

POLLEN STUDIES IN *ANTHURIUM ANDREANUM* LIN.

M. R. Bindu and S. T. Mercy

College of Agriculture, Vellayani 695 522, Trivandrum, India

Abstract: Floral biology and pollen characters of five varieties of *Anthurium andreanum* Lin. have been studied. It was observed that the species is protogynous. Anthesis occurred during early morning hours. The plant produces a large number of pollen grains per anther which are more or less uniform in size, round in shape with a single germ pore. Only a small percentage of pollen grains is fertile which reflects the hybrid nature of the species. Determination of pollen fertility by *in vitro* pollen germination method is found to be more accurate than by acetocarmine staining.

Key words: Anthesis, floral biology, pollen fertility, pollen stainability.

INTRODUCTION

Anthurium andreanum Lin., one of the commercial flower crops of India, is the best known among the anthurium. Their flowers (spadices) persist in a perfect state for weeks and a plant is rarely without a 'flower' all the year round. In the present investigation, an attempt has been made to study the flowering behaviour and pollen characters of five commercially important local cultivars of *A. andreanum*.

MATERIALS AND METHODS

Pot culture experiment with five cultivars, viz., Honeymoon Red, White (album), Lady Jane, Chilli Red and Pink was conducted with four replications at the College of Agriculture, Vellayani, Trivandrum during 1990-92. The observations recorded were time of flower opening and anthesis, pollen size and shape, pollen production per flower and pollen fertility.

RESULTS AND DISCUSSION

Observations revealed that each spadix has a flower bearing axis or candle containing about 150-250 flowers and a broad and brightly coloured subtending bract or spathe. The flowers are bisexual and regular with four perianth parts, four stamens and bicarpellary superior ovary. Flowers are protogynous with the gynoecium maturing first, from the base of the candle to the top in an acropetal succession in all the five varieties observed. Receptivity of the stigma is identified by the presence of honey dew or a viscous stigmatic exudate on

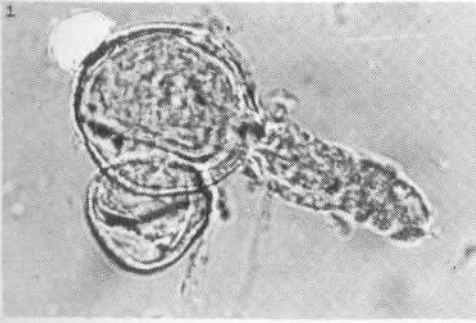
the candle and insect activity (bees, ants etc.). The female phase for the species varied from 3 to 12 days. The stigmatic droplets dry up before any stamens emerge out. The separation period or the interphase between the female and male phases for the species ranged from 4 to 7 days normally. During rainy season, the interphase is usually more prolonged and or the male phase may even be completely suppressed. Sometimes a few stamens appear on the candle irregularly. Normally the male phase starts with the emergence of the four stamens which are clustered around the stigma of each flower as reported by Croat (1980) in *Anthurium lenti*. Anther exertion starts from the base and proceeds regularly towards the apex and thus one candle may be in male phase for 3 to 7 days.

Anthesis and anther dehiscence occur during the early morning hours, i.e., 8 a.m. to 10 a.m. as they are favoured by moderately low temperature and high relative humidity of the day. During rainy days anther dehiscence and liberation of pollen are delayed.

The average pollen grain size of the varieties is not significantly different when compared. The variety Lady Jane with the smallest spathe and candle had the largest sized pollen grains (87.2 μm x 68.0 μm). The more or less uniform pollen grain size is a reflection of the stable chromosome number of $2n = 30 + 2B$ for all the varieties studied (Singh, 1962). The small variations exhibited by these varieties can be explained as natural intraspecific differences usually associated with cultivars belonging to the same species. Pollen grains of all the varieties are round with a single germ-

Table 1. Flowering behaviour and pollen characters of five varieties of *Anthurium andreaeanum*

Variety	No. of days taken for flower maturity	Pollen grain size, in μm	Pollen production per anther	Pollen fertility %	
				by acetocarmine staining	by <i>in vitro</i> germination
Honeymoon Red	19.5	81.0 x 74.0	1650	20.4	11.6
White	18.0	82.6 x 74.0	1313	24.2	13.9
Lady Jane Pink	12.8	87.2 x 86.4	1213	21.4	9.7
Chilli Red	15.5	83.6 x 72.0	1438	21.7	10.4
Pink	22.3	81.8 x 68.0	1725	28.8	17.9

Fig 1. Microphotograph (6685x) of a pollen grain germinated *in vitro* (variety : Pink)

pore and a uniform external morphology. So varietal identification by studying pollen grains under a light microscope is not feasible here as in crops like *Chrysanthemum morifolium* (Shim *et al.*, 1989), where external morphology of pollen has been established as a varietal character.

With regard to pollen production per flower, the variety Lady Jane produced the lowest amount of pollen and the variety Pink produced the maximum (Table 1). Pollen production was found to be positively correlated to anther size, flower size and plant height.

Pollen fertility was tested by acetocarmine staining and *in vitro* pollen germination methods and was found to be quite low. The *in vitro* pollen germination was done in a solution of 0.5 M sucrose and 100 ppm boric

acid. The results of these studies showed that the pollen fertility of *Anthurium andreaeanum* by acetocarmine staining method varied from 20.4 to 28.8% (Table 1 and Fig. 2) which is in conformity with the observations of Lalithambika (1978) and Satyadas (1985) while in the case of *in vitro* pollen germination method, the fertility ranged from 9.7 to 17.98 (Fig. 1). Pollen germination is found to be proportional to stainability. The present investigation indicates that acetocarmine staining method only gives an approximate estimate of pollen viability while the *in vitro* pollen germination method gives the actual pollen germination percentage. So it is more reliable to consider the latter as a functional test of pollen fertility.

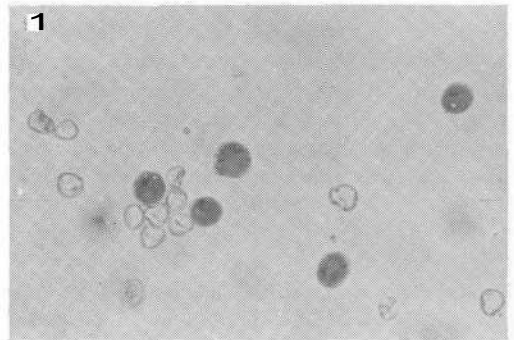


Fig 2. Microphotograph of pollen stainability (2675x) [Sterility: 75.80%; Variety: Pink]

The high pollen sterility observed in this species can be due to the high degree of meiotic abnormalities, such as clumping,

lagging of chromosomes, unequal segregation, chromosome elimination, formation of micronuclei etc. This might be due to the hybrid nature of the species *Anthurium andreanum* which is probably a naturally evolved secondary polyploid (Sheffer and Kamemoto, 1976).

REFERENCES

- Croat, T. B. 1980. Flowering behaviour of neotropical genus *Anthurium* (Araceae). *Am. J. Bot.* 67 : 888-904
- Lalithambika, K. 1978. Cytological studies on twelve species of *Anthurium* with special reference of *B. chromosomes*. M.Sc. thesis, University of Kerala, Trivandrum, India
- Satyadas, J. 1985. Karyomorphological studies on eight species and varieties of *Anthurium* with special reference to B chromosomes. M.Sc. thesis, University of Kerala, Trivandrum, India
- Sheffer, R. and Kamemoto, H. 1976. Chromosome numbers in genus *Anthurium*. *Am. J. Bot.* 63 : 74-81
- Singh, S. N. 1962. Studies on the morphology and viability of pollen grains of litchi. *Hort. Adv.* 6 : 28-53
- Shim, K. K., Sub, B. K., Han, B. K. and Park, S. H. 1989. A palynotaxonomic study of some *Chrysanthemum* species. *J. Korean Soc. Hort. Sci.* 30 : 224-233