



## **Annamocalamus H. N. Nguyen, N.-H. Xia & V. T. Tran, a New Genus of Bamboo (Poaceae) from Vietnam**

Authors: Tran, Van Tien, Nguyen, Hoang Nghia, and Xia, Nian-He

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# Annamocalamus H. N. Nguyen, N.-H. Xia & V. T. Tran, a new genus of bamboo (Poaceae) from Vietnam

Van Tien Tran, Hoang Nghia Nguyen & Nian-He Xia

## Abstract

TIEN TRAN, V., H. NGHIA NGUYEN & N.-H. XIA (2013). *Annamocalamus* H. N. Nguyen, N. H. Xia & V. T. Tran, a new genus of bamboo (Poaceae) from Vietnam. *Candollea* 68: 159-165. In English, English and French abstracts. *Annamocalamus* H. N. Nguyen, N.-H. Xia & V. T. Tran (*Poaceae-Bambusoideae*), a new genus from Vietnam, is described and illustrated. It is based on the species *Annamocalamus kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran. The new genus shares some morphological characters with *Melocanna* Trin. and *Stapletonia* Dash & al. but can be recognized by its shorter rhizome and the occurrence of pseudo-spikelets.

## Key-words

POACEAE – *Annamocalamus* – Vietnam – Taxonomy

## Résumé

TIEN TRAN, V., H. NGHIA NGUYEN & N.-H. XIA (2013). *Annamocalamus* H. N. Nguyen, N. H. Xia & V. T. Tran, un nouveau genre de bambou (Poaceae) du Vietnam. *Candollea* 68: 159-165. En anglais, résumés anglais et français.

*Annamocalamus* H. N. Nguyen, N.-H. Xia & V. T. Tran (*Poaceae-Bambusoideae*), un nouveau genre du Vietnam, est décrit et illustré. Ce genre est basé sur l'espèce *Annamocalamus kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran. Ce nouveau genre partage des caractères morphologiques avec *Melocanna* Trin. et *Stapletonia* Dash & al., mais se distingue par un rhizome plus court et la présence de pseudo-épillets.

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Addresses of the authors: VTT, HNN: Vietnam Academy of Forest Science, Dong Ngac, Tu Liem, Ha Noi, Vietnam. Email (VTT): [tvtien117@yahoo.com](mailto:tvtien117@yahoo.com)  
NHX: South China Botanical Garden, Guangzhou, 510650, China.

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## Introduction

Asian fleshy-fruited genera in the tribe *Bambuseae* are clearly demarcated in two major groups. The first group is placed in the subtribe *Bambusinae*, which is characterized by each node gives rise to several branches with one becoming longer and dominant, and flowers with short styles. Four distinct genera are currently recognized in this group: (a) *Melocalamus* Benth. from Bangladesh, S. China, India (Assam), Myanmar and Vietnam (GAMBLE, 1896a; OHRNBERGER, 1999; LI & STAPLETON, 2006; NGUYEN & TRAN, 2010), characterized by having 2-florets; (b) *Dinochloa* Buse, from India, Indonesia, Philippines, Thailand, Malaysia, China and Vietnam (DRANSFIELD, 1981; OHRNBERGER, 1999), characterized by having 1-floret; (c) *Sphaerobambos* J. Dransf. from the Philippines, Borneo and Sulawesi (DRANSFIELD, 1989), characterized by having several florets; and (d) *Cyrtochloa* J. Dransf. from the Philippines, characterized by having 1-floret and long necked rhizome (DRANSFIELD, 1998). The second group is placed in the subtribe *Melocanninae*, which is characterized by each node bearing several subequal branches, and flowers with long styles. Two genera are recognized in this group: viz., *Melocanna* Trin. from Burma, Bangladesh (GAMBLE, 1896b; OHRBERGER, 1999; XIA & STAPLETON, 2006) and *Stapletonia* Dash & al. from India (DASH & al., 2009). The genus *Melocanna* is a sympodial erect bamboo with long necked rhizome, 1-fertile floret and 1 to several sterile, rachilla articulate, two lodicules, two to four stigmas and a pear shaped fruit (GAMBLE, 1896b; XIA & STAPLETON, 2006), whereas *Stapletonia* is a shrubby bamboos with extended necks rhizome, an inflorescence in large densely glomerate head, 1 fertile floret with a rachilla extension, palea narrowly 2-keeled, three lodicules, two stigmas and an apple shaped fruit (DASH & al., 2009).

During our investigation of the bamboos from Truong Son Range of Central Vietnam in August 2005, the authors found that several populations of bamboo are widespread and abundant through degraded natural forest in valleys and mountain gorges in KonTum Province. Sterile specimens of rhizomes, branches and culm sheaths were collected. Because of this rather limited material and especially in the absence of fertile material, we were not able to keyed out to any currently known species from Vietnam and neighboring regions. During a recent visit to P, we were able to examine all the collections of bamboos from Vietnam. Fortunately, two of these, a single sheet of *Poilane 35696*, collected in September 1946, from Dak To (Komtum Province) had flowers and fruits; and a second one *Averyanov & al. VH020*, collected in February 1995, in the Ngoc Linh Mountain (Kon Tum Province) had branches, culm sheath, flowers and fruits, but no rhizomes. In addition, in October 2010, one of the author (HNN) revisited the localities where Poilane, Averynanov and their staff collected those

fertile specimens. He re-collected the bamboo that we saw in a sterile state in 2005. Nevertheless, this sterile collection matched *Averyanov & al. VH020*.

All collected specimens were dissected and studied. We confirmed the presence of pachymorph rhizomes that were relatively short necked, erect culms and branch complement typically a cluster of slender subequal branches; the pseudospikelets were clustered at the distal nodes on leafless flowering branches, each having 1 fertile floret, the style was long and beaked on fruit and the fruit was thick and fleshy. The structure of the inflorescence in those specimens is basically similar to that of *Melocanna* discussed above. Furthermore, the rhizome structure is similar to the one that characterized *Stapletonia*. However, the inflorescences of *Stapletonia* in large densely glomerate heads are born terminally on leafy branches. In addition, all paleas in collected specimens are keeled like a narrow groove with a bifid apex and each style have three stigmas. Because the combination of characters mentioned above is not found in any currently described bamboo genera, we propose to recognize this taxon as a new monotypic genus named *Annamocalamus* H. N. Nguyen, N.-H. Xia & V. T. Tran, with *A. kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran as the type species.

***Annamocalamus*** H. N. Nguyen, N.-H. Xia & V. T. Tran, **gen. nov.**

**Type species:** *A. kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran

*Genus nova habitu Melocanna, Stapletonia similis, sed rhizomatis sympodialibus, rhizomemate brevi collo, inflorescentilis iterauctantibus, pseudospiculae ad convivia in foliis nodorum distal ramis florentibus, glumis 3, stigmatibus 3 differt.*

*Densely tufted with rhizomes* short necked, pachymorph. *Culms* erect, when young densely covered with appressed white hairs, becoming rough when old due to silica; culms walls thin; nodes slight swollen. *Branches* a cluster of slender subequal branches, none dominant, these branching further. *Culm* sheaths persistent, greenish brown, rough, when young covered with densely appressed purple-brown bristle on the abaxial surface, margins dense purple-brown hairs; blade tardily deciduous, triangular, erected, base black-brown when young and produced upwards into rounded, abaxial dense white powder, margins dense cilia, adaxilly dense hairs at the base; auricles. *Leaf* blades oblong-obovate, base broadly cuneate, margins and adaxilly surface dense white cilia; leaf sheaths dense white cilia, auricles. *Inflorescence* iterauctant, bracteaete, pseudospikelets in groups at the distal nodes on leafless flowering branches; 1 fertile floret, glumes 3, apex acute, mucronate, margins shortly white-hispid, abaxial surface sparse white cilia; lemma oblong-lanceolate, apex acute,

mucronate, convolute and covering most of the palea, margins dense white cilia; palea oblong-lanceolate, strongly involutes, sparse white cilia, apex bifid, with a narrow groove on the back (at the base rachilla is joined); lodicules 3; stamens 6, filaments free, apex obtuse; style long; stigmas 3, plumose; ovary glabrous, shortly stalked. Pericarp thick, apple shaped, fleshy, globose.

*Etymology.* – The specific epithet refers to Annamite range (Truong Son Range of Central Vietnam, where the species is located, calamus: reed).

*Notes.* – This remarkable genus is similar to *Melocanna* and *Stapletonia* in general appearance, but can be distinguished by the short necked rhizomes (vs long necked rhizomes in *Melocanna* or with extended necks in *Stapletonia*), pseudospikelets grouped at the distal nodes on leafless flowering branches (vs slightly compressed bilaterally on terminal leafy branches in *Melocanna* or large densely glomerate heads on terminal leafy branches in *Stapletonia*) and a long style with 3 stigmas (vs 2 to 4 or 2). The complete list of distinctive characters are summarized in Table 1.

***Annamocalamus kontumensis*** H. N. Nguyen, N.-H. Xia & V. T. Tran, **spec. nova** (Fig. 1, 2).

**Typus: Vietnam, Kon Tum Province:** Ngoc Linh Mountain, Ngoc Linh village, c. 1200 m, 23.II.1995, fl. & fr., Averyanov & al. VH020 (holo-: P [P00451097]).

*Rhizomatis sympodialibus, rhizomemate brevi collo, culmi erectus, vaginis auriculis conspicuis, dorso dense adpressequ atro-strigosis, laminis triangularis, erectus, basis producens, deciduus, inflorescentilis iterauctantibus, pseudospiculae ad convivia in foliis nodorum distal ramis florentibus, glumis 3, flosculis hermaphroditus 1, lodicula 3, stylus longis, stigmatibus 3, brevis, frutus carnosus.*

Densely tufted with rhizomes short necked, pachymorph. Culms erect, 4-8 m tall; internodes 60-80 cm long and 3-4.5 cm in diameter, when young densely covered with appressed white hairs, becoming rough when old due to silica; culms walls 2-3 mm thick; nodes slight swollen. Branches a cluster of slender subequal branches, none dominant, these branching further. Culm sheaths persistent, greenish brown, rough, when young covered with densely appressed purple-brown bristle on the abaxial surface; 20-25 cm long and 12-16 cm wide at the base; apex 8-10 cm wide, margins dense purple-brown hairs; blade tardily deciduous, triangular, erected, base black-brown when young and produced upwards into rounded, 10-15 × 6-8 cm, abaxial dense white powder, margins dense cilia, adaxilly dense hairs at the base; one auricle standing, 2-2.5 × 0.4-0.6 cm, other one margin curved downwards, 1.5-2 × 0.4-0.5 cm, adaxilly dense purple-brown bristle, ca. 0.9 cm long; ligule ca. 0.3 cm long with dense pale-

ciliate, ca. 0.3 cm long. Leaf blades oblong-obovate, base broadly cuneate, 30-34 × 3.5-4 cm, veins in 13-14 pairs, margins and adaxilly surface dense white cilia; leaf sheaths dense white cilia, auricles ca. 0.3 × c a. 0.2 cm with slender bristles, 5-8 mm long; ligule low rim, ca. 1mm; petiole 4-5 × 2-3 mm. Pseudospikelets in groups at the distal nodes on leafless flowering branches, ca. 8 mm long; 1 fertile floret, glumes 3, upper most obovate, 4-5 × 2-3 mm, apex acute, mucronate, mucro ca. 1 mm long, veins in 5, margins short white-hispid, abaxial surface sparse white cilia; lemma oblong-lanceolate, 5-6 × 3-4 mm, veins in 9-11, apex acute, mucronate, mucro 1.5-2 mm long, convolute and covering most of the palea, margins dense white cilia; palea oblong-lanceolate, 7-8 × 2.5-3 mm, veins in 9-11, strongly involutes, sparse white cilia, apex bifid ca. 1 mm long, with a narrow groove on the back (at the base rachilla is joined); lodicules 3, obovate-shaped, 0.7-1 × ca. 0.5 mm margins long cilia; stamens 6, filaments free, 4-5 × 0.4-0.5 mm; style long; stigmas 3, plumose; ovary glabrous, short stalked. Pericarp thick, apple shaped, fleshy, globose, top horizontal or slightly truncated in the middle, 12-15 × 12-15 mm.

*Distribution and habitat.* – The new species grows in the degraded natural forest in valleys and mountain gorges, but is common along river or valleys, between 500 to 1200 m in the western highland of Vietnam.

*Phenology.* – *Annamocalamus kontumensis* flowered in December 1946 (*Poilane 35696*) and January 1995 (*Averyanov & al. VH020*). New shoots seems to develop between June to August.

*Local uses.* – This species is of considerable importance to the local people. Its culms are used for making handicrafts, household tools.

*Etymology.* – The specific epithet refers to the type locality, Kon Tum Province, Vietnam.

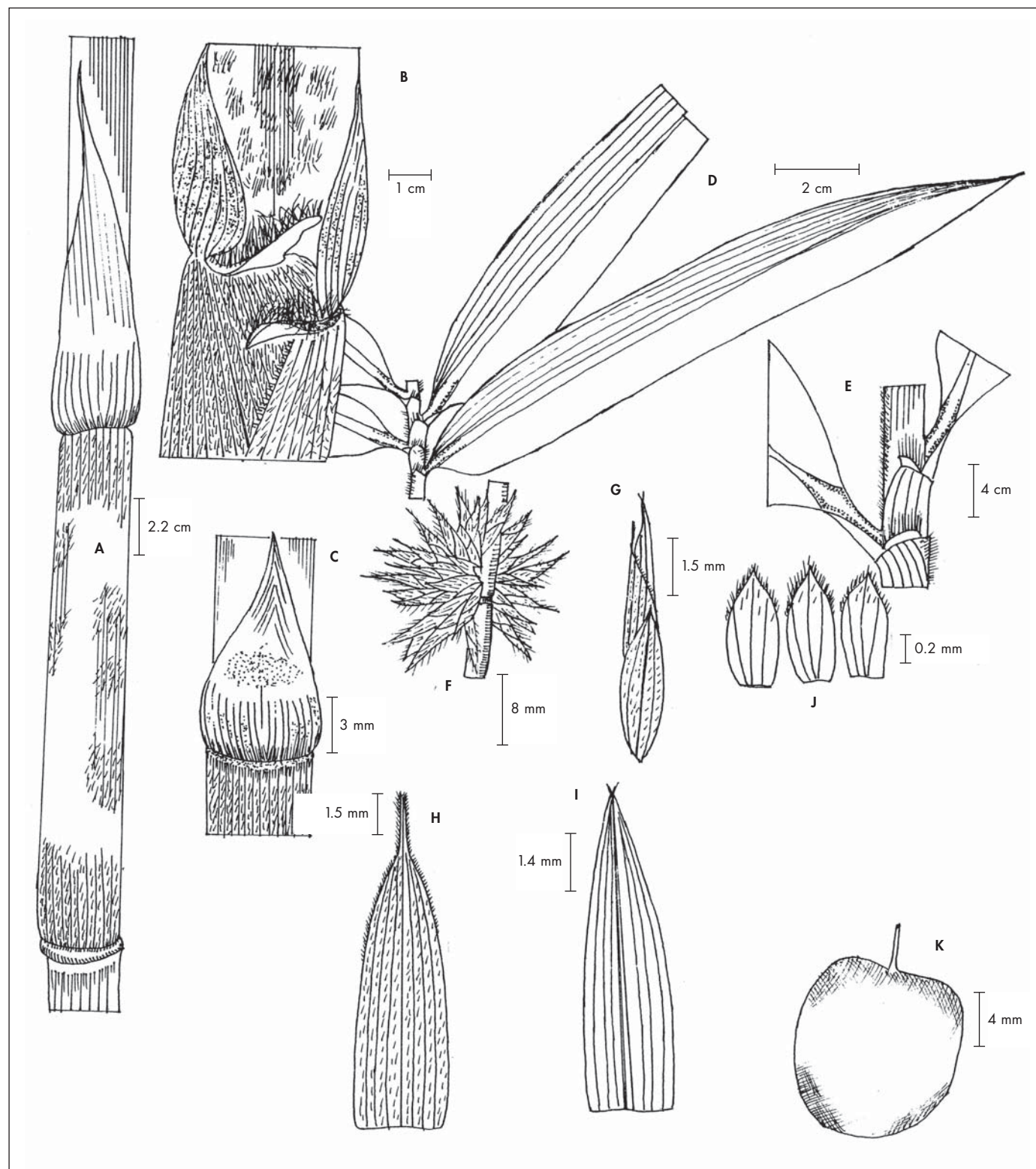
*Paratypes.* – VIETNAM. **Kon Tum Province:** Dak To District, Lo Xo Pass, 15°13'338"N 107°44'052"E, 1071 m, 28.VIII.2005, st., H. N. Nguyen, V. T. Tran 2820050540 (FSIV); Dak To and Dak Blau District, 1.IX.1946, fl. & fr., *Poilane 35696* (P).

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Fig. 1. – Holotype of *Annamocalamus kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran. [Averyanov & al. VH020, P] [© Muséum National d'Histoire Naturelle. Reproduced with permission]



**Fig. 2.** – *Annamocalamus kontumensis* H. N. Nguyen, N.-H. Xia & V. T. Tran. **A.** Culm sheath; **B.** Section of culm sheath with auricles; **C.** Dorsal view of blade; **D.** Leafy branch; **E.** Section of leafy branch; **F.** Section of flowering branch; **G.** Spikelet; **H.** Dorsal view of lemma; **I.** Dorsal view of palea; **J.** Lodicules; **K.** Fleshy fruit.

[**A, F-K:** Averyanov & al. VH020, P; **B-E:** Nguyen & Tran 2820050540, FSIV] [Drawing: Van Tien Tran]

**Table 1.** – Comparison of *Annamocalamus* H. N. Nguyen, N.-H. Xia & V. T. Tran with allied genera.

	<i>Cyrtochloa</i> Dransf.	<i>Dinochloa</i> Buse	<i>Melocalamus</i> Benth.
<b>Habit</b>	erect, then scrambling bamboos	climbing bamboos	climbing bamboos
<b>Rhizome</b>	parchymorph, often relative with long necks	parchymorph, short necked	parchymorph, short necked
<b>Culm</b>	slight zig-zag	slight zig-zag	slight zig-zag
<b>Culm sheath</b>	persistent, blade erect occasionally spreading or deflexed, auricles	persistent or deciduous, blade erect or deflexed, auricles present or absent	persistent or deciduous, blade erect or deflexed, auricles present or absent
<b>Mid-culm branches</b>	many, one dormant	many, one dormant	many, one dormant
<b>Inflorescence</b>	in group at each node on leafless flowering branches	in group at each node on leafless flowering branches	in group at each node on leafless flowering branches
<b>Pseudospikelets</b>	1-flowered, no rachilla extension	1-flowered, no rachilla extension	2-flowered with rachilla extension
<b>Lemma</b>	similar to glumes with short or long pointed tip	similar to glumes with mucronate or obtuse	similar to glumes with obtuse
<b>Palea</b>	with a narrow groove on the back	not-keeled,	2-keeled, winged
<b>Lodicules</b>	usually 3	absent or present	3
<b>Stamens</b>	6, filaments free, anthers with long pointed tip	6, filaments free, anthers with apiculate tip	6, filaments free, anthers with apiculate tip
<b>Pistil</b>	hairy, style long, stigmas 3	glabrous, style long, stigmas 3	hairy, style long, stigmas 2 or 3
<b>Fruit</b>	berry like, globose, oblong or ovoid	berry like, globes, subglobes or obclavate	berry like, globose

specimen of *A. kontumensis* in P. The curator of the Muséum national d'Histoire naturelle in Paris (P) is thank for use of all their facilities. The authors also wish to thank Dr. C. M. A. Stapleton and Dr. M. W. Callmender for constructive comments and suggestions.

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<b><i>Sphaerobambos</i> J. Dransf.</b>	<b><i>Melocanna</i> Trin.</b>	<b><i>Stapletonia</i> Dash &amp; al.</b>	<b><i>Annamocalamus</i> H. N. Nguyen, N.-H. Xia &amp; V. T. Tran</b>
erect, or climbing bamboos pachymorph, short necked	erect bamboos pachymorph, long necked	shrubby bamboos pachymorph, extended necks	erect bamboos pachymorph, short necked
straight or slight zig-zag deciduous, blade erect first then deflexed, auricles present	erect persistent, blade erect, auricles absent	erect at base, clambering above deciduous, blade erect, auricles obscure	erect persistent, blade erect and tardily deciduous, auricles present
many, one dormant in group at each node on leafless flowering branches	many, subequal slightly compressed bilaterally on terminal leafy branches	many, subequal in large densely glomerate heads on terminal leafy branches	many, subequal in group at each node on leafless flowering branches
multi-flowered with rachilla exten- sion and slender	1-fertile floret and 1-several sterile, rachilla articulate	1-flowered with rachilla extension	1-flowered with rachilla extension
similar to glumes, acute	similar to glumes	similar to glumes	similar to glumes with long pointed tip
2-keeled, winged	convolute	narrowly 2-keeled	with a narrow groove on the back, apex bifid
absent	2	3, persistent	3, persistent
6, filaments free, anthers with apiculate tip	6, filaments free or irregularly connate	6, filaments free	6, filaments free
hairy, style long, stigmas 3 berry like, globose	glabrous, style long, stigmas 2-4 pear shaped at apex	glabrous, style long, stigmas 2 apple shaped, with persistent glumes, palea and lodicules, beaked at apex	glabrous, style long, stigmas 3 apple shaped, with persistent glumes, palea and lodicules, beaked at apex