

## Flower Development of ‘Cempedak’

A.G. Yunus, Z. Wahab and A.R. Razak

The ‘cempedak’, *Artocarpus integer* Merr. belongs to the family Moraceae and was originated from South-east Asia (Barrau, 1976). It is closely related to jackfruit, *A. heterophyllus* Lam. and both are widely cultivated but very little information is available about the floral biology of ‘cempedak’. Corner (1988) described the ‘cempedak’ flower head as finger-shape and both male and female heads are on the same tree. After flowering, the male heads drop but the female persist and enlarge into the fruit heads.

This paper details the development of the flower as observed under Hi-Scope KH 2700 3D light video microscope system and Joel 6400 Scanning Electron Microscope (SEM). The structural changes of the flower will help in the understanding of the floral biology of the species.

The inflorescences develop inside the elongated dome-shaped bract, which splits open when mature and exposing a successions of 2-3 smaller bracts. Initial floral development is indicated by the formation of rounded protuberances on the surface of the inflorescence. Further development between the male and female flowers differs.

The smallest male inflorescence observed was about 600  $\mu\text{m}$  long (Fig. 1A) with apparently smooth surface. As the flower matures, the surface of the inflorescence axis developed into a round protuberance, which later differentiated into a depression, which surround the pointed middle part (Fig. 1B). The edges forms two parts and develop into the perianth, which encloses the middle part that becomes the stamen. At maturity the perianth split open longitudinally across the central region into halves, exposing the anther (Fig. 1C). The perianth is covered by trichomes with stomata interspersed on the surface of the perianth among the trichomes. Each stamen consists of bilobed anther borne on short, stout filament (Fig. 1D). The anther wall is made up of a thick fibrous layer, endothecium (Fig. 1E), suggesting the explosive release of the pollen grains. Each pollen grain is covered by short outgrowth with a round depression (Fig. 1F), indicating the pore for the emergence of pollen tube at pollination.

The initial female flower is similar to that of the male in appearance. When the inflorescence is about 1.2 cm long (Fig.2A) the flower forms elliptical opening at the terminus (Fig.2B), through which the stigma protrudes. At about 8 cm long the perianth opening encloses the base of the stigma (Fig. 2C and 2D, inset). The ovary is located at the base of the perianth, and connected to the stigma by a long style, surrounded by a thick fleshy perianth (Fig. 2D). The surface of the stigma is formed by club-like protuberances arranged at an acute angle to the long axis of the stigma (Fig. 2E). Apparently, the ovary wall develops into a thin papery tissue, covering the ovule (Fig. 2F), which develops into a large seed after successful fertilization. The perianth subsequently developed into the fleshy edible part of the fruit. The aborted flower developed into elongated fleshy fibers interspersed among the developing fruits.

The morphological structure of the flowers, both male and female of ‘cempedak’ inflorescences suggests that pollination is achieved mainly by wind pollination. Proliferation of flowers on the inflorescence, the abundance and rough surface of the pollen grain in the anther and the explosive nature of the anther wall suggest that ‘cempedak’ fruit can be formed through wind pollination. The presence of insect possibly improves pollination resulting in a uniform fruit formation.

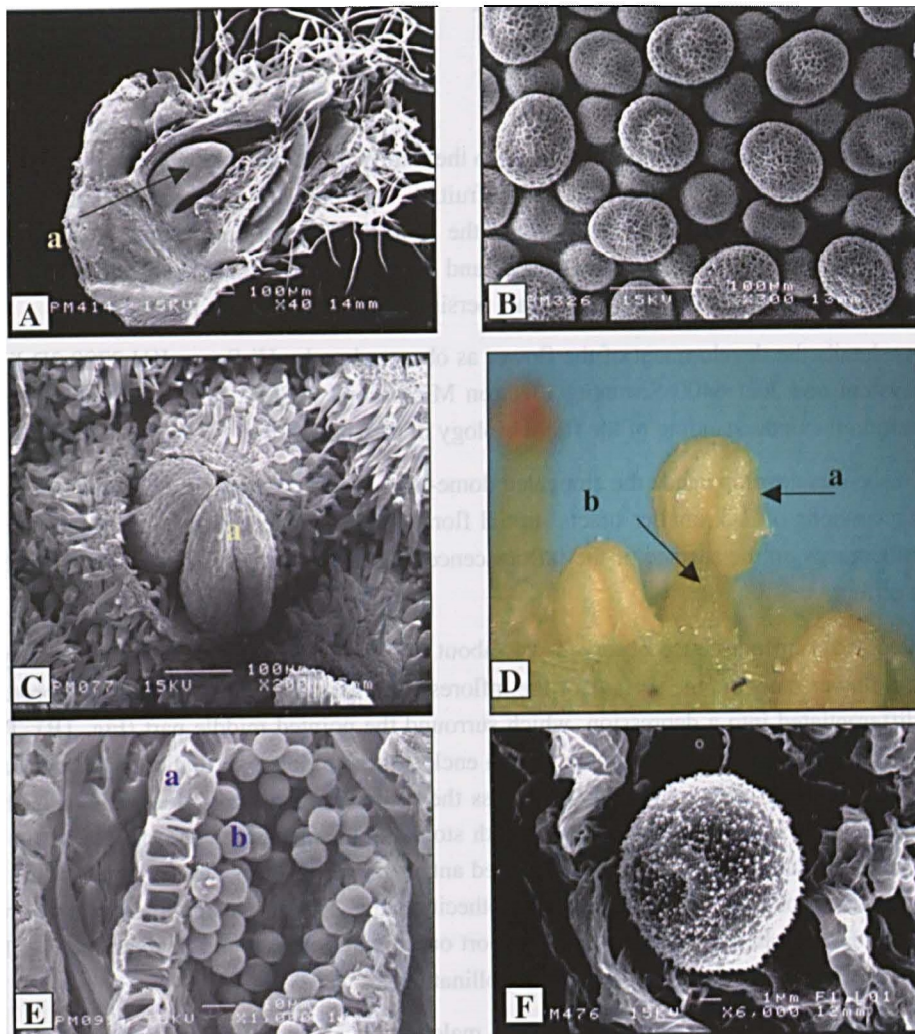
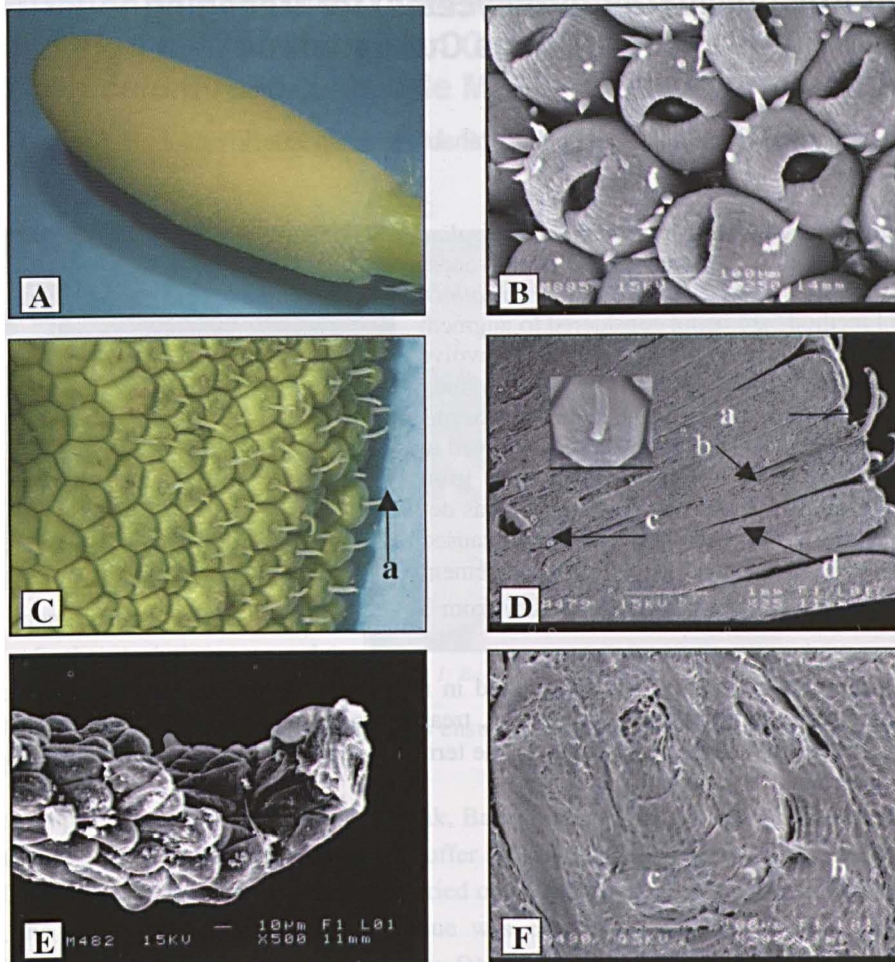


Figure 1. Male Flower

- A. The youngest male inflorescence (a) enclosed in bract (x40).
- B. Surface of older male inflorescence forms protuberances (x300).
- C. Anther (a) emerges from the split perianth (b) (x200).
- D. Anther (a) on the filament (b) (x200).
- E. Cross-section of the anther showing anther wall (a) and pollen grains (b) (x1000).
- F. Pollen grain with pore (a) where the pollen tube emerges (x6,000).



**Figure 2. Female Flower**

- A. Young female inflorescence removed from bract (x6).
- B. Enlargement of the surface of (A) showing early stage of development (x250).
- C. The flower with stigma (a) ready for pollination (x10).
- D. Cross-section of the flower showing the stigma (a), style (b) and ovary (c) which is at the base of the perianth (d) (x25). The stigma protrudes from the surface of the perianth (inset, x100).
- E. The surface of the stigma is formed from club-shaped structures (x500).
- F. The perianth (a) enclosed the ovary (b) which contains the ovule (c) (x300).

#### Reader Enquiry

Department of Crop Sciences  
Faculty of Agriculture  
Universiti Putra Malaysia  
43400 UPM, Serdang, Selangor  
Malaysia

Tel: +603 8946 7260

E-mail: [agy@agri.upm.edu.my](mailto:agy@agri.upm.edu.my)