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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Insect Pests Complex of Sunflower, *Helianthus annuus* L.

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Abstract: The most important species attacking the sunflower crop are whitefly (*Bemisia tabaci* Gennad.), plant hopper (*Empoasca* spp), cabbage semilooper (*Thysanoplusia orichalcea* F.), hairy caterpillar (*Diacretia oblique* Walk.), green stink bug (*Nezara viridula* L.), *Helicoverpa armigera* Hubner and dusky bug (*Nysius inconspicuus* Distant.). The peak infestation of sucking pests, whitefly and plant hopper was observed in last week of May and first week of June, respectively on spring crop. Their population remained high upto the first week of October on autumn. Among the defoliators, the maximum population of cabbage semilooper was observed during the second week of April and again in the second week of September. The peak population of hairy caterpillar was recorded in the second week of October. However, the later pest did not appear during spring. Among the direct pests, the highest numbers of *H. armigera* Hubner was recorded in the first week of May. It did not attack during autumn. The highest population of dusk bug was noted in the first week of October as well as in the first week of June. These results, however, confirmed that whitefly is a serious pest on autumn sunflower while high population of plant hoppers during both the seasons caused more damage than that of whitefly. The present study also showed that cabbage semilooper may be a potential sunflower pest. The green stink bug and *H. armigera* Hubner. have found to be minor pests. The dusky bug might be classified as a serious pest of spring.

Key words: *Helianthus annuus* L., insect pests, spring, autumn, Pakistan

Introduction

Sunflower (*Helianthus annuus* L.) is an important oilseed crop of the world. It is grown twice a year (spring and autumn) in Pakistan. The crop is becoming popular and has been planted on 192 thousand hectare with 109 thousand tons production during 1997-98. However, its average yield (1456 kg ha⁻¹) is lower compared to advanced sunflower growing countries. The reason for low yield can be attributed to many factors. Among these, various insect pests attacking sunflower are of great importance. Broadley (1982) reported 45 insects and one mites species as pests of sunflower in Australia, Sandhu *et al.* (1973) reported 43 insect species attacking sunflower in India. The european sunflower moth, *Homaeosome nebulella* Hubner and a spider mite, *Tetranychus turkestanii* Ugarov and Nikolski (Acarina) are the key pests of sunflower in Iran. In Pakistan, Makhdoomi *et al.* (1984) reported 43 insect species whereas Hassan *et al.* (1984) listed 19 insect species, Satter *et al.* (1984) recorded *Helicoverpa armigera*, *Aphis gossypii* Glover., *Bemisia tabaci* Gennadius, *Amrasca devastans* (Shida) and *Atractomorpha crenulata* (Fabricius) while Piracha (1989) detected *Bemisia tabaci* (Gennadius), *Amrasca devastans* Dist., *Aphis gossypii* Glover and semilooper (unidentified) attacking sunflower crop.

Different insect pests cause different level of damage in different regions. For example, defoliating insects reduced sunflower yield by 267.2 kg ha⁻¹ while *H. armigera* caused 120 kg of seed loss per hectare in India (Panchabbavi and Krishnamoorthy, 1978). Insect species, their population and yield losses may vary in different areas or in different crop season. The exact estimates of yield losses due to insect pests attack are not known in Pakistan except a single report that whitefly and jassid cause 44 percent yield losses in Sindh Lohar (1987). In view of the economic importance of insect pests damage, the present study was undertaken to identify major and minor insect pests along with their peak activity period, damaging the sunflower crop at the National Agricultural Research Centre (NARC), Islamabad as a first step towards the assessment of yield losses by the insect species.

Materials and Methods

Sunflower, hybrid NK-265 was planted on July 27, 1997 and February 19, 1998 as autumn and spring crops, respectively at

National Agricultural Research Centre (NARC), Islamabad on ridges with 0.75 cm row to row distance and 0.25 cm plant to plant distance. The fertilizer and other agronomic practices were applied according to the local recommendations. After 15 days of germination, weekly observation were recorded for insect infestation till the maturity of the crop. Insect count were made on Fifteen plants selected randomly from each stripe (15 × 5 m). A total of 60 plants were observed for insects in four stripes. Whitefly and plant hoppers population were counted from three leaves selected one each from lower, middle and upper portion of the plant. semilooper, *H. armigera* and green stink bug were recorded from the whole plant and dusky bug was observed on sunflower heads. To collect the bug, the sunflower heads were shaken vigorously after covering them with muslin cloth bags. On removing the bags, their opening ends were knotted properly and were put in freezer at 0-5°C for 24 hours before counting the bugs.

Results and discussion

Whitefly, *Bemisia tabaci* Gennad. (Hemiptera; Aleyrodidae): It is a serious polyphagous pest causing heavy damages to different crops. Its infestation to sunflower crop has been previously reported in India (Sethi *et al.*, 1978), Israel and Pakistan (Khan *et al.*, 1978; Satter *et al.*, 1984; Piracha, 1989). During autumn, 1997, its infestation started from third week of August and remained throughout the crop season. The highest population of 2.8 per leaf (Fig. 1) was observed during the last week of August which was well above the economic threshold level of 1.5 per leaf worked out by Lohar (1987). While during spring, 1998, the pest was initially observed in 4th week of May and remained present in traces until the crop is harvested. The highest population i.e., 0.4 per leaf (Fig. 2) was during the 4th week of May which was far below the economic threshold. The results, however, confirmed that whitefly is a serious pest on autumn sunflower.

Plant hopper, *Empoasca* spp. (Hemiptera; Cicadellidae): The plant hoppers attacking sunflower plant have been previously reported by Khan *et al.* (1978). At NARC, the infestation of hoppers started in the third week of August with subsequent steady increase of

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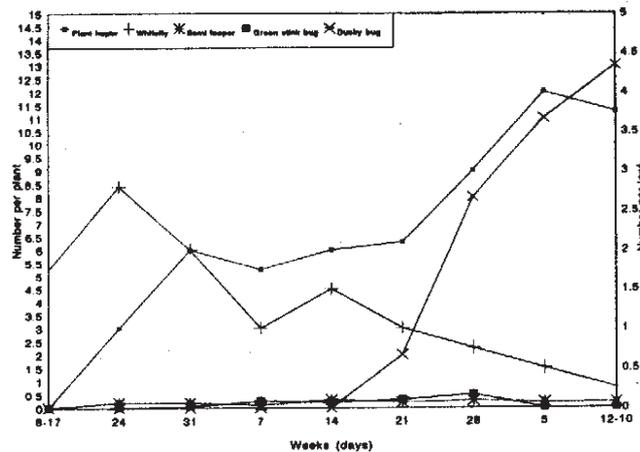


Fig. 1: Sunflower insect pests complex during autumn, 1997

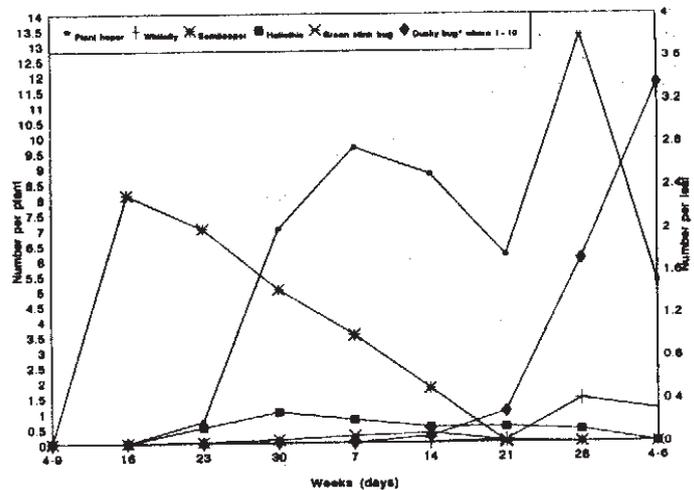


Fig. 2: Sunflower insect pests complex during spring, 1998

population up to the peak (4.0/leaf) during the first week of October (Fig. 1). The population remained high till end of crop season. During spring, 1998, the pest appeared in small number (0.2/leaf) in the third week of April. The population increased steadily and the peak population (3.8/leaf) was observed during the last week of May (Fig. 2). Then, the population declined, although remained active till the end of the spring crop. A high population of plant hoppers during both the growing seasons caused more damage than that of whitefly to sunflower.

Cabbage semilooper, *Thysanoplusia orichalcea* F. (Lepidoptera; Noctuidae): Its larvae attacked the crop in the third week of August and remained until crop maturity. The maximum population (0.3 per plant) was recorded in the second week of September during autumn, 1997 (Fig. 1). The pest attacked the crop from third week of April and remained until second week of May during spring, 1998. The population was maximum (8.1 per plant) during the second week of April and minimum (0.4 per plant) in the second week of May (Fig. 2). Although Piracha (1989) stated that it is not a regular pest of sunflower in Pakistan but the present study showed that cabbage semilooper may be a potential sunflower pest.

Green stink bug, *Nezara viridula* L. (Hemiptera; Pentatomidae): The sap sucking bugs attack the sunflower leaves. Its pest status has been reported by Hassan *et al.* (1984). At NARC, it appeared on

sunflower crop in the third to the last week of September during autumn season. The highest population was 0.3 per plant (Fig. 1). During spring, 1998, the attack of the pest was observed in the last week of April to the second week of May. The maximum population was 0.3 per plant during second week of May (Fig. 2). Obviously, *N. viridula* L. has found to a minor pest on sunflower crop.

***Helicoverpa armigera* Hubner. (Lepidoptera; Noctuidae):** The attack of *H. armigera* On 'sunflower has been reported by Singh *et al.* (1977) and Bhosale *et al.* (1990) in India and Makhdoomi *et al.* (1984) and Hassan *et al.* (1984) in Pakistan. The attack usually starts at bud stage on newly emerged leaves of sunflower plant, Larvae eat head as well as developing seeds. At NARC, the attack of this pest was found starting the last week of April upto the end of May, 1998. The highest number of larvae was 0.7 per head during the last week of April, after which the population declined (Fig. 1). Generally the larvae were found on young leaves of the plant. However, the pest did not appear on the crop during autumn, 1997. It can be concluded that *H. armigera* Hubner. is not a serious pest of sunflower at NARC.

Dusky bug, *Nysius inconspicuus* Distant. (Heteroptera; Lygaeidae): The *Nysius* genus is known to suck the cell sap by piercing the epidermis of plants. Although *N. vinitor* and *N. clelandensis* has been recorded on sunflower in Australia by Frazmann (1992) and

Broadley, 1978. The dusky bug, *N. inconspicuus* Distant. has been reported to attack sunflower for the first time in Pakistan (Kakakhel and Amjad, 1997). It appeared in the third week of September and continuously increased until the crop maturity/harvesting. The highest population before harvesting was 11 bugs per head (Fig. 1). While during spring season, its first attack was observed in the third week of May. Then, onwards, the population continuously increased until it reached the peak population i.e., 116.9 bugs per head (Fig. 2) during the first week of June, 1998. Moreover, this bug sucks the sap from the sunflower seeds in the late season, which might affect the seed germination and quality. *N. inconspicuus* was also found to cause serious damage to sunflower crop (Kakakhel and Amjad, 1997). Thus *N. inconspicuus* might be classified as a serious pest of sunflower during spring season on the basis of its high population and extensive damage to the crop.

References

- Bhosale, B.B., S.S. Shegar, G.G. Bilapate and G.M. Londhe, 1990. Chemical control of capitulum borer on sunflower. *J. Maharashtra Agric. Univ.*, 15: 113-114.
- Broadley, R.H., 1978. Insect pests of sunflowers. Advisory Leaflet No. 1433, Division of Plant Industry, Department of Prime Industries, Australia, pp: 1-10.
- Broadley, R.H., 1982. Insect and mite pests of Queensland sunflowers. Proceedings of the 10th International Sunflower Conference, March 14-18, 1982, Surfers Paradise, Australia, pp: 125-126.
- Frazmann, B.A., R.J. Lloyd and B.C.G. Scholz, 1992. The rutherghlen bug and grey cluster bug in Queensland. Their relation to sunflower. Proceeding of the 9th Sunflower Association Conference, April 28-29, 1992, Australia, pp: 94-97.
- Hassan, A.M., T. Mahmood and M. Ahmad, 1984. Insect pests of sunflower at Faisalabad. Proceedings of the National Workshop, April 28-30, Barani Agriculture and Development Project, NARC, pp: 39-42.
- Kakakhel, S.A. and M. Amjad, 1997. Biology of *Nysius inconspicuus* Distant. and its economic impact on sunflower (*Helianthus annuus* L.). *Helia*, 20: 9-14.
- Khan, K.A., M. Saddiq and R.M. Shafiq, 1978. Faunistic studies on oilseeds. Proceeding of National Seminar on Oilseeds, May 16-17, London, pp: 142-146.
- Lohar, M.K., 1987. Field evaluation of insecticides against jassid (*Amrasca devastans* D.) and whitefly (*Bernisia tabaci* G.) on sunflower crop. *Sarhad J. Agric. Res.*, 3: 215-220.
- Makhdoomi, S.M.A., M.N. Bhatti, M.A. Zia and M. Shafiq, 1984. Studies on insect pests associated with sunflower crops in Faisalabad. *J. Agric. Res.*, 22: 51-62.
- Panchabbavi, K.S. and P.N. Krishnamoorthy, 1978. Estimation of avoidable loss by insect pests on sunflower at Bangalore. *Indian J. Agric. Sci.*, 48: 264-265.
- Piracha, A.S., 1989. Response of different cultivars of sunflower to its major insect pests and their chemical control. M.Sc. Thesis, Agricultural University, Peshawar, Pakistan.
- Sandhu, G.S., K.S. Brar and J.S. Bhalla, 1973. Pests of sunflower and other insects associated with sunflower crop. *Oilseeds J.*, 3: 19-26.
- Satter, A., Karimullah and M. Yousuf, 1984. Insect pests of sunflower in NWFP, Pakistan. *Pak. J. Agric. Res.*, 5: 239-240.
- Sethi, G.R., K.M. Singh and H.H. Prasad, 1978. Incidence of insect pests on different varieties of sunflower. *Indian J. Entomol.*, 40: 101-103.
- Singh, K.M., G.R. Sethi, H. Parasad and A.K. Garg, 1977. Occurrence of *Aphis gossypii* Glov. as a pest of sunflower in Delhi. *ENT Newsletter Wat. Cent, Indian Agricultural Research Institute, New Delhi, India*, pp: 353.