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POLLEN MORPHOLOGY OF *EUSTACHYS TENERA* (CHLORIDOIDEAE, GRAMINEAE)

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Abstract

Pollen morphology of *Eustachys tenera* has been examined by light, scanning and transmission electron microscope. Pollen grain are generally oblate spheroidal, a single annulate aperature with an operculum, brevicerebro ornate exine ornamentation. This pollen type has not been reported in Poaceae

Introduction

Gramineae are one of the largest and most widely distributed families of vascular plants and the dominants of many ecosystems. The genus *Eustachys*, having c. 10 species and characterized by chloridoid bicellular microhairs, belongs to subfamily Chloridoideae which are distributed in tropic and subtropic with arid and semiarid habitats (Clayton & Renvoize, 1986). Of these one species, *Eustachys tenera* (J. S. Presl) A. Camus, occurs in China (Sun & Hu, 1990).

Pollen morphology of the family has been studied by Kohler & Lange (1979), Chaturved *et al*., (1994, 1998) and Ma & Zhao (2001). Two pollen characters that have important values in systematic studies in grass are aperature types and exine surface patterns (unpublished data). However, the prevalence of a stenopalynous condition in grasses with one annulate aperature pollen grains, although providing a characteristic feature for Gramineae, constitutes limiting factor when trying to distinguish the various taxa contained within the family.

Few studies have been conducted on the pollen morphology of Chloridoideae (Huang, 1975). In the present study, based on a screen of the pollen morphology of the Chloridoideae from China, a distinct pollen type of *Eustachys tenera* is reported.

Materials and Methods

Pollen materials of *Eustachys tenera* (J. S. Presl) A. Camus were collected from the herbarium of South China Botanical Garden (SCBG). The anthers were removed from mature spikelets with a forcep and a needle under a stereomicroscope, then placed in a 1.5 ml microcentrifuge tube with acetic acid (3:1) for 2 hours before further preparation. Pollen was acetolysed for 30 minutes in a heating block at 90^{o}C. Pollen grains for LM and SEM studies were suspended in ethanol (70%), pipetted onto stubs, air-dried and coated with gold with a SPI-MODLE™ sputter coater. Observations were made under a Jeol JSM-T300 SEM. Grains for LM studies were mounted in Kaiser's glycerin jelly. The slides were observed using a Leitz Weiztar 12 with a × 12.5 micrometricocular and a ×40 objective lens. Equatorial diameter (E) and polar diameter (P) were measured under LM for at least 15 mature pollen grains (magnification 500). The pollen size is equal to

equatorial diameter since most grains are spheroidal. All other measurements were made on SEM-graphs. Terminology follows Punt *et al*., (1999).

General pollen characters of the subfamily Chloridoideae

Pollen grain generally radially symmetrical, isopolar, prolate-spheroidal, the annulate aperature, brevicerebro ornate exine pattern.

Descriptions of pollen type

Pollen type: - *Eustachys tenera* (Fig. 1).
Pollen class: Monotreme, Zonoaperature.
Pollen size: Small (< 25 µm).
P/E ratio: Transverse.
Shape: Oblate-spheroidal.
Apertures: Ectoaperature - the annulate aperature.
Exine: Brevicerebro ornate - short cerebro beset with fine spinules dividing the exine surface into ornate type.
Measurements: Polar length L (18.5) 21.6 ± 0.67 (-24.0) µm, Equatorial breadth B (19.1)23.2 ± 3.27 (-25.2) µm, pore circular, (2.01) 2.40 ± 0.06 (-2.61) µm in diameter, annulus diameter (6.10)6.4 ± 0.50 (-6.90) µm.
Species included: *Eustachys tenera* (J. S. Presl) A. Camus

Comments

Pollen grains of *Eustachys tenera* type is characterized by porate pollen with brevicerebro ornate exine pattern. This type of pollen grain has not been reported in the grass family.

This distinct pollen may be associated with the preference of shaded habitats of *E. tenera*. Unlike most other species of Chloridoideae which live in open land, *E. tenera* is a understorey herb. Elaboration of complexity may promote greater phenotypic plasticity, which may help the plant to adapt to the irregularities in the onset and end of moist seasons in semiarid environment. Further sampling of Chloridoideae, especially of other members of *Eustachys*, should allow better understanding of the evolutionary trends of palynology within the Chloridoideae in particular and the grass in general.

Specimens examined: *Eustachys tenera*: under bushland c. 20 km from Sanya to Anyou, Hainan, Xiangri Liang 68339 (SCBG); around woodland in Dongfang, Hainan Guoai Fu 5602 (IBSC).

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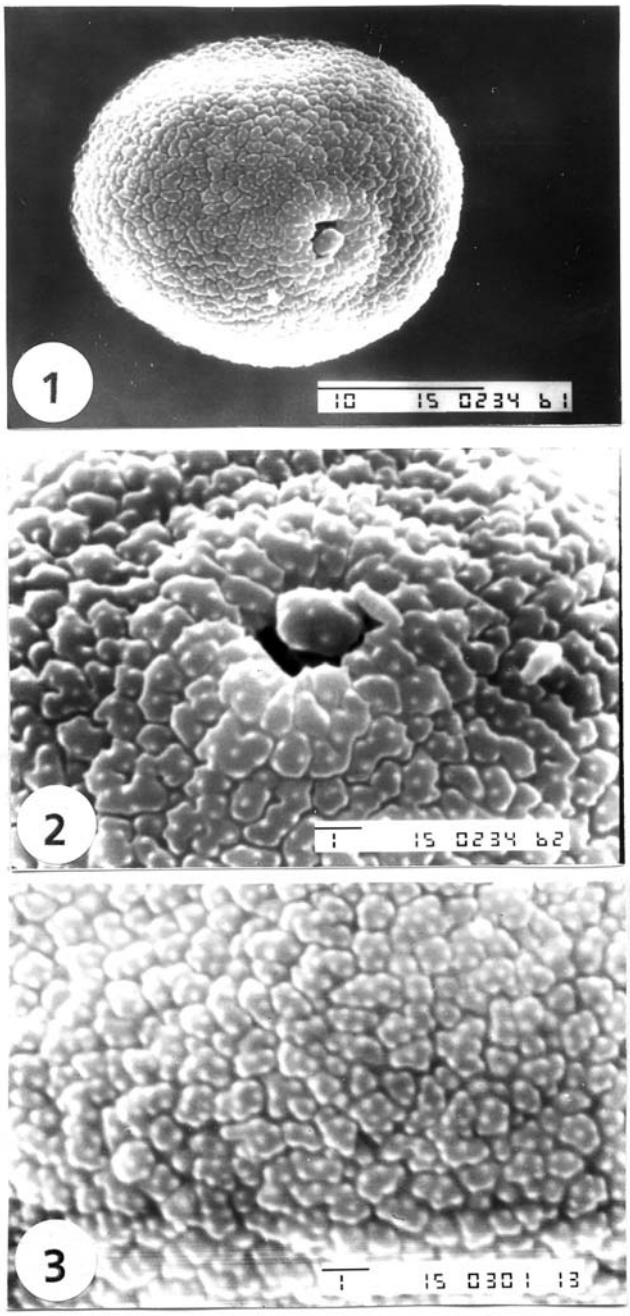

Fig. 1. Pollen morphology of *Eustachys tenera* – type.
A = grain oblate-spheroidal, subpolar views
B= detail of an operculate-annulate aperature
C = brevicerebro ornate exine pattern
Scale bars: 1=10µm; 2-3=1µm.

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