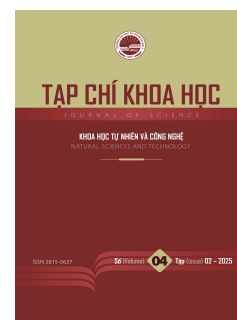




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## Taxonomic characteristics of the Genus *Mucuna* Adans. in Vietnam

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### Abstract

The genus *Mucuna* Adans. encompasses around 105 species, predominantly inhabiting tropical and subtropical zones, with a significant number occurring in Asia. These species are mostly associated with primary and secondary forest habitats and are seldom cultivated, with *M. pruriens* being a notable exception. They are characterized as woody lianas, either annual or perennial—they exhibit considerable morphological variation. *Mucuna* species significantly contribute to forest ecosystem dynamics and offer diverse applications, including in timber production, traditional medicine, and food resources. Of these, two species are cultivated, while three are considered threatened and of conservation concern. This study provides a comprehensive account of the genus *Mucuna* in Vietnam, detailing its key morphological features, distribution patterns, habitat preferences, ecological functions, and practical applications. Additionally, a dichotomous identification key is proposed to aid in distinguishing the seven native species found in the flora of Vietnam.

**Keywords:** *Fabaceae*, *Mucuna*, taxonomy, Vietnam, identification key

### 1. Introduction

Genus *Mucuna* was published by Adanson in the *Familles des Plantes* in 1763 [1]. It belongs to Fabaceae Lindl. [2]. According to recent studies, the genus has about 112 species, mainly in the tropics and subtropics, more than half occur in Asia [3]. Vietnam has 7 species and 2 varieties; it can be found in primary and secondary forests scattered all over the country, rarely cultivated (*M. pruriens* var. *utilis*) [4]. The genus is characterized by species that are woody climbers, stipules often present, with irritating hairs, the hardened, hooked apical part of the keel petals; stamens 10, diadelphous, 9 connate at base to tube, 1 stamen free; anthers dimorphic; gynoecium always of a solitary carpel; ovary superior, 1-locular; fruit

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dehiscent (Legume). As woody climbers, *Mucuna* species play an important role in ecosystems, some species for medicine and one species is planted for food.

Up to now, several studies have investigated the genus *Mucuna* in Vietnam, covering aspects such as the description of new species, taxonomy, species checklists, and assessments of resource value [4]–[9]. However, these studies remain incomplete and lack a truly systematic approach, and the nomenclature has not yet been fully updated. Therefore, this study aims to provide a comprehensive and up-to-date taxonomic revision of the genus *Mucuna* in Vietnam.

## 2. Materials and methods

**Materials:** *Mucuna* Adans. in Vietnam, include 64 specimens, which were preserved at Herbarium Institute of Biology (Hanoi, Vietnam), Vietnam National University (Hanoi, Vietnam HNU) and National Institute of Medical Materials (Hanoi, Vietnam) Additional data were collected from wild populations and online botanical databases.

**Methods:** This study followed the standard taxonomic approach described by Nguyen Nghia Thin (2007) [10], which emphasizes morphological analysis, especially of reproductive organs. Field surveys were conducted to collect samples, take photographs, and observe living specimens in their natural habitats. Characteristics related to distribution, habitat, and morphology were documented on-site.

**Species identification and assessment methods:** Species were identified using comparative morphological methods and references from Pham Hoang Ho (1999) [9], along with regional and global taxonomic surveys [11]–[16]; Scientific names were standardized according to *Checklist of plant species of Vietnam* [4] and updated based on *The Plant list* [16].

**Assessment of conservation status:** The level of threat was evaluated based on Decree No. 84/2021/ND-CP [17], the Vietnam Red Book part II – Plants (2024) [18]; and the IUCN Red list (2025) [29]. Information on plant resources was referenced from the Plant Resources of Vietnam [20]; Plant Resources of South-East Asia (PROSEA) [21], and the Checklist of medicinal plants in Vietnam [22].

Classification was carried out in the Botany office (Institute of Biology) and the Botany experiment office (Hanoi Pedagogical University 2).

## 3. Results and discussion

### 3.1. Characteristics of the genus *Mucuna* Adans. in Vietnam

MUCUNA Adans. 1763, nom. cons.

Adans. 1763. Fam. Pl. 2: 325, nom.cons.; Gagnep. 1916. Fl. Gen. Indoch. 2: 315; N.V. Thuan, 1979. Fl. Camb. Laos Vietn. 17: 29; Lee Sukang et Chang Benneng, 1995. Fl. Reip. Pop. Sin. 41: 172 ; C.M. Wilmot-Dear, 2008, Thai For. Bul. (Bot.), 36, pp. 114; Sa Ren & C.M. Wilmot-Dear, 2011. Fl. China, 10: 207; H. Wiradinata, H. Ohashi & F. Adema, 2016. Blumea 61: 93; B.C. Ho & H.K. Lua, 2022, Gard. Bull. Singapore, 74(1): 37.

- *STIZOLOBIUM* P. Browne, 1756, Civ. Nat. Hist. Jamaica: 290, t. 31, f. 4.

- *CITTA* Lour. 1790. Fl. Cochinch. 456.

- *MARCANTHUS* Lour. 1790. Fl. Cochinch. 461.

- *CARPOPOGON* Roxb. 1832. Fl. Ind., ed. 2 (3): 283.

*Vietnamese names:* Đậu mè, Móc mè, Mắc mè.

**Description:**

Woody lianas, perennial or annual, ranging from slender to large. Stems are usually 10-20 m long, rarely reaching up to 70-80 m (*M. macrocarpa*, *M. gigantea*). Young parts of some species may bear irritant bristles (*M. bracteata*, *M. pruriens*; *M. revoluta*). Leaves are pinnately 3-foliolate, arranged alternately. Stipules are usually caducous; stipels (stipule-like structures) are often present at the base of the petiolules, sometimes caducous, and rarely absent (*M. bracteata*, *M. macrocarpa*). Leaflets are large, with pinnate venation; secondary veins either terminate at the margin (in crenate leaves: *M. bracteata*, *M. pruriens*) or anastomose near the margin (in entire-margined leaves).

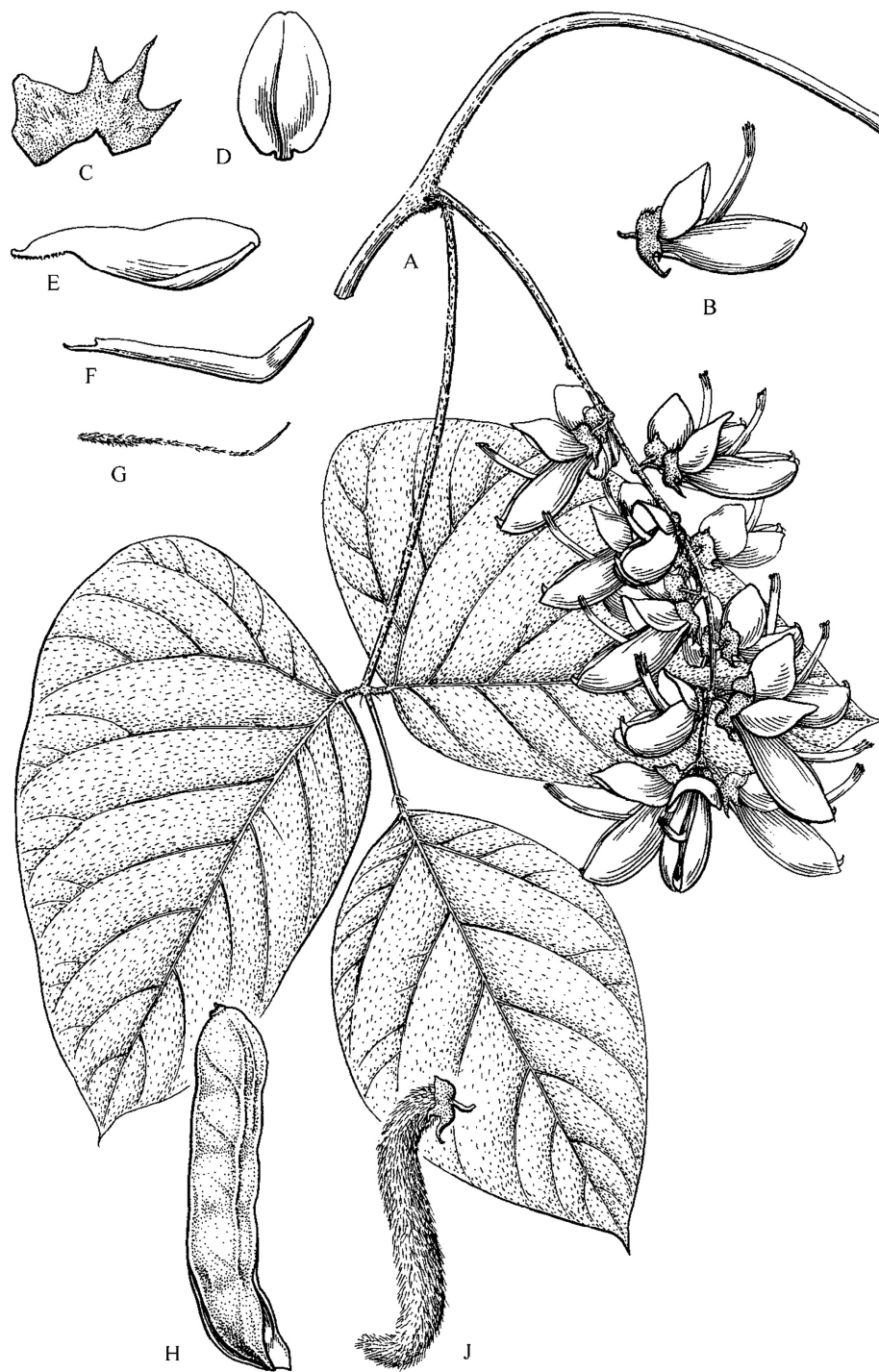
Inflorescences are axillary, forming pseudoracemes, or pseudopanicles, or sometimes fascicles. They are mostly pendulous, usually bearing three flowers at the top of a brachyblast. Bracts on brachyblasts and flowers are present, caducous or persistent at least until the fruiting stage (*Mucuna bracteata*, *M. hainanensis*, *M. interrupta*). Bracteoles are present at the top of the pedicel or base of the calyx, and are caducous.

Flowers are large, showy, bisexual, and zygomorphic. The calyx is campanulate with five lobes; the upper two lobes are connate into a broad lip. The corolla may be dark purple, red, light green, or nearly white, usually darker when dried, and is longer than the calyx. The standard petal is typically shorter than the wings and keel, stalked, with two auricles at the base. Wings are oblong or ovate, inflexed, and usually attached to the keel. Keel petals are partially connate along the lower margin, slightly longer than or equal to the wings, with an inflexed apex forming a horny, often hooked, apical beak.

Stamens are ten, diadelphous (9 fused, 1 free). Anthers are dimorphic and free, usually bearded: five longer anthers are almost basifixed, and five shorter ones are dorsifixed. The gynoecium consists of a solitary carpel. The ovary is superior, sessile, 1-locular, 1-10 ovules, rarely up to 20 (*M. macrocarpa*). The style is filiform, inflexed, sometimes hairy, lacking a beard; stigma small and capitate.

Fruit: Dehiscent legumes, often oblong or linear, swollen around the seeds or laterally flattened, up to 50 cm long (*M. macrocarpa*). Texture varies from leathery to woody (*M. macrocarpa*), often winged along the sutures. Valves are thick, smooth to ribbed or lamellate, and frequently ornamented raised lamellae and commonly bearing irritant bristles; they are septate between seeds.

Seeds: 1-10, rarely up to 20 (*M. macrocarpa*); shapes include reniform, orbicular, or elliptic. The hilum is linear. Seeds have a rim aril. Embryo is curved; cotyledon is large; endosperm is absent. (Figure 1).



**Figure 1.** *Mucuna pruriens*.  
A. habit; B. flower; C. calyx; D. standard; E. wing; F. keel;  
G. pistil; H-J (*M. pruriens* var. *utilis*). fruit  
(Source: C.M. Wilmot-Dear, 2008)

Typus: *Dolichos urens* L. 1759 (= *Mucuna urens* (L.) Medik. 1787)

**Distribution:** The genus *Mucuna* comprises approximately 112 species distributed across tropical and subtropical regions [3]. In Vietnam, seven species have been recorded, occurring throughout the country. Among them, *M. pruriens* var. *utilis* is widely cultivated in the provinces of Ha Giang, Cao Bang, and Lang Son [4].

**Habitat and Ecology:** Species commonly occur in evergreen or semi-deciduous primary and secondary forests, forest edges, and along rivers, at elevations up to 1800 m. Flowers are insect-pollinated. The flowering season typically spans from December to February of the following year, while fruiting occurs from March to April. Seeds germinate directly on the ground, exhibiting hypogeal germination. The germination rate is relatively high, and two seedling types have been observed: one with scale-like first leaves (*M. gigantea*), and one with simple, opposite first leaves (*M. pruriens*) [3].

**Resource value:** Among seven species, *Mucuna bracteata* and *Mucuna revoluta* were assessed as Least Concern (LC) on The IUCN Red List of Threatened Species in 2010, but have since been removed from the list [19]. No *Mucuna* species are currently listed in Decree No. 84/2021/ND-CP [17] or in the Vietnam Red Book (2024) [18].

All *Mucuna* species are valued for their ability to improve soil quality and prevent erosion; stems and leaves are commonly used as green manure [4]. Several species are also utilized in traditional medicine [20]–[22]. Notably, *M. pruriens* var. *utilis* is cultivated for its seed as a food source. However, the fruits and young parts of some species bear irritant bristles that can cause skin irritation (*M. bracteata*, *M. pruriens*, *M. revoluta*).

### 3.2. Key to the species of *Mucuna* Blume in Vietnam

- 1A. Leaflets  $\pm$  crenate; secondary nerves ending in or anastomosing at the margin. Wing petals with broadly rounded apex, not tapering. Ovary S-shaped. Fruits without marginal wings; seed with rim aril.
  - 2A. Stipels absent; bracts often persistent until the fruiting stage ..... 1. *Mucuna bracteata*
  - 2B. Stipels present; bracts earlier-deciduous ..... 2. *Mucuna pruriens*
- 1B. Leaflets entire; secondary veins anastomosing close to the margin. Wing petals are narrowing near the apex. Ovary straight. Fruits with a pair of marginal wings; seed without a rim aril.
  - 3A. Stems and leaves with conspicuous red-brown indumentum. Stipels absent. Fruit 26-45 cm long3. *Mucuna macrocarpa*
  - 3B. Stems and leaves glabrous or with pale indumentum. Stipels present. Fruit 7-18 cm long.
    - 4A. Bracts are often persistent until the fruiting stage.
      - 5A. Inflorescence 8-24 cm long. Corolla white. Fruit  $13-14 \times 6-7$  cm. Legume with erect lamellae, 2-winged along margins, forming a T-shaped cross-section. Seeds 3; approximately  $3 \times 2.5$  cm, 1.2 cm thick ..... 4. *Mucuna interrupta*
      - 5B. Inflorescence up to 40 cm long. Corolla deep purple (rarely white). Legume lamellae often partly adpressed, with 2-winged margins but not forming a T-shaped cross section. Seeds 2-4;  $1.7-2.5 \times 1.5$  cm, 5-7 mm thick .....5. *Mucuna hainanensis*
    - 4B. Bracts are early-deciduous.
      - 6A. Leaves up to 27 cm, glabrous or with sparse, short adpressed hairs. Corolla white, tinged green, yellow, or pale pink. Fruit (7-)10-15(-18) x (3.5-)4-5.5(-6) cm; surface with reticulate raised lines, no lamellae; wings 0.5-1 cm wide. Seeds 1-3 .....6. *Mucuna gigantea*
      - 6B. Leaves up to 20 cm, hairy (rarely glabrous) on both sides. Corolla deep purple or pinkish-purple.



Fruit 6–9 x 4–4.5 cm; surface with at least a few partly developed lamellae running obliquely or transversely; wings up to 5 mm wide, strongly revolute. Seeds 1-2..... 7. *Mucuna revoluta*

#### 4. Conclusions

The genus *Mucuna* Adans. in Vietnam comprises seven species and two varieties, distributed in both primary and secondary forests across the country. Among them, *M. pruriens* var. *utilis* is cultivated for food. All species are woody lianas, large and robust, with highly diverse morphological characteristics. They play an important ecological role in forest ecosystems and are utilized for various purposes, including soil improvement and erosion control, medicinal applications, and food production.

In this study, the key morphological characteristics of the genus *Mucuna* in Vietnam were described, a summary of its distribution, habitat, ecology, and resource value was provided and a taxonomic key for identifying the seven species of *Mucuna* was presented in the flora of Vietnam.

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