

Flowering phenology and Pollen Histochemical analysis of *Gossypium Sp.*

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Abstract

Phenology is the study of timing of vegetative activities, flowering and fruiting and their relationships to environmental factors. "Flowering Phenology" refers to the seasonal timing of flowering. Pollen histochemical analysis are carried out for , possible relation between the pollen content and the mode of pollination , study of pollinator foraging behavior, nutritional demands, pollination mode, pollen content and composition in relation to phylogeny. Lipids and starch are important constituents of the pollen grains to establish the relations with flower foragers. From the histochemical tests it was noted that the pollen grains of all cotton varieties contains starch and lipids. Thus the Pollen grains of all cotton varieties belong to the class of starchy pollen as in all varieties it showed positive test. From the histochemical tests it was noted that the pollen grains of all cotton varieties contains starch and lipids. Pollen histochemistry is possibly related to pollination mode, pollinator foraging behavior and phylogeny. The nutritive value of pollen also influences the behaviour of flower visitors.

Keywords: *Gossypium, Pollen , Starch , lipid, IKI, Sudan IV*

I INTRODUCTION

A phenological record depends on parameter chosen by the various investigators and depends on the research levels, the aim of the research, and the type of analysis. The main events are the timing, duration, sequence, intensity and timing of flowering, which can determined by the physical environment factors like temperature, rainfall and day- length (Dafni, 1992). Plants reproductive characteristic can affect the flowering phenology, mode of seed dispersal and fruiting seed set efficiency. A wide variety of environmental factors may select for one or more reproductive characteristic in plant population (Smith *etal*, 1986) and such factors include seasonal climatic events (Schemske, 1977). The basic Palynology can also be referred investigations of pollen and spore dispersal, preferably by wind and water and of the pollen and spore content of peat and sediments under formations. Understanding the Palynology of commercially important crop plants like cotton is

an important aspect of investigations. The genus *Gossypium* is known as cotton. Cotton is a valuable crop plant. It is used as a textile fiber because the mature dry hairs twist in such a way that, fine strong thread can be spun from them. Other byproducts, such as cottonseed oil, cake and cotton linter are very useful products. The variety of cotton comes under four cultivated species of *Gossypium* viz. *G.hirsutam*, *G. barbadense*, *G. arborium* and *G. herbacium*. India is only the third largest producer of cotton in the world. In fact, India is the first country in the world to deploy hybrids and at present some 90 varieties of cotton belonging to all four botanical species (*Gossypium arboreum*L., *G. herbaceum*L., *G. hirsutum*L. and *G. barbadense*L.). Of these, only 25 varieties account for 98 per cent of the total output. The other 65 varieties have poor fibre strength and are of short fibre length. Some of these varieties were once popular, but have now outlived their usefulness. There is a need to denotify these varieties and develop their substitutes (Choudhary and Laroia, 2001).

Pollen histochemical analysis are carried out for the following reasons i) possible relation between the pollen content and the mode of pollination ii) study of pollinator foraging behavior, nutritional demands, pollination mode, pollen content and iii) composition in relation to phylogeny (Dafni, 1992). Lipids and starch are important constituents of the pollen grains to establish the relations with flower foragers.

II MATERIAL AND METHODS

For the collection of phenological data of selected cotton varieties, field trips were undertaken daily or on alternate days. Events and the changes of the single flower are recorded to study the flowering phenology in relation to geographical (latitudinal and altitudinal) and climatic variables, the time and duration of pollen exposure and the interrelations among environmental variables (temperature and humidity) and flower development were noted.

Plants were observed from the beginning of flowering stage up to the opening of last flower. Flowering period was taken as the period from the opening of first flower up to the opening of last flower. The timing of onset, progress, termination and blooming of selected varieties under study were noted.

For the histochemical tests fresh and mature pollen grains were collected from freshly dehisced anthers. For the test of starch method proposed by Baker and Baker (1979) was followed. Pollen samples were immersed in to IKI solution and examined under the microscope for the change in colour. Dark bluish-black color indicates the presence of starch. For the estimation of lipids pollen sample were kept in freshly prepared stock solution of Sudan IV and treated pollen sample was observed under microscope within 2-3 minute to note the change in colour. A red color indicates the presence of lipid (Baker and Baker, 1983).

III RESULTS AND DISCUSSION

Phenology is the study of the timing of biological events. According to Mori and Prance (2005) phenology is the study of timing of vegetative activities, flowering and fruiting and their relationships to environmental factors. The events included under phenological studies are the timing, duration, sequence and intensity. Timing of flowering can be determined by the physical environment factors like temperature, rainfall and day- length (Dafni, 1992).

Dafni (1992) commented that pollen histochemistry is possibly related to pollination mode, pollinator foraging behavior and phylogeny. All Angiosperm pollen grains contain stored food reserves in the forms of starch and /or lipids and can be classified in two classes, 'starchy' and 'starch less' (Baker and Baker, 1979). Many studies have shown that all Angiosperm pollen contains some lipids, while starch are not always present (Wang *et al*, 2004). Possible ecological and taxonomic (including phylogenetic) correlation with their presence or absence has also been discussed by Baker and Baker (1979). Pollen grains of all the varieties of cotton studied showed the presence of both starch and lipids. Thus the Pollen grains of all cotton varieties belong to the class of starchy pollen as in all varieties it showed positive test From the histochemical tests it was noted that the pollen grains of all cotton varieties contains starch and lipids.

IV CONCLUSION

Flower opening in all varieties starts during 06.45 to 09.45 hours depending on the weather conditions. During cloudy and rainy days flowers starts to open after 07.30 hours depending on prevailing temperature. The anther dehiscence in all varieties was observed during 07.00 to 08.30 hours. The stigmas become receptive before anther dehiscence. The stigmas were viscid and shiny and remained receptive for about 8 hrs. After 03.00 hours it becomes blackish in colour indicating loss of receptivity. The opened flowers starts to withered by the evening on same day. From the observations on flowering phenology, it is noticed that the flowering phenology is related with seasonal variations and environmental conditions and has an impact of different environmental factors.

From the histochemical tests it was noted that the pollen grains of all cotton varieties contains starch and lipids. Pollen histochemistry is possibly related to pollination mode, pollinator foraging behavior and phylogeny. The nutritive value of pollen also influences the behaviour of flower visitors.

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