

## FLOWERING PHENOLOGY, POLLEN PRODUCTION AND INSECT BEHAVIOUR IN SOME ORNAMENTALS

J. A. TIDKE and RITA O. DHARAMKAR

Department of Botany, Amravati University, Amravati - 444602, India

Email : jaikiranidke@rediffmail.com

In present paper an account of flowering phenology, pollen production and the observations on insect visitors of *Papaver somniferum* Linn., *Iberis amara* Linn., *Dianthus caryophyllus* Linn., *Tithonia tagetiflora* Desf., *Phlox drummondii* HK; and *Antirrhinum majus* Linn; are given. All the plants are cultivated as ornamentals. The peak period of flowering in December to February and it stops with the onset of summer season. The average pollen production per flower was found to be 516096 in *Papaver somniferum*, 5226 in *Iberis amara* 37940 in *Dianthus caryophyllus*, 4578 in *Tithonia tagetiflora*, 14875 in *Phlox drummondii* and 159936 in *Antirrhinum majus*. In all species the flowers open during the morning hours. The flowers are visited by the bees like *Apis indica*, *A. dorsata*, *A. florea*, beetles, butterflies, solitary bees, grass hoppers etc. for nectar and pollen thereby bringing about the cross pollination. The number and frequency of insect visitors are found to be more in *Papaver somniferum* and *Dianthus caryophyllus*.

**Keywords :** Flowering phenology; Insect behaviour; Pollen production.

### Introduction

Floral biology is the science of flower life, a life begins with the ripening of one or other essential organs, such as the dehiscence of the first stamen or the attainment of receptivity by a stigma, and ends when stamens cease to be receptive<sup>1</sup>. In the process of reproduction in flowering plants the pollinators and flower mutually assure the reproductive success. For the knowledge of mode of pollination, fruit setting and reproduction, it is necessary to study the pollination ecology. Insects play a dominant role in pollination. There is a dearth of information on important aspects of floral biology and pollination ecology of seasonal garden plants from this region. The plants with attractive flowers and high reward levels are visited by various insect species. The insect pollinators are much sensitive to floral rewards, floral phenology and floral diversity.

### Materials and Methods

During this investigation of the seasonal flowering plants such as *Papaver somniferum* Linn., *Iberis amara* Linn., *Dianthus caryophyllus* Linn., *Tithonia tagetiflora* Desf., *Phlox drummondii* HK., and *Antirrhinum majus* Linn. were observed for flowering phenology, pollen production and behaviour of insect visitors. The seedlings of about 10-15 cm. length were collected from college of

Agriculture, Nagpur and planted in the Botanical Garden of Amravati University, Amravati. The flowering starts after 25-30 days from the date of planting. The dates of first and last flowering of these plants were recorded. The pollen production was done by taking the undehisced, mature anthers of the flowers. The pollen production was evaluated as per the method of Nair and Rastogi<sup>2</sup>. Mature, undehisced anthers were crushed in 5ml of 50% glycerine and pollen grains were counted by taking a drop of the mixture on the slide to observe under microscope. The timing of insects visit, time spent on a flower, number of flower visited per trip was observed. The present investigations were carried out during the period 2001-2002 in Botanical Garden of Amravati University, Amravati.

### Observations

Flowering of the plants under investigation was at the peak during the month of January and February which lasted upto the month of March. The flowering period and pollen production of each species was noted. (Table 1) The initial, peak and termination phases of flowering in *Papaver somniferum*, *Iberis amara*, *Dianthus caryophyllus*, *Tithonia tagetiflora*, *Phlox drummondii* and *Antirrhinum majus* were observed.

### Insect behaviour

*Papaver somniferum* : In poppy, petals were

red in colour. Number of insect visitors were found to be attracted towards the flowers. In these bees were the dominant foragers. The bees land on anthers to collect the pollen and deposited it in pollen basket. Anther dehiscence in bud condition during 0730 hr upto 1000 hrs before the opening of flower. The bees *Apis indica*, *A. dorsata*, *A. florea* visit the flowers and stay on flowers for few seconds to 2-3 minutes. Due to the movements of bees pollens from dehiscent anthers adhered to the insects body. During their flower to flower visits the pollen grains were deposited on the stigma of other flower, thus accomplishing the cross pollination. The bees start visiting the flowers from 0830 hrs and remain active upto 1130 hrs. The number of bees visited to the flowers was found to be more than the butterflies.

#### *Iberis amara*

Small sized yellow and white butterflies visited the flowers in search of food. The bees *Apis indica* and *A. florea* visit the flower and stay on them for few seconds. The insect visit timing was during 0900 hrs to 1100 hrs.

#### *Dianthus caryophyllus*

In the morning the flowers were found to be visited by many insects. In these bees and butterflies were the dominant visitors. The bees *Apis florea*, *A. indica* and *A. dorsata* visited the flower and stay on the flower for 5 to 60 sec or even sometimes for longer period. *Danais chrysippus* and *Calochryps shabo* were also visiting the flowers. Their visit lasted for 2 sec. to 10 sec. The butterflies were found to be faithful visitors. They visit the flowers between 0930 hr to 1030 hr. Occasional visits of bugs were also recorded.

#### *Tithonia tagetiflora*

Insect visitors were observed at different hours during peak flowering period. The bees and butterflies visit the flower during 0830 hr to 0900 hr. Bees visited the disc florets to collect pollen grains. Bees *Apis dorsata*, *A. florea* and *A. indica* collect the pollen and deposited it in pollen basket.

#### *Phlox drummondii*

The foragers start visiting the flowers from 0900 hrs. upto 1200 hr. The opening of flower was found to be 0800 hr. upto 0900 hrs. In this bees and butterflies were the dominant foragers. Bees *Apis indica*, *A. florea* visit the flowers for few seconds. The anthers were situated in corolla tube. The bees enter in corolla tube to collect the pollen grains. The butterflies *Danais chrysippus* visit the flower for few seconds. Medium size yellow black butterfly visit the flowers and lasting for 1 to 2 sec.

#### *Antirrhinum majus*

Insect visitors were observed at different hours during peak flowering period. Bees *Apis dorsata*, *A. florea* and *A. indica* collected the pollen grains and deposited it in pollen basket. The butterflies also visit the flower for few seconds. Occasional visit of spider was observed. Insects visit the flower mostly during 0930 hr. to 1130 hr.

#### Discussion

In *Papaver somniferum*, the colour of flower was dark red and in *Dianthus caryophyllus*, the colour of flower was violet, which is one of the reasons to attract the visitors towards the flower. The bright colour of the flowers is an important factor in attracting insect pollinators<sup>3</sup>. In *Dianthus caryophyllus*, the butterflies visit the flower for nectar. The butterflies with the help of proboscis, which was adapted for feeding on liquid diet, pay their visits to the flowers<sup>4</sup>. There is mutualistic relationship between butterflies and flowers as was also observed by Wiklund *et al.*<sup>5</sup>.

Pollen grains are numerous in number in *Poppy*, which attracts more visitors. Any adaptation that forces pollinators to visit increased numbers of flowers should be selectively advantageous<sup>6</sup>. In *Poppy* and *D. caryophyllus* bees were the principal pollinators and butterflies were rare. The data relating to the frequency of flower visitors, the number of flowers visited per unit time, the amount of pollen picked in their visits, helped to distinguish the

Table 1. Flowering phenology and pollen production.

Sr. No.	Name of Plants	Initial	Peak	Termination	Average no. of pollen grain/anther	Pollen production per flower
1.	<i>Papaver somniferum</i>	16.01.02	08.02.02	19.03.02	2016	516096
2.	<i>Iberis amara</i>	01.02.02	09.02.02	18.03.02	871	5226
3.	<i>Dianthus caryophyllus</i>	12.02.02	11.03.02	16.02.02	3794	37940
4.	<i>Tithonia tetragyniflora</i>	08.11.01	21.11.01	16.01.02	875	4378
5.	<i>Phlox drummondii</i>	09.02.02	19.02.02	20.03.02	2975	14875
6.	<i>Antirrhinum majus</i>	12.02.02	23.02.02	24.03.02	39984	159936

pollinators as principal or rare ones<sup>7</sup>. *Apis cerena indica*, noted for its efficacy as a pollinator<sup>8</sup> was found to be efficient in picking up pollen and it relatively more mobile was also recorded during the investigations. The insect visitors were more in number during the morning hours. Proctor and Yeo<sup>9</sup> states that excessively high temperatures often lead to scarcity of pollinating insects was also noticed during the investigation.

#### References

1. Percival M S 1965, *Floral biology*, Pergamon, Oxford.
2. Nair P K K and Rastogi K 1963, *Curr. Sci.* 32 566
3. Leppik E E 1977, *Floral Evolution in Relation to Pollination Ecology*. Today and tomorrow's Printers and Publishers, New Delhi.
4. Subba Reddi C and Meera Bai G 1984, *Proc. Indian Acad. Sci. (Anim. Sci.)* 93 (4) 391.
5. Wiklund C, Eriksson T and Lundberg H 1979, *Oikos* 33 256
6. Cruden R W, Hermann H M and Peterson S 1983, *Patterns of nectar production and plant-pollinator coevolution; in the biology of nectaries* (eds) Barbara Bentley and Thomas Elias (New York; Colombia University Press) pp 80.
7. Baker H G, Cruden R W and Baker I 1971, *Bioscience* 21 1127.
8. Mehrotra K N 1983, *Second International Conference on Apiculture in tropical climates*, IARI (New Delhi : Yugantar Press)
9. Proctor M and Yeo P 1972, *The pollination of Flowers*, Taplinger Publishing Co., New York.