

A Chinese Wood Species, Hongmu and Its Characteristics for Identification

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ABSTRACT

A Chinese wood species called China Hongmu, is an excellent wood to make high quality furniture owing to attracting color, beautiful grain, and durability. Hongmu is not a tree or wood species name. The general designation in Hongmu group is similar to one of its density, structure, color and use. Hongmu considers more than 30 hardwood species of *Pterocarpus*, *Dalbergia*, *Diospyros*, *Millettia*, and *Cassia*. According to the macrostructural characteristics and properties, Hongmu group can be classified into 8 groups which are Zitanmulei, Hualimulei, Heisuanzhimulei, Hongsuanzhimulei, Xiangzhimulei, Wumulei, Tiaowenwumulei and Jichimulei. In this paper, the growing areas, scientific names and identifiable characteristics of these Hongmu group species were introduced for help to identify China Hongmu and its products in the market as well.

Keywords : *Hongmu hardwood structure properties grouping*

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1. Introduction

The origin of the word Hongmu (those wood species which basic color is mainly red) is from China. Hongmu is not the name of the tree but a general designation of woods that have similar density, structure, color and use. China Hongmu has a long history. Zheng He, the minister in Ming Dynasty, and his ship-teams visited more than 30 countries and districts for many times (A.D.1403-1433). They visited in Viet Nam, Indonesia, Sri Lanka, India and the coast of East Africa. They traded silk, copperware, iron ware and gold coins for special local products like woods. Therefore, many wood species transported to China which were used to make furniture for royal palaces or houses belonged to magnates and dignitaries. Furniture made from Hongmu species does not decay or distort easily. It becomes more beautiful with aging. They have practical and beautification use as well. The price of those furniture increases with age, which is the symbol of rarity, elegance, magnificence and enjoyed by people in different estate.

Afterwards, many pseudo Hongmu appeared in the market because of limited resources and high prices. Recently, with the increase of Hongmu trade, the Chinese national standard of Hongmu is published in order to protect the benefit for consumers and to standardize the Hongmu market. There is strict restriction on the characteristics of Hongmu such as species,

density, structure, color and so on. Hongmu is accepted only if a wood species can satisfy the standard requirements[1]. The definition, species, growing areas and identification characteristics of China Hongmu were briefly introduced in this paper which would be helpful for the relevant personnels to identify Hongmu and their products in the market.

2. Definition of Hongmu

According to the China national standard[1], Hongmu consider more than 30 species of hardwood including *Pterocarpus*, *Dalbergia*, *Diospyros*, *Millettia*, and *Cassia*. The species of Hongmu can be divided into 8 groups; *Zitanmulei*, *Hualimulei*, *Heisuanzhimulei*, *Hongsuanzhimulei*, *Xiangzhimulei*, *Wumulei*, *Tiaowenwumulei*, and *Jichimulei*. Their characteristics such as density, structure and color (according to dark color of Hongmu in the atmosphere) must accord with the standard. Hongmu name is not allowed to use unless the considered wood species meet the standard. The color of Hongmu will become darker and more beautiful with aging. When it is exposed in the environment, there will be a desirable change of characteristics into beautiful grain, compact structure, attracting color, excellent stability of size, high durability and so on.

3. Species and Growing Areas

3-1 Zitanmulei

This group has only one species- Red sanders (*Pterocarpus santalinus* L.f.). It grows in India.

3-2 Hualimulei

There are seven wood species in this group which includes *Pterocarpus cambodianus*, *Pterocarpus dalbergioides*, *Pterocarpus erinaceus*, *Pterocarpus macrocarpus*, *Pterocarpus marsupium*, *Pterocarpus pedatus*, and *Pterocarpus indicus*. They grow in Indo-China peninsula, Andaman archipelago, tropical district of Africa, Indo-China peninsula, India and Sri Lanka, India, Southeast Asia, China Taiwan, China Guangdo, and Yunnan.

3-3 Heisuanzhimulei

There are eight wood species in this group. They are *Dalbergia cultrata*, *Dalbergia fusca*, *Dalbergia latifolia*, *Dalbergia louvelii*, *Dalbergia melanoxydon*, *Dalbergia nigra*, *Dalbergia spruceana*, and *Dalbergia stevensonii*. Their growing regions are Myanmar, India, China, Vietnam, Indonesia, Madagascar, East Africa, tropical district of South America especially Brazil, the Amazon basin of South America, and Belize of Central America.

3-4 Hongsuanzhimulei

There are seven wood species in this group which includes *Dalbergia bariensis*, *Dalbergia cearensis*, *Dalbergia cochinchinensis*, *Dalbergia frutescens* var. *tomentosa*, *Dalbergia*

granadillo, *Dalbergia oliveri*, and *Dalbergia restusa*. They grow in Asia, tropical district of South America especially Brazil, Indo-China peninsula, South America and Mexico; Indo-China peninsula, and South America and Central America.

3-5 Xiangzhimulei

This group includes only one wood species-*Dalbergia odorifera* T. Chen, and it grows in Hainan province of China.

3-6 Wumulei

There are four wood species in this group such as *Diospyros ebenum*, *Diospyros crassiflora*, *Diospyros pilosanthera*, and *Diospyros poncei*. Their growing regions are Sri Lanka, South of India, tropical district of West Africa, and Philippine respectively.

3-7 Tiaowenwumulei

There are two wood species in this group-*Diospyros celebica*, and *Diospyros philippensis* (including *Diospyros ciscolor* Willd in China Taiwan). They grow in Indonesia, Philippine, Sri Lanka, and China Taiwan.

3-8 Jichimulei

Three wood species- *Millettia laurentii*, *Millettia leucantha* and *Cassia siamea* belongs to this group. Their growing regions are Congo, Myanmar, Thailand, South Asia, Southeast Asia, Yunnan, Fujian, Guangdong, and Guangxi of China.

4. Identification characteristics^[2]

4-1 Zitanmulei

Wood of this group is diffuse-porous, and its heartwood color on new cut-sectional surface is red-orange, ranging from purple-red to near-black which change with aging. If the powder of wood is mixed with alcohol solution, the color of solution will be jacinth, and such solution will have fluorescence color after several days. The block of wood will fall down in water.

4-2 Hualimulei

In this group woods are diffuse-porous or semi-diffuse-porous. The color of heartwood is brown, or ranging from rufous to dark rufous. Most of them will float in water. If the powder of wood is immersed into water, solution will give fluorescence color after several hours. The pores are slightly obvious or obvious, which are in different size and are diffused in cross section. It is obvious that vessel lines and grain look like the pupae of silkworm or block. Axial parenchyma makes bands in longitudinal section. Ripple mark is visible or very obvious in tangential section. There are many distinct identifiable characteristics among the wood species in this group. *Pterocarpus cambodianus*, *Pterocarpus dalbergioides* and *Pterocarpus erinaceus* have many axial parenchyma cells and less pores. *Pterocarpus indicus*, *Pterocarpus macrocarpus* and *Pterocarpus cambodianus* also have many axial parenchyma cells. *Pterocarpus pedatus* falls down in water which means

that the specific gravity is greater than 1. When the powder of *Pterocarpus pedatus* is mixed with water, the solution shows blue fluorescence color. *Pterocarpus indicus* has famous grain of *Amboyna* burl, many axial parenchyma and has a large variations of color and weight among individual wood species. Ray parenchyma of *Pterocarpus marsupium* is composed of either one seriate homocellular ray or biseriate homocellular rays.

4-3 Heisuanzhimulei

This group of wood is diffuse-porous. The color of heartwood is ranging from brown of chestnut to black which often has grain with vicissitudinary dark and light colors. Its specific gravity is greater than 1. When it is dissolved in water, the solution is little sour. Pores are slightly visible or obvious, which are relatively similar size and diffused in cross section. Axial parenchyma are obvious or not and are distributed on bands seen by naked eyes. Ripple mark is usually visible in tangential section. There are many distinct identifiable characteristics among the different woods in this group. *Dalbergia cultrate* has many axial parenchyma cells. Ray parenchymas of *Dalbergia latifolia* and *Dalbergia nigra* tends to have heteromorphism type III, and is obvious for the later. *Dalbergia louvelii* has few axial parenchyma cells, and has uniseriate ray. *Dalbergia melanoxyton* has few axial parenchyma cells. It is not obvious that wood ray has storied

phenomena. *Dalbergia stevensonii* has few axial parenchyma cells and less pores. *Dalbergia spruceana* also has less pores.

4-4 Hongsuanzhimulei

This group woods are diffuse-porous or semi-diffuse-porous. The color of heartwood is light red, or ranging from rufous to dark rufous, which often have grain with vicissitudinal dark and light color. If the powder of wood is mixed with water, the sourness of the solution is much more obvious than those of Heisuanzhimulei. Axial parenchyma has a style of concentric lamina and thin line or narrow zone. The woods in this group have fragrance of sourness. There are many distinct identifiable characteristics among the different woods in this group: *Dalbergia bariensis* often falls down in 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 quantity is large. The uniseriate, biseriate and three seriate ray parenchyma were obvious in *Dalbergia cochinchinensis* with homocellular. *Dalbergia granadillo* and *Dalbergia retusa* have the same identifiable characteristics that the ray parenchyma is one seriate homocellular or biseriate homocellular, but wavy grain of *Dalbergia granadillo* is obvious. In *Dalbergia retusa* it is not obvious. It is rare that ray parenchyma of *Dalbergia oliveri* has the tendency of heteromorphism type III, which has many axial parenchyma.

4-5 Xiangzhimulei

This species is diffuse-porous wood or semi-diffuse-porous wood with a specific gravity less than 1. Its heartwood color is light red, or ranging from dark red to dark rufous, which often has grain with vicissitudinal dark and light color. It has fragrance of strong acidity. The pores are slightly visible and diffused in cross section. The size of the pores are not same. Axial parenchyma distributed in bands either aliform or confluent. Wavy grain is obvious in tangential section.

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

Dalbergia odorifera T. Chen and *Dalbergia* in Vietnam have many similar identifiable characteristics, but the former has thinner grain than the latter. Usually *Dalbergia odorifera* T. Chen looks like just many grimaces or tiger coat, which is much more beautiful than the *Dalbergia* in Vietnam, and its fragrance is also stronger than *Dalbergia* in Vietnam. The difference in color between them is that it is darker than the *Dalbergia* in Vietnam. The diameter of *Dalbergia* in Viet Nam is much bigger than *Dalbergia odorifera* T. Chen which is about 20~40 centimeters but the biggest diameter of *Dalbergia odorifera* T. Chen is not more than 30 centimeters.

4-6 Wumulei

Woods are diffuse-porous in this group. The color of heartwood is near-black, and the wood will fall down in water or not. The pores are slightly visible or not observed by naked eyes. Pores are same size and arrange in the radial direction or diffuse in cross section. Axial parenchyma is slightly visible by a hand lens, most of which forms a thin tangential line. Wavy grain is not visible. *Diospyros ebenum* has many axial parenchyma.

4-7 Tiaowenwumulei

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

4-8 Jichimulei

Woods are diffuse-porous in this group. The color of heartwood is brown of chestnut to dark brown which often has black grain. The pores are slightly visible or obvious by naked eye. Parenchyma is in bands or confluent which is alternately arranged with wood fiber. Axial parenchyma zone and fiber zone have the same width or the width of Axial 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 makes aliform type in tangential section.

5. Utilization

As Hongmu has many excellent properties such as high density and rigidity, fine durability, attracting color and beautiful grain, it is usually used to make famous furniture with the style of Ming and Qing Dynasty. As the Hongmu has good properties, it is usually the best materials for industrial arts products such as high-grade carvings, floorings, jewel cases, the pedestal of ivory carvings, gems and so on. Though the origin of the name of Hongmu is from China, most of their growing regions are not in China. Hongmu and their products are rare, beautiful, expensive and famous, especially *Dalbergia odorifera* T. Chen. This one is the top grade wood of Hongmu, and its price is as same as the gold or higher. Because of the scarcity of Hongmu resources, most trees of Hongmu are listed in the plant checklist for protection recently. Therefore, it is necessary for us to cherish woods of Hongmu.

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