



ORIGINAL ARTICLE

Pollen Germination and Pollen Viability of *Ceiba pentandra* L.

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ABSTRACT

We studies the pollen viability & germination of *Ceiba pentandra* L. trees, located at agra. To determine the pollen viability of this species we recorded the pollen February through July over year 2009. The flowers are large, hermaphrodite, actinomorphic and complete. Flowers open in the evening between 7.00- 8.00 pm. followed by another dehiscence at 7.30- 8.30 pm flower offer pollen and nectar to the visitor, which include bats, honey bees, moths and butterflies fruit-set in 67.58% and seed-set is 80.34%. we also recorded the flowering period of *Ceiba pentandra* L. during February to April, when it sheds all its leaves.

Key words: pollen viability, germination, *Ceiba pentandra* L.

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INTRODUCTION

Ceiba pentandra L (bombacaceae) is large tree. It is native of south America it now has spread to the primary *Malay peninsula* and the *Indonesian archipelago*, tropical America and either native or long ago introduced and established in Africa and it is found in various types of moist evergreen and deciduous forests as well as in dry forests. Kapok trees *Ceiba pentandra* L. are cultivated as well as found naturally in the evergreen forests of south India. they bloom at night and flowers emit a strong odour that attracts nocturnal pollinators (Vander Pijl, 1936).

Ceiba pentandra L has hermaphroditic and chiropterophilic flowers with five stamens around a protruding style, yellowish white petals and nocturnal anthesis the fruits are elliptic and seeds are surrounded by a white silk cotton, used for wind dispersion. This species is an emergent deciduous tree that may reach heights of more than 15m. we studied the pollen viability and pollen germination of *ceiba pentandra* L.

MATERIALS AND METHODS

The main goal of this study was to provide data on the pollen viability and pollen germination of *ceiba pentandra* L. population located at Agra. In order to determine the sequence of flowering of trees. We recorded the pollen viability and germination of marked flower every week from February 2009 to March 2009. Flowering is recorded in month of February to march, when the temperature is moderate. Minimum flowering is seen in last week of March to April.

Pollen production per flower was calculated by first counting the number of pollen grains per anther and then multiplying by the number of anther per flower (Cruden 1977) total number of pollen per anther is 14500-15000 and number of pollen per flower is 72500-75000 were calculated by first counting the number of pollen per anther and multiplying

this figure by number of anther per flower. The number of pollen grains divides by the number of ovules per flower yield the pollen ovules ratio (Cruden 1977) The number of ovules per ovary is 286 and pollen ovule ratio in 258% were calculated in *Ceiba pantandra*, flowers are protandrous hence stigma become receptive after anther dehiscence and stigma receptivity were studies using various methods as described by Rhivanna and Rangaswamy.

The scanning Electron microscopic (SEM) studies showed that anther dehiscd by longitudinal slits and ditheous with numerous pollen grains. SEM studies indicate that pollen grain are 3- colporate. oblate ! ornate in polar view more rounded and sexine is retipilate. SEM studies of pistil, stigma is broad with presence of large papillae. A considerable amount of pollen grains are also observed on stigmatic surface. SEM photography of T.S. of ovary shows that ovary is elongated pentalocular with numerous ovules. SEM studies of sepals and petals clearly show that stomata are present on the outer surface of sepals and trichomes are present on the autor surface of petal.

Pollen fertility was checked by Alexander (1980) staining technique and also cheked by both tetrazolium chloride (TTC) test and *furochromatic reaction (FCR) Test.* (Shivanna and Rangaswamy 1992.

The pollen grains as tested by Alexander's stain show 85.79% viability. The viable pollen grain become purpel and nonviable pollen grain remain green. the viability is 88.89% as shown by fer test. the viable pollen grains give brights yellow fluorescence. pollen viability as tested in 1% TTC (in tris HCl at PH 7.8) is 77.27%. the 60% pollen germination was checked by hanging drop culture method after Brewbaker and Kwack's (1993) medium. with 98um long pollen tubes. the pollen germination percentage is 50%, 86% and 40% when 850um, 1050um, 750um long pollen tubes in 10%, 15% and 20% sucrose solution respectively.

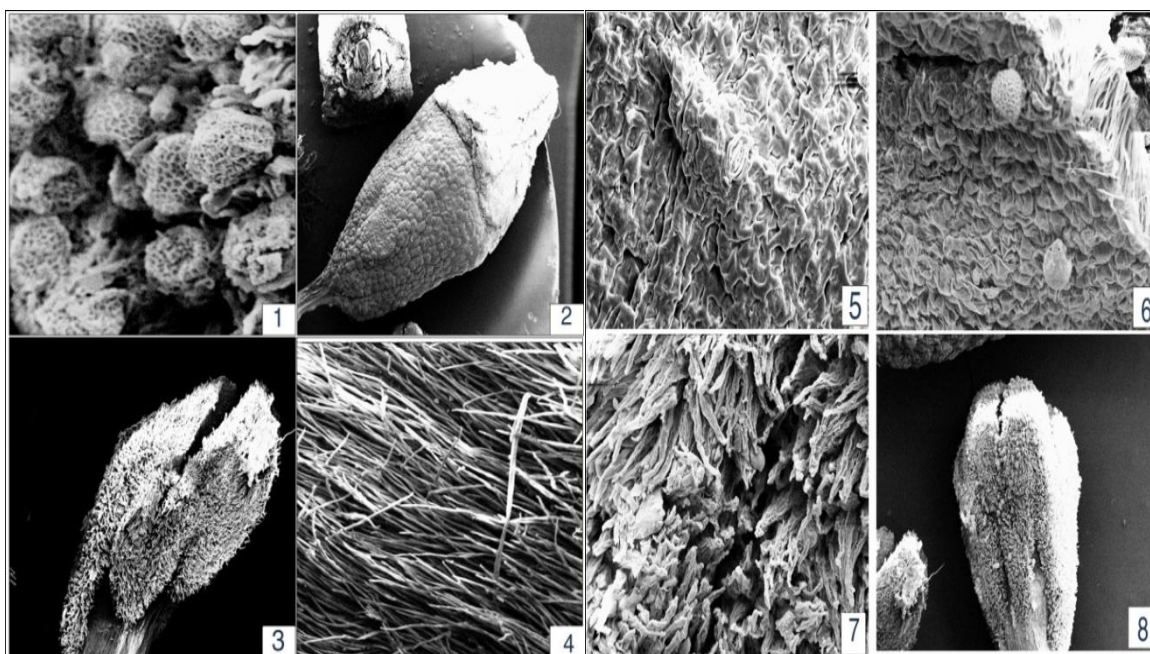


Plate 1: Showing SEM study of the floral parts (Fig-1 showing pollen grain in dehiscent anther, Fig-2 showing morphology of ovary, Fig-3 showing morphology of stigma, Fig-4 showing hairy outer surface of petal, Fig-5 showing stomata on the surface of sepal, Fig-6 showing papillae on the stigmatic surface, Fig-7 magnified view of stigmatic surface, Fig-8 showing pollen load on stigmatic surface)

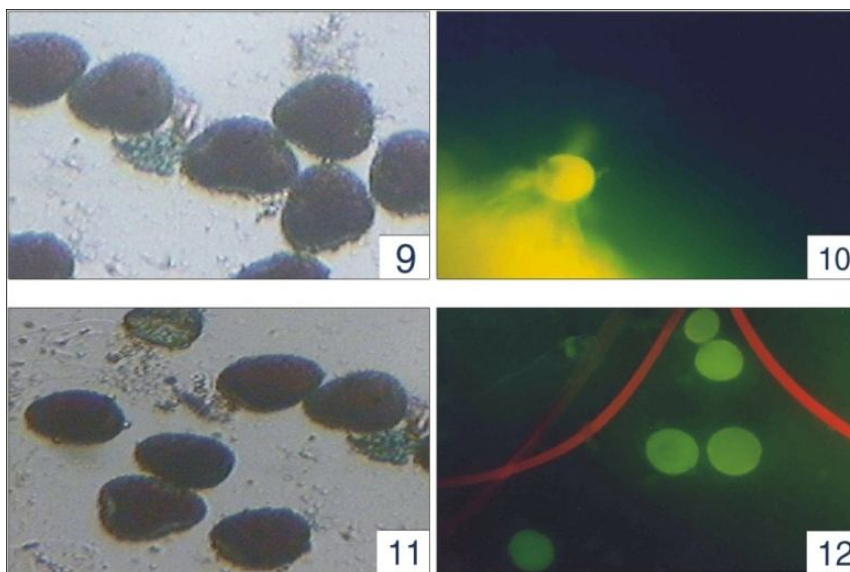


Plate 2: Showing viability test of pollen grains (Fig- 9 -11 showing viable and non viable pollen grains on anther by Alexander's stainability test, Fig- 10 showing pollen load on stigmatic surface by fluorescence microscopic method, Fig-12- showing pollen viability at tested by FCR)

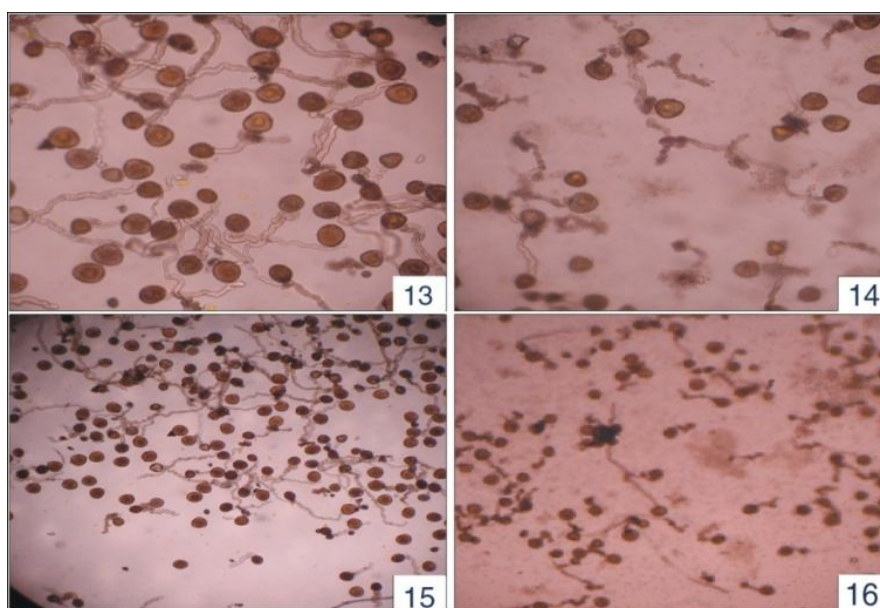


Plate 3: Showing germination test of pollen grains (Fig-13 In-vitro pollen germination as checked by Brewbaker and Kwack's method, Fig-14 In-vitro pollen germination test and checked by 10% sucrose solution, Fig-15 In-vitro pollen germination test as checked by 15% sucrose solution, Fig-16 In-vitro pollen germination test as checked by 20% sucrose solution)

In-vivo pollen germination is checked by aniline blue fluorescence microscopic method as described by Shivanna and Rangaswamy and after Alexander's multiple staining method after Alexander (1987). The pollen load on stigmatic surface is very high 60% and 70% in aniline blue and Alexander's multiple staining method respectively.

RESULT

In the present observation we studies the reproductive biology of plant *Ceiba pantandra* L. growing at Agra the flower open in the evening time followed by anther dehiscence the number of pollen per anther is 15000 and pollen per flower is 75000 the number of ovules per flower is 286 and pollen ovule ratio is 258. pollen viability is 88.89% in FCR test and in TTC is 77.27%. plant shows highest pollen germination in 15% sucrose solution (86.25% with 1050 um long pollen tube) and Brewbaker and kwack's medium (60% with 980 um long tube lenght). there is 70% in vivo germination as tested by Alexander 's multiple staining method and 60% as tested by by aniline blue fluorescence test. these studies are essential for the conservation, improvement and establishment of cultivation to increase the frequency of occurrence of this species.

The plant *Ceiba pantandra* L. has great medicinal value the fresh leaves are used against dizziness, decoction of the boiled roots is used to treat oedema . The gum is eaten to relieve stomach upset and tender shoot decoction is a contraceptive and leaf infusion is taken orally against cough and pounded together with fermented boiled rice water and the extract is administered to cows orally as a remedy for reproductive problems. The fruits of *Ceiba pantandra* L. have large amount of silk cotton fibre. The fibre is used to make it ideal for stuffing pillows, mattresses and cushions . It is light, water repellent and buoyant, making it ideal for the jackets, life boats and other naval safety apparatus.

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