

# **Anatomical Studies of *Canna Hybrida* in Rejang Lebong District Bengkulu Province**

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## **Abstract**

Anatomy is the study of plant cells and tissues. Anatomical variations in plants have specific characters that can be used to distinguish between species, particularly diverse and distinctive plant species. Cannaceae is the only genus of *Canna*. The center of origin of *Canna* from South America and cultivated in the tropics. *C. hybrida* is widely cultivated by the community, especially in Rejang Lebong District, Bengkulu Province as an ornamental plant. There is no data on the anatomy of *Canna hybrida*. This research aims to provide information about the anatomical study of *C.hybrida* in Rejang Lebong District, Bengkulu Province. This research used the exploration method. The results of the study found that the anatomical study of *C. hybrida* stomata is paracytic type, the type of parenchyma is aerenchyma, and the type of pollen grains are spherical, echinate, omniaperturate.

**Keywords:** Anatomy, *Canna hybrida*, parenchyma, pollen, stomata.

## **Introduction**

Anatomy is the study of plant cells and tissues. Anatomical variations in plants have specific characters that can be used to distinguish between species, particularly diverse and distinctive plant species. Plant anatomical studies study plant cells and tissues, with anatomical variations that can be specific markers between species, especially in diverse and distinctive plants (Damayanti *et al.* 2015). In addition to morphology, anatomical characters are indicators that are easy to analyze in assessing diversity. Anatomical data supports the understanding of kinship relationships between tribes and plant species (Cutler *et al.* 2007). Anatomical characters are utilized in studies of physiology, ecological interactions (Yeung 1998), and forensics (Bock & Norris 2016). A review of studies shows the important role of vegetative anatomy in taxon identification and relationships between genera and species (Tomlinson, 1961; Stace, 1965; Kotresha & Seetharam, 2000; Tschan & Denk, 2012). Leaf anatomy, as the most varied organ in angiosperms, provides significant characters for taxonomic studies (Metcalf & Chalk, 1950; Metcalfe, 1968; Stace, 1984).

Cannaceae is a family of herbs characterized by a distinctive flower structure, which has only one stamen and one pistil (Maas-van de Kamer & Maas, 2008). The distinctiveness of this family is found in the fact that it consists of a single genus with more than 50 species that are widely distributed in the tropics. Leaf anatomy plays an important role in identifying and categorizing different plant species. Cannaceae is the only genus of *Canna*. The center of origin of *Canna* from South America and cultivated in the tropics. *Canna hybrida* is widely cultivated by the community. Leaf organs are considered to be the most anatomically variable in the angiospermae group with

characteristic anatomy used as a taxonomic character (Metcalf and Chalk, 1950; Metcalfe, 1968; Stace, 1984) mainly the genus *Canna*. The relevance of taxonomy is primarily the study of vegetative organ anatomy as a way of determination of taxa and the establishment of intergenetic or interspecific relationships (Tomlinson, 1961; Stace, 1965; Kotresha and Seetharam, 2000; Tschan and Denk, 2012). *Canna* anatomical characters in leaf organs have distinctive characters in development as taxonomic characters (Sultan et al. 2019) including stomata, sclerenchyma and parenchyma type.

Some varieties of *Canna* that are used as ornamental plants or better known as flowering canna are classified as *Canna flaccida* Salibs., *Canna liliiflora* Warsz. ex Planch., *Canna iridiflora* Ruiz & Pav., and *Canna glauca* L. (Maas-van de Kamer & Maas 2008). These *Canna* species have been cultivated by developing cultivars with large flowers and diverse colors. Farmers recognize flowering *Canna* cultivars as *Canna hybrida*. *Canna hybrida* is a complex and variable species because it has different flower colors. Different variations of *Canna hybrida* have not been studied anatomically in Rejang Lebong District, Bengkulu Province. Especially in Rejang Lebong District, Bengkulu Province as an ornamental plant. There is no data on the anatomical of *Canna hybrida*. This research aims to provide information about the anatomical study of *Canna hybrida* in Rejang Lebong District Bengkulu Province.

### Research Method

The research phases of specimen collection and data collection used an exploration study February-March 2025, which collected data by tracing or exploring the location of the research site to represent each sub-district in Rejang Lebong District, Bengkulu Province. Explore several locations of cultivated and wild plants Rugayah *et al.* (2004) *Canna* in Rejang District. Collection specimens were taken from plants in the form of important organs characterizing the characteristics of *Canna*, namely leaves, petioles, and flowers. Each of specimens taken from the field was given a hanging etiquette with a description of the collection. Identified using the literature cultivars *Canna hybrida* refers A Fresh Investigation Into The Structure of The Flower ff *Canna* (Costerus 1916), *Canna* (Gray & Grant 2003), *Canna* Lilies for Alabama Gardens (Kessler 2007), The Cannaceae Of The World (Maas-van de Kamer & Maas 2008).

Important characters that would be lost in the field were documented with a digital camera. The collected specimens were then brought to the laboratory for further anatomical observations. The variables of this study include, among others, anatomical preparations made are paradermal preparations (leaf blade organs), transverse preparations (leaf blade organs and petioles), and pollen. Preparation of leaf paradermal preparations follows the method of Cutler (1978). The identification of anatomical characters follows several publications including Morphological and micromorphological investigation among six variants of *Canna Indica* L. (Sultan *et al.* 2019); Morphomicromorphologia do pecime caulinar de *Canna edulis* Kerr-Gawler (Cannaceae) (Alonso *et al.* 2004); and Leaf anatomical structure as evidence in the delimitation of flowering plant taxon: A Case Study of 12 Flowering Plant Tribes in Indonesia (Wulansari *et al.* 2020).

### Results and Discussion

The results of an exploratory study conducted in Rejang Lebong District, found 4 cultivars of *Canna hybrida*. Four cultivars including *Canna x generalis* 'peach delight', *Canna hybrida* 'Yellow King Humbert', *Canna hybrida* 'Roil Soleil', and *Canna hybrida* 'Fire Red' (Figure 1).



Figure 1. Four Cultivars *Canna* in Rejang Lebong District.

A: *Canna x generalis* 'peach delight', B: *Canna hybrida* 'Yellow King Humbert',  
C: *Canna hybrida* 'Roil Soleil', D: *Canna hybrida* 'Fire Red'

The individuals of *Canna hybrida* found were 14 individuals, all of these individuals were cultivated plants. Exploration results were found generally found in the yards of houses and community plantations in Rejang Lebong District. Exploration results from 159 individuals obtained were identified referring to *Canna* (Gray & Grant 2003), *Canna* Lilies for Alabama Gardens (Kessler 2007), including into cultivars. Each cultivar found consisted of *Canna x generalis* 'Peach Delight' (5 individuals), *C. hybrida* 'Yellow King Humbert' (61 individuals); *C. hybrida* 'Fire Red' (80 individuals); *C. hybrida* 'Roil Soleil' (13 individuals) (Table 1).

No	Cultivar	Individual	Location
1	<i>Canna x generalis</i> 'Peach Delight'	5	1. Selupu Rejang 2. Curup Tengah
2	<i>Canna hybrida</i> 'Yellow King Humbert'	61	1. Curup Tengah 2. Selupu Rejang
3	<i>Canna hybrida</i> 'Roil Soleil'	13	1. Sindang Kelingi
4	<i>Canna hybrida</i> 'Fire Red'	80	1. Selupu Rejang 2. Sindang Kelingi 3. Curup Tengah 4. Curup Selatan
<b>Totally</b>		<b>159</b>	

*C. hybrida* has a variety of cultivars that show a variation of characteristics in the flowers. It is popular as an ornamental plant among the population because it displays various colors and color combinations on the undeveloped stamens (staminodia) and has leaves with attractive patterns and a glossy appearance (Tanaka 2004). *C. hybrida* is characterized by its relatively large and variable flower sized. In addition, another characteristic is the rhizome, in which *C. hybrida* has a small rhizome with low starch content (Riandini 2015).

Anatomical characters in *C. hybrida* cultivars were carried out by reviewing the structure of stomata on leaves, parenchyma on petioles, and pollen contained in flower pollen. Anatomical study of stomata of *C.hybrida* cultivars observed were parasitic type stomata, parenchyma are aerenchyma type, and Pollen grains are spherical, echinate, omniaperturate (Picture 2).

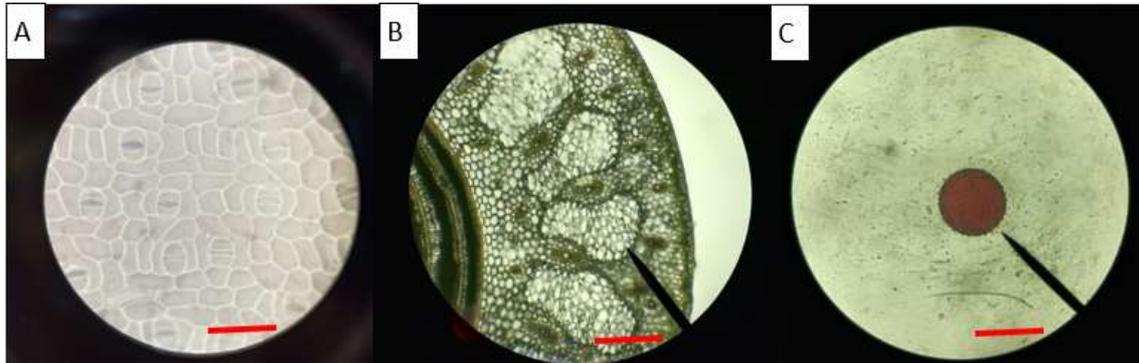


Figure 2. Anatomical *Canna hybrida* in Rejang Lebong District.  
A: Stomata type, B: Aerenchyme type', C: Pollen grains

*Canna* plants have parasitic type stomata with dumbbell-shaped closing cells (Jayakumari and Stephen 2009). Stomata in canna plants are mainly found on the abaxial part of the leaf (Abdulrahaman *et al.* 2011). The leaf contains two layers of pallsade parenchyma and spongy parenchyma, and characteristically oblique cells are present with round ends obliquely to the long axis. However, in our experiment we found that mesophyll was not differentiated into pallsade and spongy parenchyma. Type parenchyma is a aerenchyma (Sultana *et.al* 2019).

**Pollen** The sporoderm presents a very thin exine covering a thicker intine. Corrugate micro-perforate, sub-reticulate, rugate, rugulate, striate to folded, micro-striate, micro-granulate, and smooth types of the external surface of the sporoderm were found. The spines consist of exine, partially to completely covered by tryphine. The intine, as seen with light microscope, has two layers, and represents the thicker part of the wall. Echinata ornamentation is a generic character in *Canna*. Size, surface and colour of the walls of pollen grains, density and shape of spines, are diagnostic traits at the specific level in all studied taxa (Ciciarelli *et al.* 2010).

### Conclusion

The results of an exploratory study conducted in Rejang Lebong District, found 4 cultivars of *Canna hybrida*. Four cultivars included *Canna x generalis* 'Peach Delight' (5 individuals), *C. hybrida* 'Yellow King Humbert' (61 individuals); *C. hybrida* 'Fire Red' (80 individuals); *C. hybrida* 'Roil Soleil' (13 individuals). Anatomical characters in *C. hybrida* cultivars were carried out by reviewing the structure of stomata on leaves, parenchyma on petioles, and pollen contained in flower pollen. Anatomical study of stomata of *C.hybrida* cultivars observed were parasitic type stomata, parenchyma are aerenchyma type, and pollen grains are spherical, echinate, omniaperturate.

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**International Seminar on Plant Protection**  
Faculty of Agriculture, University of Bengkulu  
Departement of Plant Protection, Faculty of Agriculture, University of Bengkulu,  
Indonesia

Volume 1, No. 1, June. 2025