

# Species in China Hongmu and Their Identifying Characteristics

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## 1. Introduction

The origin of the word Hongmu (as the basic color of those wood species is mainly red, people call them Hongmu, which means red wood in Chinese) is from China, and Hongmu is not the name of the tree but is a general designation of woods that they have similar density, structure, color and use. And China Hongmu has a long history. Zheng He, the minister in Ming Dynasty, and his ship-teams had visited more than 30 countries and districts such as Viet Nam, Indonesia, Sri Lanka, India and the coast of East Africa for many times (A.D.1403-1433), and exchanged china, silk, copperware, iron ware, gold coins for special local products—woods. Therefore, many wood species were transported to China since then, and used to make for furniture that they were put in royal palaces or houses belonged to magnates and dignitaries. The furniture is not easily rotten and distorted, and also becomes more beautiful with age. And they have functions of practicality, ornamental, and their prices will be increased with age, which are symbols of rarity, elegance, magnificence, and are enjoyed by people in different estate.

Afterwards, many pseudo Hongmu appeared in the market because of the limited resources and high prices of Hongmu. Recently, with the amounts of Hongmu trade increasing, the Chinese national standard of Hongmu is published in order to protect the benefit of consumers and make Hongmu market standardized. And there are strictly restrictions on characteristics of Hongmu such as species, density, structure, color and so on in standard, and none but wood accords with the standard is deemed to Hongmu[1]. The definition, species, growing areas and identifying characteristics of China Hongmu were briefly introduced in this paper in hope that it may be helpful for correlative personnel to identify Hongmu and their products in the market.

## 2. Definition of Hongmu

According to China national standard <sup>[1]</sup>, Hongmu includes more than 30 species of hardwood, which are the wood of *Pterocarpus*, *Dalbergia*, *Diospyros*, *Millettia*, and *Cassia*. And the species of Hongmu can be divided into 8 groups of Zitanmulei, Hualimulei, Heisuanzhimulei, Hongsuanzhimulei, Xiangzhimulei, Wumulei, Tiaowenwumulei, and Jichimulei, and their characteristics such as density, structure and color (according to dark color of Hongmu in the atmosphere) must accord with the standard, and everyone confirms that it is Hongmu, who must definitely point out its species, and any of woods does not accord with the standard, which is not allowed to use the name of Hongmu. It is worth to point out that the color of Hongmu will become darker and more beautiful in the atmosphere with age and exposure in the atmosphere except other characteristics such as beautiful grain, compact structure, attracting color, excellent stability of size and fine durability and so on.

### 3. Species and growing areas

#### 3-1 Zitanmulei

There is only one species of wood in this group that is Red sanders (*Pterocarpus santalinus* L.f.), and its habit is India.

#### 3-2 Hualimulei

There are seven species of woods in this group that they are *Pterocarpus cambodianus*, *Pterocarpus dalbergioides*, *Pterocarpus erinaceus*, *Pterocarpus macrocarpus*, *Pterocarpus marsupium*, *Pterocarpus pedatus*, *Pterocarpus indicus*, and their growing areas are Indo-China peninsula; Andaman archipelago; tropical district of Africa; Indo-China peninsula; India and Sri Lanka; Indo-China peninsula; India, Southeast Asia, China Taiwan, China Guangdo and Yunnan, respectively.

#### 3-3 Heisuanzhimulei

There are eight species of woods in this group that they are *Dalbergia cultrata*, *Dalbergia fusca*, *Dalbergia latifolia*, *Dalbergia louvelii*, *Dalbergia melanoxylon*, *Dalbergia nigra*, *Dalbergia spruceana*, *Dalbergia stevensonii*, and their growing areas are Burma and India; China, Burma, India and Vietnam; India and Indonesia; Madagascar; East Africa; tropical district of South America, especially Brazil; the Amazon basin of South America; Belize of Central America, respectively.

### 3-4 Hongsuanzhimulei

There are seven species of woods in this group that they are *Dalbergia bariensis*, *Dalbergia cearensis*, *Dalbergia cochinchinensis*, *Dalbergia frutescens* var. *tomentosa*, *Dalbergia granadillo*, *Dalbergia oliveri*, *Dalbergia restusa*, and their growing areas are Asia tropical district of South America, especially Brazil; Indo-China peninsula; South America and Mexico; Indo-China peninsula; South America and Central America.

### 3-5 Xiangzhimulei

There is only one species of wood in this group that is *Dalbergia odorifera* T. Chen, its growing area is Hainan province of China.

### 3-6 Wumulei

There are four species of woods in this group that they are *Diospyros ebenum*, *Diospyros crassiflora*, *Diospyros pilosantha*, *Diospyros poncei*, and their growing areas are Sri Lanka and South of India; tropical district of West Africa; Philippine; Philippine, respectively.

### 3-7 Tiaowenwumulei

There are two species of woods in this group that they are *Diospyros celebica*, *Diospyros philippensis* (including *Diospyros ciscolor* Willd in China Taiwan), and their growing areas are Indonesia; Philippine, Sri Lanka and China Taiwan, respectively.

### 3-8 Jichimulei

There are three wood species of *Millettia laurentii*, *Millettia leucantha* and *Cassia siamea* in this group. And their growing areas are Congo; Burma and Thailand; South Asia, Southeast Asia, Yunnan, Fujian, Guangdong, Guangxi of China, respectively.

## 4. Identification characteristics <sup>[2]</sup>

### 4-1 Zitanmulei

It is the diffuse-porous wood in this group, and the color of heartwood on new cut-sectional surface is red-orange, ranging from purple-red to near-black with age. If the powder of

wood immersed into alcohol solution, the color of solution around powder takes on jacinth, and such solution will have fluorescence after several days, and the block of wood will fall down in water.

#### 4-2 Hualimulei

Those are the diffuse-porous woods or semi-diffuse-porous woods in this group, and the color of heartwood is brown, or ranging from rufous to dark rufous, most of them will float in water. And if the powder of wood immerses into water, such solution will have fluorescence after several hours. The pores are slightly obvious or obvious, which are in different sizes and diffuse in cross section. It is obvious that vessel lines and grain like the pupae of silkworm or block, and longitudinal parenchyma takes on bands in longitudinal section, Ripple mark is visible or very obvious in tangential section. And there are many distinct identifying characteristics among the different woods in this group: *Pterocarpus cambodianus*, *Pterocarpus dalbergioides* and *Pterocarpus erinaceus* have much longitudinal parenchyma and a little of pores, *Pterocarpus indicus*, *Pterocarpus macrocarpus* and *Pterocarpus cambodianus* also have much longitudinal parenchyma; and *Pterocarpus pedatus* will fall down in water, and if the powder of *Pterocarpus pedatus* immerses into water, the solution will take on blue fluorescence; *Pterocarpus indicus* has famous grain of Amboyna burl and much longitudinal parenchyma, and there are large variation of color and weight among individual plants; ray parenchyma of *Pterocarpus marsupium* is composed of one seriate homocellular ray and biseriate homocellular rays.

#### 4-3 Heisuanzhimulei

Those are the diffuse-porous woods in this group, and the color of heartwood is ranging from brown of chestnut to black, which often has grain with vicissitudinary dark and light colors, and the wood will fall down in water or approximate to this, and the solution is with tiny sourness. The pores are slightly visible or obvious, which are in slightly same sizes and diffuse in cross section, and longitudinal parenchyma are obvious or not and takes on bands by naked eyes. Ripple mark is usually visible in tangential section. And there are many distinct identification characteristics among the different woods in this group: *Dalbergia cultrate* has much longitudinal parenchyma; Ray parenchyma of *Dalbergia latifolia* and *Dalbergia nigra* has the tendency of heteromorphism type III, and it is obvious for the latter; *Dalbergia louvelii* has a little of longitudinal parenchyma and its ray parenchyma is

composed of one seriate ray; *Dalbergia melanoxyton* has a little of longitudinal parenchyma and it is not obvious that wood ray has storied phenomena; *Dalbergia stevensonii* has a little of longitudinal parenchyma and pores; *Dalbergia spruceana* also has a little of pores.

#### 4-4 Hongsuanzhimulei

Those are the diffuse-porous woods or semi-diffuse-porous woods in this group, and the color of heartwood is light red, or ranging from rufous to dark rufous, which often have grain with vicissitudinary dark and light color, if the powder of wood immerses into water, and the sourness of the solution is much more obvious than those of Heisuanzhimulei. Longitudinal parenchyma is the style of concentric lamina and thin line or narrow zone. The woods in this group have fragrance of sourness. And there are many distinct identifying characteristics among the different woods in this group: *Dalbergia bariensis* often falls down in the water; Ray parenchyma of *Dalbergia frutescens* var. *tomentosa* and *Dalbergia cearensis* have the tendency of heteromorphism type III, and the pores of *Dalbergia cearensis* are small but the amount is large; It is obvious that ray parenchyma of *Dalbergia cochinchinensis* is one seriate homocellular ray or biseriate homocellular rays, three seriate homocellular rays *Dalbergia granadillo* and *Dalbergia retusa* have the same identifying characteristics that ray parenchyma is one seriate homocellular ray or biseriate homocellular rays, but wavy grain of *Dalbergia granadillo* is obvious, *Dalbergia retusa* is not obvious; It is rare that ray parenchyma of *Dalbergia oliveri* is the tendency of heteromorphism type III, which has much longitudinal parenchyma.

#### 4-5 Xiangzhimulei

It is the diffuse-porous wood or semi-diffuse-porous wood in this group, and the color of heartwood is light red, or ranging from dark red to dark rufous, which often has grain with vicissitudinary dark and light colors and has fragrance of strong acidity, the wood will float in water. The pores are slightly visible and diffuse in cross section and their sizes are not same, longitudinal parenchyma is bands, aliform or gather aliform. Wavy grain is obvious in the tangential section.

The color of *Dalbergia odorifera* T. Chen is rufous or dark rufous, which has black grain, and longitudinal parenchyma is paratracheal zone, fragrance of strong acidity comes from new section and turns weak with age.

*Dalbergia odorifera* T. Chen and *Dalbergia* in Viet Nam have many similar identifying

characteristics, but its grain is thinner than the latter and it usually just look like many grimaces or tiger coat, which is much more beautiful than the latter, and its fragrance is also stronger than the latter. The difference in color between them is that it is darker than the latter. And the diameter of *Dalbergia* in Viet Nam is much bigger than *Dalbergia odorifera* T. Chen, most is about 20~40 centimeters but the biggest diameter of *Dalbergia odorifera* T. Chen is no more than 30 centimeters.

#### 4-6 Wumulei

Those are the diffuse-porous woods in this group, and the color of heartwood is near-black, and the wood will fall down in water or not. The pores are slightly visible or not by naked eyes, which are the same size and arrange in the radial direction or diffuse in cross section. Longitudinal parenchyma is slightly visible by a hand lens, most of which is thin tangential line and wavy grain is not visible. *Diospyros ebenum* has much longitudinal parenchyma.

#### 4-7 Tiaowenwumulei

The identifying characteristics of wood in this group are similar with those of Wumulei, and their color of heartwood is black or chocolate brown, and they have grain with vicissitudinary dark and light colors, so they are called Tiaowenwumu.

#### 4-8 Jichimulei

Those are the diffuse-porous woods in this group, and the color of heartwood is brown of chestnut or dark brown, which often has black grain, and the pores are slightly visible or obvious by naked eyes, and parenchyma is bands or confluent, which is alternately arranged with wood fiber, and longitudinal parenchyma zone and fiber zone have the same width or the width of longitudinal parenchyma zone is slightly narrow. Wavy grain is visible in the wood of *Millettia spp* but not visible in the wood of *Cassia spp*, which takes on aliform type in tangential section.

### 5. Utilization

As Hongmu have many excellent properties such as high density and rigidity, fine durability, attracting color and beautiful grain, they are usually made into famous furniture with the style of Ming and Qing Dynasty. And it is also just that Hongmu are good woody materials,

they are usually the best materials for industrial arts products such as high-grade carvings, floorings, jewel cases, the pedestal of ivory carvings and gems and so on. Though the origin of the name of Hongmu is from China, most of their growing areas are not in China. Hongmu and their products are rare, beautiful and became more and more expensive and famous, especially *Dalbergia odorifera* T. Chen, which is the top grade wood of Hongmu, and its price is as same as the gold or higher. Recently, most trees of Hongmu are listed in the plant checklist of protecting trees, and the resource of Hongmu is very scarce. Therefore, it is necessary for us to cherish woods of Hongmu.

## References

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