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Flowering Phenology, Pollen Production And Insect Behaviour In Some Crops Around Arvi, District Wardha

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Abstract

In present paper an account of flowering phenology, pollen production and the observation on insect visitors *of Brassica campestris L. Raphanus sativus L, Allium cepa L., Gossypium hirsutum L. Cajanus cajan L.* are given. All the plants cultivated as crops.In*Brassica campestris*Flowering stars from third week of November and peak period was first week of December and it lasts upto first week of January,*Raphanus sativus* Flowering stars from third week of November and full bloom was in second and third week of December and ends towards second week of January, *Allium cepa* flowering starts form second week of February and peak period was during third week of February to first week of March and its lasts upto third week of March, *Gossypium hirsutum* Inflowering stars from second week of September and peak period was observed during third week of September and termination phase was observed during third week of JanuaryIn *C. cajan,* flowering stars from second week of October and full bloom was in last week of October and ends towards last week of December. The average pollen production per flower was found to be 14034 in *Brassica campestris,*16093 in *Raphanus sativus,* 33940 in *Allium cepa,* 15175 in *Gossypium hirsutum* and 14928 in *Cajanus cajan*. In all plants the flowers open during the morning hours. The flowers are visited by the bees like *Apis indica, A. dorsata*, A. Florae, beetles, butterflies, solitary bees etc. for nectar and pollen thereby bringing about the cross pollination. The number and frequency of insect visitors are found to be more in *Brassica campestris* and Allium cepa.

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 [1]. In the process of reproduction in flowering plants the pollinators and flowers mutually assured reproductive success. For the knowledge of mode of pollination, fruit setting and reproduction, it is necessary to study the pollination ecology. Insect play a dominant role in pollination. There is a dearth of information on important aspects of floral biology and pollination ecology of seasonal crop 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.

Objective of the Study

The foremost objective of this work is to know the role of insects in general and bees in particular in pollination in the crops cultivated around Arvi Dist Wardha. and thus, to enhance the yield. Another objective in focus is to record that in the absence of crops the wild vegetation provides sustenance to the pollinators and enabling them to live until the crops are grown. It is also intended to note the population of pollinators, their activity, behavior and their role in crop pollination.

Materials and Methods

During this investigation of the seasonal crop plants such as *Brassica campestris L. Raphanus sativus L, Allium cepa L., Gossypium hirsutum L. Cajanus cajan L.* were observed for flowering phenology, pollen production and behaviour of insect visitors. The crops were selected from different locality of this region. The dates of first and last flowering of these plants were recorded. The pollen production was done by taking the dehisced, mature anther of the flowers. The pollen production was evaluated as per the method of Nair and Rastogi[2]. Mature, dehisced anthers were crushed in 5 ml of 50% glycerin and pollen

grains were counted by taking a drop of the mixture on the slide to observe under microscope. The timing of insect visit, time spent on a flower, number of flowers visited per trip was observed. The present investigations were carried out during 2005 to 2006 in the filed where the crops were cultivated

Observation

Flowering Of the plants under investigation was at the peak during the respective month for each plant. The flowering period and pollen production of each plant was noted (Table 1). The Initial, peak and termination phases of flowering in *Brassica campestris L. Raphanus sativus L, Allium cepa L., Gossypium hirsutum L. Cajanus cajan L.* were observed.

Insect behaviour

Brassica campestris:

In mustard, petals were yellowish in colour. Number of insect visitors were found to be attracted to the flowers. In these bees were the dominant foragers. The bee land on the anthers to collect the pollen and deposited it in pollen basket. Anther dehiscence takes place during 09.30 to 10.30. The bees *Apis indica*, *A. dorsata, A. florea* visit the flower and stay on the flower for few seconds to 3 to 4 minutes. Due to the movements of bees pollen from dehisced anther adhered to the insect body. During their flower to flower visit the pollen grains were deposited on the stigma of other flower, thus accomplishing the cross pollination. The bees start visiting the flowers from 8:30 am and remain active upto 11:30 am. The number of bees visited to flowers was found to be more than the butterflies.

Raphanus sativus

Small sized yellow and white butterflies visited the flowers in search of food. The *Apis indica* and *A. florea* visit the flower and stay on them for few seconds. The insect visit timing was during 7:00 am to 11:30 am.

Allium cepa

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 indica*, *A. dorsata, A. florea* visited the flower and stay on the flower for 5 to 60 seconds or even sometimes for longer period. *Danais chrysippus* and *catochrysops shabo* were also visiting the flowers. Their visit lasted for 2 to 4 sec. The butterflies foud to be faithful visitors. They visit the flowers between 8:30 am to 11:30 am..

Gossypium hirsutum

Insect visitors were observed during the morning period during the peak flowering period. The bees and butterflies visit the flower during 8:00 am to 10:30 am. Bees visited the flower to collect pollen grains. Bees *Apis indica*, *A. dorsata, A. florea* collect the pollen and deposited it in pollen basket.

Cajanus cajan

In *C. cajan* the flowers yellowish in colour. The frequency of insect visitors was found to be more. The visitors especially bees visit the flowers during morning hours at 07.30 to 12.30 hrs. and in evening 16.00 to 18.0 hrs. *Trigona A. florea A. dorsata cerena* indica and flying bee (unidentified) visit the flower for 4 to 72 second or even some times for longer period. The butterflies and *Xylocopa* spp. were found to be regular visitors. The butterflies visit flower during 09.00 to 17.00 hrs and visit the 1 to 4 flowers per bout and stay for 5 to 48 second. The Xylocopa spp visit the flower during 08.30 to 17.30 hrs and visit 1 to 8 flowers per bout stay for 4 to 38 second. The other occasional visitors such as beetle, ants, housefly and spider visited the flower. They remain on the flower for longer period

Table 1 Flowering Phenology and Pollen Production

Sr.No.	Name of Plants	Initial	Peak	Termination	Pollen production per Flower
1	*Brassica campestris*	22.11.06	7.12.06	6.01.07	14034
2	*Raphanus sativus*	28.11.06	16.12.06	14.01.07	16093

3	*Allium cepa*	13.02.07	05.03.06	24.03.07	33940
4	*Gossypium hirsutum*	12.09.06	29.09.06	27.01.07	15175
5	*Cajanus cajan*	13.10.06	26.10.06	28.12.06	14928

Discussion

In *Brassica campestris*,and *Cajanus cajan* the colour of flower was yellowish bright which is one of the reason to attract the visitors towered the flowers. Bright colour of the flowers is an important factor in attracting insect pollinators[3]. In *Gossypium hirsutum* 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[4]. There is a mutualistic relationship between butterflies and flowers as was also observed by Wiklund et al[5].

Pollen grains are numerous in number in *Allium cepa* which attract more insect visitors. Any adaptation that forces pollinators to visit increased numbers of flowers should be selectively advantageous[6]. 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 pollinators as principal or rare ones[7]. *Apis cerana* indica, noted for its efficacy as apollinator[8] was found to be efficient in picking up pollen and it recorded during the investigation. The insect visitors were more in number during morning hours. Proctor and Yeo[9] states that excessively high temperature often lead to scarcity of pollinating insects was also noticed during the investigation.

Conclusion

The average pollen production per flower was found to be 14034 in *Brassica campestris,*16093 in *Raphanus sativus,* 33940 in *Allium cepa,* 15175 in *Gossypium hirsutum* and 14928 in *Cajanus cajan which* assures the higher fruit and seed set. Availability of more pollen grains and abundance of flower visitors is again found to be responsible for higher yield. It is concluded from the above during the observations that the insect visits synchronize with the time of nectar secretion reflecting the mutualistic relation between flower and insect visitor. In *A.cepa*dorsata, large size black colour bee (unidentified) small black colour bee (unidentified), A. florea, Xylocopa spp. and Flying bee (unidentified) were regular visitors. Bees are found to be dominant and important pollinators.

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