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## Taxonomical characteristics of *Dysoxylum* Blume in Vietnam

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### Abstract

Genus *Dysoxylum* Blume in Vietnam, the *Dysoxylum* has 15 species, can be found in primary and secondary forests. All species are trees, some are large trees, with very diverse morphological characteristics; they play an important role in forest ecosystems where they are present and are used for many purposes: for timber, in medicine, 2 species are cultivated, 3 species are threatened with extinction.

In this article, we described characteristic of genus *Dysoxylum* in Vietnam, added summary informations about distribution, habitat, ecology and use of genus *Dysoxylum* Blume in Vietnam, and propose to establish classification key to the 15 species belong to *Dysoxylum* in flora of Vietnam.

**Keywords:** Taxonomy, *Dysoxylum*, Vietnam

### 1. Introduction

Genus *Dysoxylum* Blume, belong to Meliaceae Juss. has about 80 species; mainly tropical Asia, tropical and subtropical Australia, Pacific islands [1,4,8]. Vietnam has 15 species; can be found in primary and secondary forests scattered all over the country [2,3,5].

Up to now, there have been research about the genus *Dysoxylum* in Vietnam, but it is still incomplete and really systematic; nomenclature has not been updated [2,3,5]. Therefore, it is necessary to have an complete taxonomic study about the genus *Dysoxylum* in Vietnam. All species are trees, sometimes are large trees, so they play an important role in forest ecosystems; many species for wood

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very durable, high quality, some species for medicine; some species are threatened with extinction.

## 2. Materials and methods

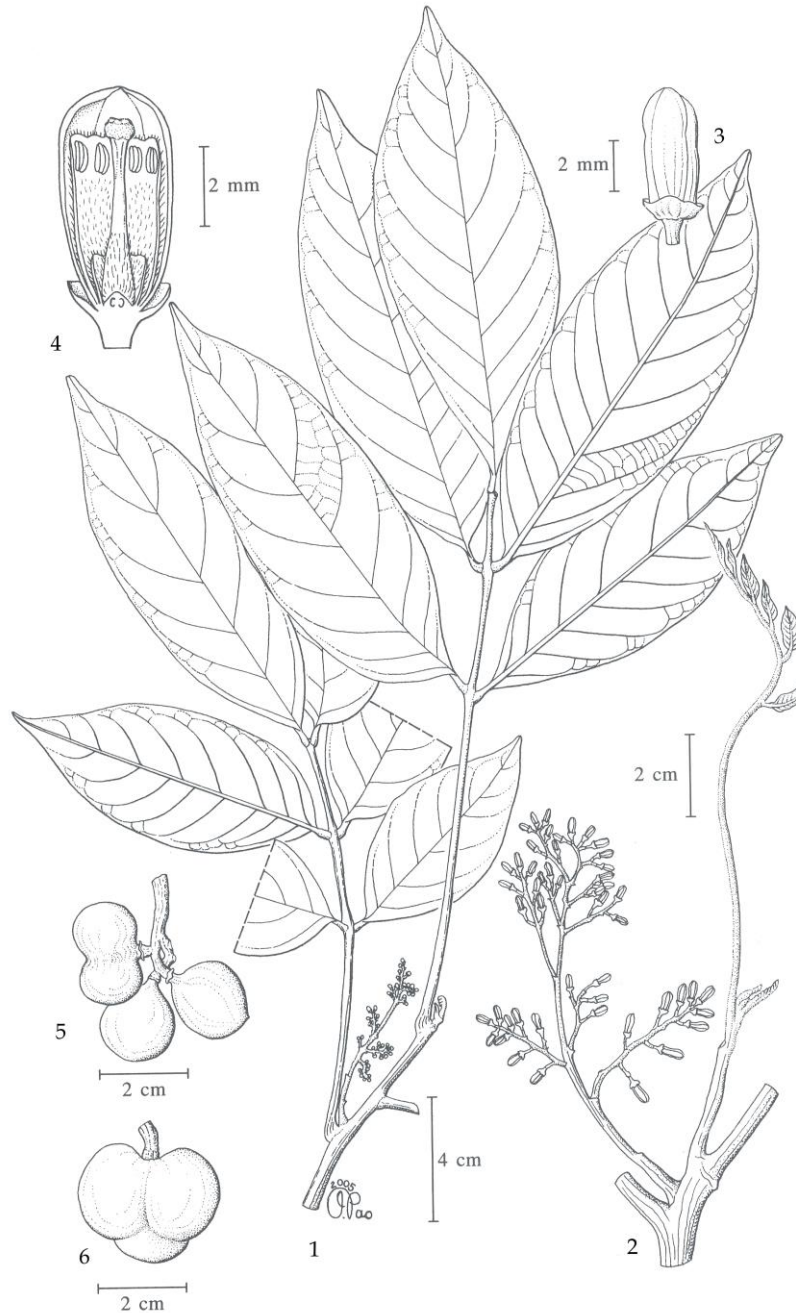
*Materials:* *Dysoxylum* Blume in Vietnam, include 79 specimens, which preserved at Herbarium, Institute of Ecology and Biological Resources, Hanoi Vietnam (HN), wild species and internet.

*Methods:* We used morphological comparison method, according to Nguyen Nghia Thin (2007) [7]. Classification is carried out in the Botany office (Institute of Ecology and Biological Resources) and Botany experiment office (Hanoi Pedagogical University 2); nomenclature of taxa are updated on the website <http://www.theplantlist.org> [9].

## 3. Results and discussion

### 3.1. Characteristics of the genus *Dysoxylum* Blume in Vietnam

Trees, evergreen, usually medium trees or large trees (up to 30-40(-45) m tall: *D. alliaceum*, *D. arborescens*, *D. carolinae*, *D. cauliflorum*, *D. grande*, *D. juglans*, *D. loureiri*, *D. tonkinense*), and up to 80(-150) cm in diameter, sometimes with buttresses up to 3 m high, occasionally small trees (*D. excelsum*, *D. rubrocostatum*); branchless up to 25 m long; bark smooth or lenticellate, becoming cracked, brown to blackish; inner bark fibrous, often brown to pink, often fragrant of sour or pungent; heart-wood often red-brown; young parts usually hairy. Leaves paripinnate or imparipinnate, alternate (except *D. carolinae* opposite); size variation (up to 1 m in *D. grande*); petiole usually long, sometimes hairy, flattened adaxially, weakly swollen at base. Leaflet opposite or subopposite; margin entire; base more or less oblique; paripinnate venation. Inflorescences paniculate, sometimes reduced to a fascicles or solitary, in terminal or axillary (except *D. cauliflorum* in bole). Flower unisexual (flower has stamens and pistils but only one develops, the rest abortion), usually dioecious, rarely bisexual (*D. alliaceum*, *D. cyrtobotryum*); 4-merous 4, rarely 5-6-merous (*D. alliaceum*, *D. arborescens*, *D. tonkinense*). Calyx tubular, lobed (except *D. loureiri* free). Petals free or adnate to the lower half of staminal tube; valvate or weakly imbricate in bud. Stamens are usually slightly shorter than the petals; staminal tube cylindrical of jar-shaped, with 8 anthers or 9-10 anthers (*D. alliaceum*, *D. arborescens*, *D. hoanense*, *D. tonkinense*); anther 2-celled. Disk tubular, free, terminal lobed, encloses partially to more than the height of ovary. Ovary superior, syncarpous, often 4-locular, sometimes 2-locular (*D. cyrtobotryum*, *D. rubrocostatum*) or 3-locular (*D. alliaceum*, *D. loureiri*), seldom 4-5-locular (*D. arborescens*); 2 ovules per locule; style distinct; stigma capitate to discoid. Fruit capsular, spherical or ovoid, (2-)4(-5)-valved, each valve with 1-2 seeds. Seed usually with orange-yellow to red aril or sarcotesta; hilum large; cotyledon fleshy, fatty oily; endosperm absent. (Figure 1).



**Figure 1.** *Dysoxylum alliaceum* (Blume) Blume

1-2. habit; 3. male bud; 4. longitudinal section of male flower bud;  
5. infructescence; 6. fruit

(Source: D. J. Mabberley & C. M. Pannell, 2013)

*Distribution:* Distributed mainly in the tropical Asia (India, China, Sri Lanka, Laos, Thailand, Campuchia and throughout Malesia: Malaysia, Indonesia, Singapore, Brunei, the Philippines and New Guinea) to tropical and subtropical Australia, Pacific islands (Australia, New Zealand). Vietnam currently knows that there are 15 species scattered throughout the country [4,6,8].

Common in evergreen or semi-deciduous primary and secondary forests, at the edge of the forest, along rivers, wetlands, limestone mountains, at an altitude up to 2000 m. Flowers are pollinated by

insects. Flowering January to May; fruits from April to December. Seeds usually germinate in the ground. Seedling with hypogeal germination; cotyledons occasionally emergent, peltate; hypocotyl not or only slightly elongated; first pair of leaves opposite or spiral, simple to 5-foliolate. The seed germination rate is quite high (Seeds of *D. cauliflorum* have a germination rate of 95% in 1-3 months, 80% in 3,5-8 months; those of *D. arborescens* 70% in 2-10 months) [4,6,8].

*Uses:* The wood of species belong to *Dysoxylum* are used for a wide variety of products such as general construction, boat construction, heavy decking, flooring, posts, foundation piles, doors, window frames and sills, mouldings, interior finish, decorative wall panelling, high grade furniture, cabinet work, coffins, vats, pallets, cart wheels, carving, turnery, tool handles, billiard cue butts, and match splints and matchboxes, sometimes are exported; some species are used for medicine; seeds of *D. alliaceum* smell of galic, have been used in fish sauces and young leaves smell of onions have been cooked with fish; fruit of *D. excelsum* edible, etc; species *D. excelsum* and *D. loureiri* are cultivated. Among them, species *D. carolinae*, *D. cauliflorum* and *D. loureiri* are threatened with extinction [2,6].

### 3.2. Key to the species belong to *Dysoxylum* Blume in Vietnam

- 1A. Leaves opposite, flower bisexual ..... 1. *Dysoxylum carolinae*
- 1B. Leaves alternate, flower usually unisexual.
  - 2A. Leaves paripinnate.
    - 3A. Leaves 9-11-jugate.....2. *D. perryanum*
    - 3B. Leaves 3-5-jugate.
      - 4A. Large trees, up to 30-40(-45) m tall; ovary and fruit 3-locular.
        - 5A. Leaflets opposite, subglabrous; with strong smell of onions; flowers pediceled; calyx cup-shaped; anthes 8-103. *D. alliaceum*
        - 5B. Leaflets alternate, both surfaces hairy; without smell of onions; flowers sessile; sepal free; anthes 8 ..... 4. *D. loureiri*
      - 4B. Medium trees; ovary and fruit 4 or 2-locular.
        - 6A. Ovary and fruit 2-locular; inflorescens spikes; cụm hoa bông .....5. *D. rubrocostatum*
        - 6B. Ovary and fruit 4-locular; inflorescens thyrses.
          - 7A. Leaflets alternate; flowers pediceled; petal with 2 appendages; fruits up to 7 cm diam.....6. *D. gotadhora*
          - 7B. Leaflets opposite; flowers sessile; petal without appendages; fruits 2-3,5 cm diam.
            - 8A. Anthers 10; Disk shallow cup-shaped ..... 7. *D. hoaense*
            - 8B. Anthers 8; Disk tubular ..... 8. *D. poilanei*
    - 2B. Leaves imparipinnate.
      - 9A. Petioles weakly angled; petals (4-)-5(-6); anthers 10; ovary usually 4-locular ..... 9. *D. arborescens*
      - 9B. Petioles terate; petals 4(-5); anthers 8; ovary 2 or 4-locular.
        - 10A. Inflorescences in old branches or trunk .....10. *D. cauliflorum*
        - 10B. Inflorescences in axillary or terminal.
          - 11A. Leaves up to 1 m long, leaflets 5-15; nerves 15-30 on each side of midrib; fruits up to 9,5 cm diam ..... 11. *D. grande*
          - 11B. Leaves up to 0,6 m long, leaflets 5-13; nerves fewer than 15 on each side of midrib; fruits ≤ 6 cm diam.
            - 12A. Ovary 2-locular ..... 12. *D. cyrtobotryum*
            - 12B. Ovary 4-locular.
              - 13A. Trees up to 10-15 m tall; anthers 8 .....13. *D. excelsum*
              - 13B. Trees up to 25-30 m tall; anthers 8-10.
                - 14A. Flowers 4-merous; disk tubular, entire ..... 14. *D. juglans*
                - 14B. Flowers 4-5-merous; disk tubular, apex undulate ..... 15. *D. tonkinense*

### 4. Conclusions

Genus *Dysoxylum* Blume in Vietnam has 15 species; can be found in primary and secondary forests scattered all over the country. All species are trees, some are large trees, with very diverse

morphological characteristics; they play an important role in forest ecosystems where they are present and are used for many purposes: for timber, in medicine, 2 species are cultivated, 3 species are threatened with extinction.

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### References

- [1] Blume C.L. 1825. *Bijdragen tot de flora van Nederlansch Indie*. 1: 172-176. Batavia.
- [2] Trần Đình Đại, 2003. *Danh lục các loài thực vật Việt Nam*. 2: 997-1000. Nxb Nông nghiệp, Hà Nội.
- [3] Phạm Hoàng Hộ, 2003. *Cây cỏ Việt Nam*. 2: 392-395. Nxb Trẻ, Tp Hồ Chí Minh.
- [4] Mabberley D. J., C. M. Pannell, 2013. *Flora of Peninsular Malaysia*, Ser. II, 4(1): 189-223. 52109 Kepong, Selangor Darul Ehsan, Malaysia.
- [5] Pellegrin in H. Lecomte, 1911. *Flore Générale de l'Indo-Chine*. 1(4): 741-750. Paris.
- [6] Sosef M.S.M, L.T.Hong and S. Prawirohatmodjo, 1993. *Plant Resources of South-East Asia (PROSEA)*. 5(3): 197-201. Pudoc, Wageningen.
- [7] Nguyễn Nghĩa Thìn, 2007. *Các phương pháp nghiên cứu thực vật*. Nxb ĐHQG Hà Nội.
- [8] Xi suo shu, Peng hua, David J. Mabberley, 2008. *Flora of China*, Vol. 11, pp.125-129. Science Press và Missouri Botanical Garden Press, USA.
- [9] <http://www.theplantlist.org>.