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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

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

Pakistan Journal of Biological Sciences 3 (12): 2251-2252, 2000

Melittophily and Aphidophagy Found on Sunflower (*Helianthus annuus* Linnaeus) (Compositae) Genotypes

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Abstract: Sunflower plants also attract tremendous number of insects of beneficial nature (predators, parasites and pollinators including honey bees). To see which beneficial insects are attracted to which genotypes and to what extent, observations were made on different genotypes of sunflower and the bee pollinators (melittophily) and aphid feeders, *Coccinella* spp. (aphidophagy) found on different genotypes were recorded. The highest number of honey bees (*Apis* spp.) was attracted to Suncross-24 and the lowest to SF-187. On SMH-9706, SMH-9707, Parasun-1, SF-187 and Hysun-33, the number of honey bees attracted was the lowest. It was concluded that SMH-9707 attracted the highest number of lady bird beetles (*Coccinella* spp.).The genotypes SMH-9706, Parasun1, SF-187, Hysun-33 and Suncross-24 attracted statistically equal number of lady bird beetles. Hysun-33 had the highest number of aphids (*Aphis gossypii*) and on all other genotypes except SMH 9707, the number of aphids was intermediate. SMH 9707 had significantly lower number of aphids than Hysun-33. The lady bird beetles were found feeding on aphids on different genotypes of sunflower. These beneficial insects helped regulate the population of insect pests and also helped in the pollination of sunflower plants.

Key words: Beneficial insects, *Apis* spp., *Coccinella* spp., sunflower genotypes, pollination, melittophily, aphidophagy

Introduction

The sunflower is a good bee plant as it furnishes hive bees with large quantities of wax and nectar. Based on Patrick (1998), pollination is vital in producing many seed crops. Sunflower hybrids are self-fertile and depend less on insect pollination than earlier, self-incompatible varieties requiring insect pollination (primarily bees). Studies indicate that even current self-compatible hybrids benefit from insect pollination. Seed set, seed oil percentage, seed yields and oil yields increase when pollinators are present. *Apis* spp. are very important pollinators (melittophily) (Richard, 1978). Based on Skoric (1988), sunflower is very attractive to honey bees. Bees play an important role in pollinating sunflower plants because they are much visited by them. Based on Gaud and Giriraj (1999), pollination in a sunflower plant does not depend on its own pollen but on foreign pollen. According to Weiss (2000) older sunflower cultivars are basically insect pollinated and vary greatly in the degree of cross fertilization, or self-pollination, with quoted figures ranging from 5 to 95%, most commercial hybrids are virtually self-fertile. He further reported that sunflower is generally insect pollinated, principally by bees.

Coccinella spp. feed on aphids (aphidophagy) and other soft bodied insects (Thalji,1994). They reduce the number of aphids from sunflower agroecosystems (Arora *et al.,* 1998). The members of Coccinellidae are predacious feeding on other insects during their larval and adult stages, (Imms *et al.,* 1977). Lady Bird Beetles feed on aphids attacking agricultural crops (Bujaki and Szalay-Marzso, 1995). Based on Aslam (1994) the agroecosystem of sunflower should be least distrupted as natural enemies including *Coccinella* spp. are almost always busy in sunflower fields to reduce the number of aphids.

Keeping into view the growing importance of beneficial insects, it was desired to study their existence on different sunflower genotypes and to observe the phenomena of melittophily and aphidophagy on them.

Materials and Methods

Studies on beneficial insects found on different sunflower genotypes were conducted in the University of Arid Agriculture, Rawalpindi during spring 2000. The experiment was laid out in a completely randomized block design with 4 replications and 6 genotypes. Five plants were selected from each plot and number of beneficial insects found on each plant were counted on whole plant basis. The observations pertaining to melittophily and aphidophagy were recorded on four days interval. The data were analyzed using MStatC. Means were compared using LSD to see the differences in the number of insects attracted per plant to different sunflower genotypes.

Results and Discussion

Melittophily: Table 1 and 2 reveal that the highest number of honey bees was found on Suncross-24 and the lowest on SF-187.On all other genotypes, the number of the honey bees attracted was intermediate.The honey bees were found pollinating different flowers (Fig. 1). Honey bees (*Apis* spp.) are very important pollinators (Richard, 1978). These insects on the one hand pollinate our crop plants and on the other produce honey of medicinal value (Aslam, 1983, 1984, 1993) In search of one drop of honey, honey bee visits about 500-1000 flowers. Based on Aslam (1994) the activities of honey bees and other pollinating insects may not be disrupted as these insects help a lot, in the pollination process of sunflower plants. According to Sharma and Sharma (1997) there was variation in the extent of pollination by insects especially bees in different sunflower genotypes.

Aphidophagy: The analysis of variance for *Coccinella* spp. is presented in Table 3. Table 4 reveals that the genotype SMH-9707 had maximum number of *Coccinella* spp.(Lady Bird Beetles) which was significantly different from all other genotypes. All other genotypes did not differ from one another in attracting the number of beneficial insects, the Lady Bird Beetles. Hysun-33 had the highest number of aphids (*Aphis gossypii*) and on all other lines except SMH9707, the number of aphids was intermediate.SMH-9707 had significantly lower number of aphids than Hysun-33.

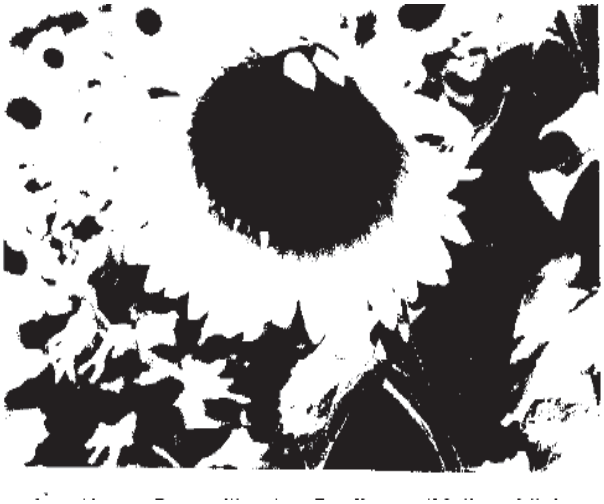

Fig. 1: Honey Bee pollinating Sunflower (Melittophily)

Fig. 2: Lady Bird Beetles Feeding on Aphids (Aphidophagy)

Table 1: Analysis of variance for honey bees

K Value	Source	Degree of Freedom	Sum of Squares	Mean Squares	F Value	Prob.
1	Replication	3	0.097	0.032	0.2031	0.0024
2	Factor A	5	1.064	0.213	1.3301	0.2549
4	Factor B	7	18.482	2.640	16.5004	0.0000
6	AB	36	5.532	0.158	0.9878	0.4667
7	Error	141	22.563	0.160		

Table 2: Mean number of *Apis* spp. attracted to different sunflower genotypes under field conditions

Sunflower Genotypes	Mean number of *Apis* spp.
SMH-9707	1.131 ab
SMH-9706	1.188 ab
Parasun-1	1.044 ab
SF-187	1.006 b
Hysun-33	1.156 ab
Suncross-24	1.212 a

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

Table 3: Analysis of variance for lady bird beetles

K Value	Source	Degree of Freedom	Sum of Squares	Mean Squares	F Value	Prob.
1	Replication	3	1.495	0.498	5.0443	0.0024
2	Factor A	5	1.216	0.243	2.4621	0.0358
4	Factor B	7	19.715	2.816	28.5025	0.0000
6	AB	35	3.486	0.100	1.0080	0.4667
7	Error	141	13.932	0.099		

Table 4: Mean number of *Coccinella* spp. attracted to different sunflower cenotypes under field conditions

Sunflower Genotypes	Mean of number *Coccinella* spp.	Mean number of Aphids
SMH-9707	0.6129 a	2.063 b
SMH-9706	0.4494 b	2.375 ab
Parasun-1	0.4438 b	2.225 ab
SF-187	0.4219 b	2.231 ab
Hysun-33	0.3938 b	2.594 a
Suncross-24	0.3625	2.394 ab

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

Rogers and Thompson (1978) also reported variations in the degree of resistance of different sunflower genotypes against aphid, *Masonaphis masoni.* The lady bird beetles were found feeding on aphids (Fig. 2). Thus the phenomena of aphidophagy were observed on almost all the genotypes of sunflower. Aslam *et al*. (2000) indicated that aphids damaged sunflower plants in 'barani' tracts of our country. Based on Aslam (1994) the agroecosystem of sunflower should be least disrupted as natural enemies like *Coccinella* spp. are always busy in the sunflower fields to reduce the number of aphids.

References

Arora, R., S. Kaur and A.S. Dhillon, 1998. Manipulation of Date of Sowing for Natural Control of Insect Pests in Sunflower Agroecosystem. In: Ecological Agriculture and Sustainable Development, Volume 1, Dhaliwal, G.S., R. Arora, N.S. Randhawa and A.K. Dhawan (Eds.). Centre for Research in Rural and Industrial Development, India, ISBN: 8185835381, pp: 449-456.

Aslam, M., 1983. Insects-both detrimental and beneficial. World Islamic Times, 3: 27-27.

Aslam, M., 1984. Insects and industry. World Islamic Times, 4: 44-44.

Aslam, M., 1993. Insects and flowers. Nation, 5: 5-5.

Aslam, M., 1994. Combating pests ravaqing sunflower. Nation, 6: 9-9.

Aslam, M., N. Suleman, A. Riaz, A. Rehman and Q. Zia, 2000. Insect pests found on *Helianthus annuus* Linnaeus (Compositae) in the Potohar region of Pakistan. Pak. J. Biol. Sci., 3: 963-964.

Bujaki, G. and L. Szalay-Marzso, 1995. Damage of aphids in sunflower production and study of their natural enemies. Bull. Univ. Agric. Sci. Godol., 1995: 143-158.

Gaud, I.S. and K. Giriraj, 1999. Pollen competition at gametophytic and sporophytic phases in sunflower (*Helianthus annuus* L.). Helia, 22: 57-62.

Imms, A.D., O.W. Richards and R.G. Davies, 1977. Imm's General Textbook of Entomology-Volume 2: Classification and Biology. Springer, Netherlands, ISBN: 978-94-011-6516-7, pp: 79-87.

Patrick, C.D., 1998. Managing insect pests of Texas sunflower. The Texas A&M University System, B-1488, pp: 1-8.

Richard, J.E., 1978. Fundamentals of Entomology. Prentice Hall Inc., USA., pp: 276.

Rogers, C.E. and T.E. Thompson, 1978. Resistance of wild *Helianthus* species to an aphid, *Masonaphis masoni*. J. Econ. Entomol., 71: 221-222.

Sharma, M. and V. Sharma, 1997. Effect of sowing date and sampling time on the nectar sugar content in sunflower. Crop Res., 13: 151-155.

Skoric, D., 1988. Sunflower breeding. J. Edible Oil Ind., 25: 1-90.

Thalji, R., 1994. Occurrence and distribution of aphidophagous coccinellids (Coleoptera: Coccinellidae) on agricultural crops and wild plants in Vojvodina. Zastita Bilja, 210: 279-291.

Weiss, E.A., 2000. Sunflower. In: Oilseed Crops, Weiss, E.A. (Ed.). 2nd Edn., Blackwell Science Ltd., London, pp: 205-243.