



A Palynology and Classification Study of Some Species in Apocynaceae family at Yala Rajabhat University, Thailand

เรณูวิทยาและการศึกษาการจัดจำแนกของพืชในวงศ์ Apocynaceae บริเวณมหาวิทยาลัยราชภัฏยะลา ประเทศไทย

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Abstract

The pollen morphology of 5 species such as *Adenium obesum* Roem. & Schult., *Allamanda cathartica* L., *Ervatamia coronaria* (Jacq.) Stapf, *Plumeria alba* L. and *Wrightia pubescens* Blume belonging to apocynaceae family has been examined by light microscopy microscope. Generally pollen grains occur singly in monads. Pollen grains generally spheroidal shape, isopolar and radial symmetry. However, P/E ratio, size, aperture, and tectum of apocynaceae species are differential characteristics. Thus, they can classify with palynological study.

Keywords: Palynology, Plant classification, Apocynaceae, Pollen grains

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บทคัดย่อ

การศึกษาสัณฐานวิทยาของเรณูของพืช 5 สปีชีส์ในวงศ์ Apocynaceae ได้แก่ *Adenium obesum* Roem. & Schult., *Allamanda cathartica* L., *Ervatamia coronaria* (Jacq.) Stapf, *Plumeria alba* L. และ *Wrightia pubescens* Blume โดยใช้กล้องจุลทรรศน์แบบใช้แสง พบว่า โดยทั่วไปแล้วเรณูจะเป็นเม็ดเดี่ยว (Monad) โดยมีรูปร่างเป็นทรงกลม (spheroidal) มีขั้วแบบ isopolar และมีสมมาตรแบบรัศมี (Radial symmetry) อย่างไรก็ตาม อัตราส่วน P/E (P/E ratio) ขนาด (Size) ช่องเปิดที่ผนังเรณู (Aperture) และผิวของผนังชั้นนอก (Tectum) ในแต่ละสปีชีส์มีลักษณะที่แตกต่างกัน ดังนั้น การศึกษาด้านเรณูวิทยาสามารถใช้ในการจัดจำแนกของพืชได้

คำสำคัญ : เรณูวิทยา การจัดจำแนกพืช Apocynaceae ละอองเรณู

Introduction

Palynology is the study of pollen grains produced by seed plants (angiosperm and gymnosperm) and spores produced by pteridophytes, bryophyte, algae and fungi (Moore et al., 1991). Rozema et al. (2006) reported that palynology serves as a tool for reconstruction of past vegetation and environment. It can also be applied to classification or taxonomy, genetics, evolutionary studies, honey study, forensic science, allergy studies, tracing vegetation history in a individual and communities correlation, and climate change studies. Pollen biology has directed to use in agriculture, horticulture, forestry, plant breeding and biotechnology (Faegri and Iversen, 1964). Many families of plants were classified by palynological methods such as mimosaceae, malvaceae, zygothylaceae, myrtaceae and sapotaceae (Aftab and Perveen, 2006).

In the present a palynology and classification study studies of the 5 cultivated plant species in apocynaceae family at Yala Rajabhat University, Thailand. The selected species are *Adenium obesum* Roem. & Schult., *Allamanda cathartica* L., *Ervatamia coronaria* (Jacq.) Stapf, *Plumeria alba* L. and *Wrightia pubescens* Blume

Objectives

In the present a palynology and classification study studies of the 5 cultivated plant species in apocynaceae family at Yala Rajabhat University, Thailand. The selected species are *Adenium obesum* Roem. & Schult., *Allamanda cathartica* L., *Ervatamia coronaria* (Jacq.) Stapf, *Plumeria alba* L. and *Wrightia pubescens* Blume

Materials and Methods

Study site

Study of some species in apocynaceae family was carried out at Yala Rajabhat University, Thailand. (Figure. 1)

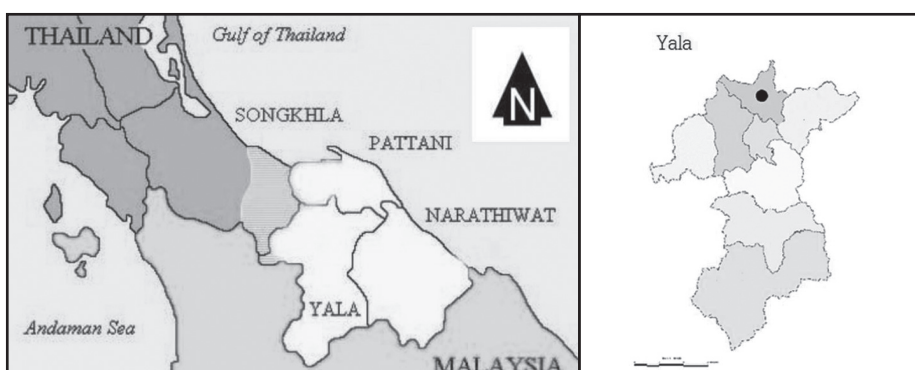


Figure 1 Location studied of Yala Rajabhat University, Thailand.

Methods

Member of apocynaceae were collected and classified at biology laboratories, Yala Rajabhat University. Pollen grains were prepared for light (LM) and scanning electron microscopy (SEM) by the standard method, described by Erdtman (1952). For light microscopy, the pollen grains were mounted in unstained glycerin jelly and observations were made with a ALPHATECH Model AT 123 microscope fitted with camera, under (E40, 0.65) and using 10x eyepiece. The measurements are based on 15-20 readings from each specimen. Polar axis (P), equatorial diameter (E) and tectum texture were measured. The terminology used is in accordance with Erdtman (1960); Faegri and Iversen (1964); Kremp (1965); Walker and Doyle (1975).

Results

Pollen morphology

Pollen morphology of these species varies among different plants species and according were described.

Pollen morphological descriptions

***Adenium obesum* Roem. & Schult. (Figure 2 A,B)**

Family : Apocynaceae

P/E ratio : 1.09

Size : Polar axis (P) 85.40(86.40)87.40 μm and equatorial diameter (E) 78.70(79.50)80.30 μm

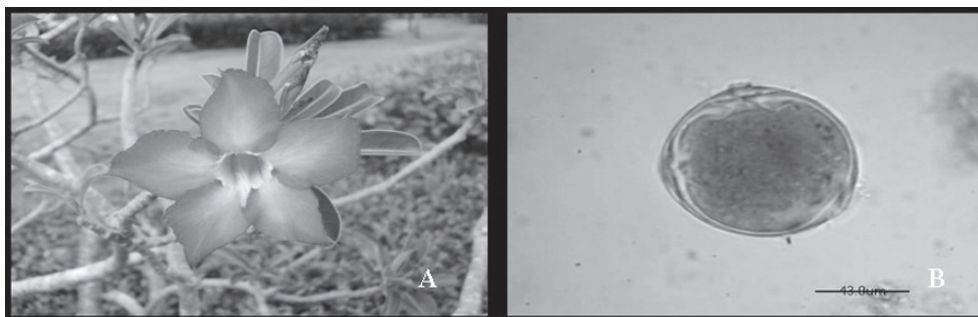


Figure 2 Floral morphology (A) and light micrograph of *Adenium obesum* Roem. & Schult. : B - Polar view (Bar=43.0 μm)

Morphology : Spheroidal, periporate, isopolar, radial symmetry and tectum psilate.

***Allamanda cathartica* L. (Figure 3 A, B)**

Family : Apocynaceae

P/E ratio : 1.61

Size : Polar axis (P) 134.40(138.30)142.20 and equatorial diameter (E) 85.80(85.90)86.00 .

Morphology : Prolate, tricolporate, isopolar, radial symmetry and tectum granulate.

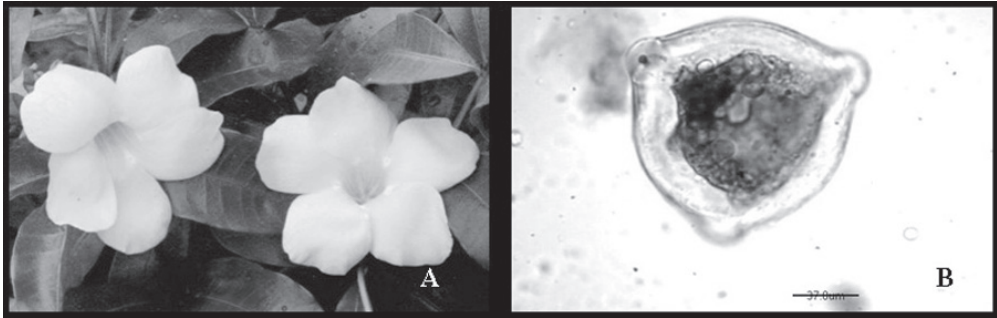


Figure 3 Floral morphology (A) and light micrograph of *Allamanda cathartica* L. : B - Polar view (Bar=37.0 μm)

***Ervatamia coronaria* (Jacq.) Stapf (Figure 4 A, B)**

Family : Apocynaceae

P/E ratio : 1.04

Size : Polar axis (P) 116.30(116.60)116.90 μm and equatorial diameter (E) 111.00(111.90)112.80 μm .

Morphology : Spheroidal, periporate, isopolar, radial symmetry and tectum granulate.

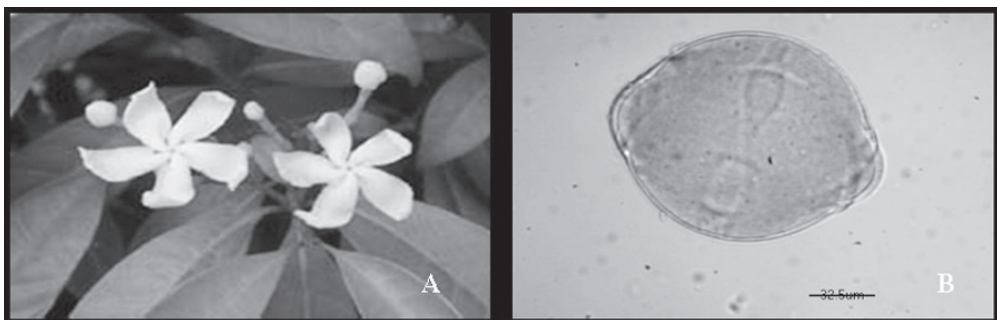


Figure 4 Floral morphology (A) and light micrograph of *Ervatamia coronaria* (Jacq.) Stapf : B- Polar view (Bar=32.5 μm)

***Plumeria alba* L. (Figure 5 A, B)**

Family : Apocynaceae

P/E ratio : 1.18

Size : Polar axis (P) 76.20(78.10)80.00 μm and equatorial diameter (E) 65.70(66.25)66.80 μm .

Morphology : Spheroidal, tricolpate, isopolar, radial symmetry and tectum granulate.

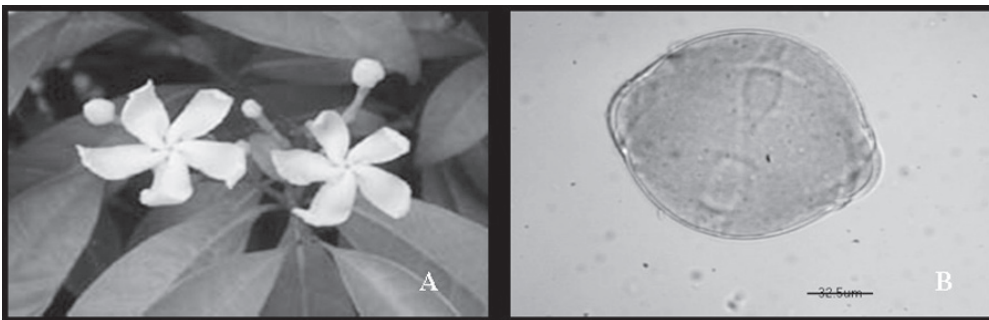


Figure 5 Floral morphology (A) and light micrograph of *Plumeria alba* L.:
B- Polar view (Bar=37.3 μm)

***Wrightia pubescens* Blume (Figure 6 A, B)**

Family : Apocynaceae

P/E ratio : 0.95

Size : Polar axis (P) 82.30(82.75)83.20 μm and equatorial diameter (E) 85.00(86.90)88.80 μm .

Morphology : Spheroidal, triporate, isopolar, radial symmetry and tectum granulate.

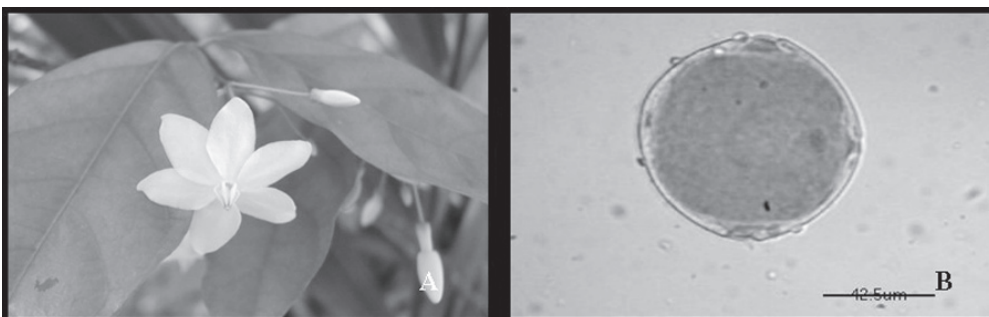


Figure 6 Floral morphology (A) and light micrograph of *Wrightia pubescens* Blume:
B- Polar view (Bar=42.5 μm)



Key to species

- 1 + Spheroidal shape isopolar radial symmetry.....2
 - Prolate shape isopolar radial symmetry.....*Allamanda cathartica* L.
- 2 + Spheroidal shape isopolar, radial symmetry tricolpate3
 - Spheroidal shape isopolar, radial symmetry periporate tectum psilate*Adenium obesum* Roem. & Schult
 - Spheroidal shape isopolar, radial symmetry periporate tectum granulate*Ervatamia coronaria* (Jacq.) Stapf
- 3+ Spheroidal shape isopolar, radial symmetry tricolpate tectum granulate P/E ratio : 1.18
 - (P) 76.20(78.10)80.00 μm (E) 65.70(66.25)66.80 μm *Plumeria alba* L.
 - Spheroidal shape isopolar, radial symmetry tricolpate tectum granulate P/E ratio : 0.95
 (P) 82.30(82.75)83.20 μm (E) 85.00(86.90)88.80 μm *Wrightia pubescens* Blume

Discussion

Difference of pollen grains occurs in apocynaceae family. It led to classify with characteristics of pollen grains such as shape, pore, symmetry, polarity, tectum ornament and size. *Allamanda cathartica* L. were separated with others species by porate shape. However, spheroidal shape, isopolar, radial symmetry, periporate are characteristics of *Adenium obesum* Roem. & Schult. and *Ervatamia coronaria* (Jacq.) Stapf but they are not similarity of tectum. In addition, *Plumeria alba* L. has P/E ratio: 1.18 but *Plumeria alba* L. has P/E ratio: 0.95. Huang (1989) reported that seventeen species of apocynaceae from Taiwan were studied and they found that pollen grains vary in size and shape. Moreira et al. (2004) showed that two large groups of apocynaceae can be identified: colporate pollen grains - *Aspidosperma parvifolium* (5-6-colporate, psilate exine, rugulate only apocolpus), *Himatanthus lancifolius* (3-colporate, reticulate exine), *Tabernaemontana flavicans* (4-colporate, endocingulate endoaperture) and *T. laeta* (3-4-colporate, rugulate exine); porate pollen grains - *Forsteronia leptocarpa*, the four species of *Mandevilla*, *Prestonia coalita*, and *Rhabdadenia pohlii*. Kalpana et al. (2013) reported that aperture



morphology showed *Acacia auriculiformis* cunn. ex Benth, *Acacia leucophloea* Willd and *Acacia planifrons* are 3-4 porate, *Acacia catechu* Willd and *Acacia dealbata* Link are indistinct, *Acacia latronum* Willd and *Acacia mangium* Willd are 4 porate, *Acacia longifolia* Willd is 3 porate respectively. The ornamentation is foveolate in *Acacia catechu* Willd, *Acacia dealbata* Link, *Acacia latronum* Willd and *Acacia leucophloea* Willd and faintly faveolate in *Acacia auriculiformis* cunn. ex Benth, *Acacia longifolia* Willd, *Acacia mangium* Willd and *Acacia planifrons*. W & A. It was concluded that the genera could be separated by pollinical characters and within genera their species studied are heterogeneous palynologically. However, when we consider others family, it has differential characteristics. For example, malvaceae family has dominant spine exine but many of mimosaceae family has polyads pollen grains (Bibi et al., 2008; Santos. 2008). It has strongly varied in feature.

Thus, characteristics of pollen grains led to apply in classification of plants in the future.

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