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DESCRIPTION OF POLLEN MORPHOLOGICAL STUDIES OF *Adina cordifolia* Linn. (RUBIACEAE)

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ABSTRACT

The pollen grains of *Adina cordifolia* Linn. (Rubiaceae) were observed by SEM and light microscope and recorded their pollen description. Pollen grains are tricolpate, oblate and sub-spheroidal in shape. The exines reticulate and size of pollen is 45 x 42 µm. The outer and inner surface of colpus membrane is densely verrucate. The tectum is medium and corsely reticulate. The average number of pollen grains produced per anther is 8,000 - 9,000 and pollen grains per flower is 40,000 - 45,000. The number of ovule/flower is two and pollen-ovule is 21,000 : 1.

Keywords: Pollen grains, Morphology and *Adina cordifolia.*

INTRODUCTION

Adina cordifolia Linn. belongs to the family Rubiaceae, is a large deciduous tree with a large crown and straight, fluted bole upto 18m in height (Chadha, 1985). It is found scattered in deciduous forests through the greater part of India ascending to an altitude of 900m in the Sub-Himalayan tract. It also occurs in the forests of South India, especially in Eastern Ghats and Karnataka. It is called as *Haldu* in Hindi, *Keli kadam* in Bengali and Assam, *Manga Kadamba* in Tamil, *Heddi* in Marathi, *Bahuphala* in Sanskrit, *Pasupu kadamba* in Telugu, *Kath kadamba* in Brij Mandal region. Bark light grey, 1.8 cm thick, blaze light red inside with white streaks, leaves 10-30cm in diameter, broadly ovate, flowers yellow in globose, pedunculate heads capsules, splitting into two dehiscent cocci, seeds minute. In its natural habitat, the absolute maximum shade temperature varies from 38°C to 47°C, minimum temperature from -1°C to 11°C and normal rainfall from 85 to 375 cm.

Wood is yellow when fresh cut and changing into reddish brown and moderately hard, it is used for construction, furnitures and agricultural equipments. Bark is used as antiseptic and in fever, juice extract of plant is used in killing the worms (Chopra *et al.,* 1956). The present investigation mainly deals with the pollen morphological studies in *Adina cordifolia* Linn. plant in Brijmandal region at Agra-Mathura Highway near Runukta (Keetham lake), Agra district. The nature of size, aperture, position, structure, shape and surface features of pollen grains were also studied. Pollen grains are tricolpate, oblate and sub-spheroidal in shape. Exine is reticulate and size of pollen is 45 x 42 µm. Pollen production per anther is 8,000-9,000 and pollen per flower is 40,000-45,000. The pollen morphology has been studied from several species of Rubiaceae family by Erdtman (1923).

MATERIAL AND METHODS

The present study was carried out on *Adina cordifolia* Linn. growing at Agra in different seasons. For identification of the speices, the specimen were collected in the field from fresh specimens and from herbarium specimens. These were identified at FRI, Dehradun (Uttaranchal). Flowers were collected at various stages of their development from the field and kept in ethanol (70%) for 1 hr. The flowers of herbarium specimen were kept in ethanol (70%) for 24 hr to remove the fatty acids present in flowers. The slides of pollen have been prepared by acetolysis and chlorination method (Erdtman, 1952). The pollen grains from freshly dehisced anthers were mounted in a drop of 50% aqueous glycerine placed on a microslide. Pollen diameter was measured with a calibrated occular micrometer and the values were converted to µm.

Morphology of pollen grains were studied with SEM and light microscopic observations on floral parts which showed the ultra structure of anther and pollens. Anthers are dehisce by a longitudinal slit releasing large number of pollen grains. The mature undehisced anthers were encored in a solution of sodium hydroxide (1N, 1hr) at 60°C, washed in tap water and mounted in solution of acetocarmine (50%) and glycerine (50%) in 1:1 ratio. Each anther was gently squashed to

release the pollen and pollen grains were observed under microscope and recorded the total number of pollen grains. This number was multiplied with the total number of anthers to calculate the number of pollen grains produced from anthers and the total pollen production per flower was determined.

Description of pollen grains:

Pollen grains of *Adina cordifolia* Linn. are tricolpate, oblate, sub-spheroidal in shape and 45 x 42 µm in size which are more or less round. The outer and inner surface of colpus membrane is densely verrucate. Colpi is linear, pointed in both ends. The tectum is medium and coarsely reticulate. The terminology in the description of pollen grains is the same as proposed by Erdtman (1952) and Hyde and Adam (1958). Pollen production was calculated following the method described by Cruden (1977).

RESULTS AND DISCUSSION

The pollen grains of *A. cordifolia* are usually tricolpate, oblate, sub-spheroidal in shape but changes from spheroidal to prolate in dried specimens. The exine is reticulate and most of the pollen grains are rather thin and the size of pollen is 45 x 42 µm. It showed that the pollen production per anther is 8,000-9,000 and pollen per flowers are 40,000-45,000. The number of ovules per flower is two and the pollen ovule ratio is 21,000:1. Pollen grains number produced by plant reflects the number of staminate flowers produced the average number of stamens per staminate flower and the average number of pollen grains per stamen (Bestin, 1982). Zer-Avanesian (1978) has observed that the increasing load can increase the quality and reduce the degree of variability of progeny, while smaller pollen loads yield the more variable progeny.

The climate influencing time of anther dehiscence and also influence the pollen quantities (Stanley and Linskens, 1974). The low or high temperatures during the developmental period effect the quality of mature pollen. Flowers are creamish white in colour and arranged in aggregate head, hermaphrodite, tubular, actinomorphic, bisexual, pentamerous, complete and epigynous. Sepals are five, gamosepalous with valvate aestivation and petals are five, stamens five, epipetalous with dithecous introse anthers which dehisce by longitudinal slit. Pistil is bicarpellary and syncarpous, ovary inferior, bilocular and one ovule in each locule. Flowers are very small and open between 5.00-6.00 a.m. and anther dehisce between 6.00-6.30 a.m. The receptivity of stigma was noticed between 6.30-7.00 a.m. During flowering period, the pollen fertility as tested by Alexander Strain and TTC (1%) is 70.10% and 45.5% respectively.

There is close correlation between pollen morphology and taxonomy of plants. The pollen grains are more or less similar and belongs to some or two closely related pollen types. The number of total pollen grains per flower divided by the number of ovules per flower yield of pollen ovule ratio (Cruden, 1977). The total number of pollen per anther ratio was measured by a haemocytometer and mature anthers were crushed and dissolved in lactophenol-glycerine with aniline blue solutions. A known dilution was placed on the grid and 10 replicate counts were made using a haemocytometer (Barrot, 1985).

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