sunflower plants already selected.

## 2.3 Statistical Analysis

Data was analyzed, two-way analysis of variance (ANOVA) was constructed and the Least Significant Difference (LSD) was performed for the differentiation of means among sunflower hybrids.

## 3. Results

Two-way Analysis of variance (ANOVA) for Head moth was constructed and it expressed that insect incidence was significant for data recording dates ( $P=0.0000$ ) while it was non-significant for hybrids ( $P=0.3517$ ) and for Hybrids\*Dates interaction ( $P=0.1829$ ) at 5% significance level.

It is evident from Table 1 that no hybrid showed significant

difference for population of Head moth. Least population (0.0000) was found on FH-713, FH-743 and FH-744. Maximum population of head moth (0.7778) was recorded on FH-735. All other hybrids did not show any major difference from the above stated values and hence considered as one group because means with differing letters are considered as significantly different from each other. Hybrids showed the different response to incidence of head moth which did not differ greatly within all the tested hybrids. The insect population was below its ETL level throughout the cropping season which is considered at 1 over 5 inspected heads of sunflower.

**Table 1:** LSD Pairwise comparison of Sunflower hybrids' Susceptibility to Head moth

Hybrids	Head moth	Hybrids	Head moth	Hybrids	Head moth
1. FH-712	0.2222ab	6. FH-728	0.2222ab	11. FH-743	0.0000b
2. FH-713	0.0000b	7. FH-734	0.3333ab	12. FH-744	0.0000b
3. FH-714	0.4444ab	8. FH-735	0.7778a	13. FH-747	0.5556ab
4. FH-722	0.2222ab	9. FH-739	0.3333ab	14. FH-749	0.5556ab
5. FH-723	0.4444ab	10. FH-742	0.5556ab	15. FH-750	0.5556ab

Pairwise comparison from Table 2 states that incidence of head moth was at maximum (0.9333) in the end of the month of March-2018 while it was at its minimum (0.0222) in the mid of the month of April-2018. Incidence of head moth also increased (0.0889) in the end of the month of April-2018 but it is noteworthy to state that this increase was also less than the maximum population found in the end of the month of March-2018.

**Table 2:** LSD Pairwise Comparison for data recording dates and incidence of Head Moth

Date	Head Moth
30-03-2018	0.9333a
13-04-2018	0.0222b
27-04-2018	0.0889b

Hybrids\*Dates interaction was developed (Table 3). On first data recording date, maximum population (2.3333) was observed in FH-735. Lowest population (0.0000) was found in Hysun-33, FH-713, FH-743 and FH-744. All other hybrids showed significant difference with these stated hybrids and did not represent significant difference among themselves. It is noteworthy to mention here that means possessing different letters fall in different groups.

On second data recording date, maximum population (0.3333) was observed in FH-747. No incidence of head moth was observed on other hybrids. On third data recording date, maximum population (0.6667) was observed on FH-739. All other hybrids showed no incidence of head moth except FH-722 and FH-750 (0.3333) which showed difference in incidence to some extent with FH-739.

**Table 3:** Hybrids\*Dates interaction for incidence of Head Moth

Sr. No.	Hybrid	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	3 <sup>rd</sup> Date
1	FH-712	0.6667bcd	0.0000d	0.0000d
2	FH-713	0.0000d	0.0000d	0.0000d
3	FH-714	1.3333abc	0.0000d	0.0000d
4	FH-722	0.3333cd	0.0000d	0.3333cd
5	FH-723	1.3333abc	0.0000d	0.0000d
6	FH-728	0.6667bcd	0.0000d	0.0000d
7	FH-734	1.0000bcd	0.0000d	0.0000d
8	FH-735	2.3333a	0.0000d	0.0000d
9	FH-739	0.3333cd	0.0000d	0.6667bcd
10	FH-742	1.6667ab	0.0000d	0.0000d
11	FH-743	0.0000d	0.0000d	0.0000d
12	FH-744	0.0000d	0.0000d	0.0000d
13	FH-747	1.3333abc	0.3333cd	0.0000d
14	FH-749	1.6667ab	0.0000d	0.0000d
15	FH-750	1.3333abc	0.0000d	0.3333cd

## 4. Discussion

Head moth (*Helicoverpa armigera*) is considered as major yield limiting factor on different crops. It feeds on about 180 plant species [4]. Its control and management practices are much difficult owing to a number of reasons which may include: higher mobility, fecundity, survival rate and ability to develop resistance against insecticides [5]. So, the evaluation was made and germplasm proved effective against this insect pest as no hybrid was found to be susceptible. In fact, during the whole crop season its population did not reach its ETL.

Incidence of head moth can be proved through literature [2, 8, 3] as the hybrids studied during the present study are newly developed and have never been evaluated in the previous years. The difference in evidences of insect incidence might be due to different environmental conditions and the time of sowing which are responsible for significant impact on the population buildup of insect pests because it is an admitted fact that incidence of insect pests is always minimum if crop is sown at its standardized sowing time.

## 5. Conclusion

Head moth is considered to be the most notorious lepidopteran insect pest infesting the sunflower crop. In this hybrid evaluation experiment, no hybrid was found resistant against the head moth. However, all the tested hybrids showed less susceptibility against head moth. Moreover, three hybrids, viz; FH-713, FH-743 and FH-744 dominated all the other hybrids for their less susceptible status to head moth.

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