

# Study on the Landscaping Model of Pines in Protected Green Space in Central Yunnan

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## Abstract

According to the plant landscape design of the top plant community in central Yunnan, this paper proposes a garden plant community model with strong adaptability. This paper analyzes the application of two Pinaceae plant communities in protected green space. The research content of this paper includes the plane structure, façade structure, and seasonal structure of plant landscape design. This paper studies the landscape design of protected green space plants, mostly forest plants, which form a pattern combining community and forest planting.

## Keywords

Pinus; garden plants; Protective green space; Landscaping model; Central Yunnan.

## 1. Purpose and Meaning

Pinaceae plays an essential role in soil and water conservation, water conservation, windbreak, and sand fixation. Pinaceae plants are adaptable, have deep roots, and are resistant to drought and barrenness. The mixed forest of Pinaceae and broad-leaved trees has obvious ecological function advantages, especially in absorbing carbon dioxide, the release of O<sub>2</sub>, dust adsorption, and air purification. Pinaceae plants achieve coverage and fully enclosed space layout by controlling canopy closure (0.7-1) and density (0.8-0.9). Pinaceae provides excellent concealment and isolation.

Due to the robust adaptability of Pinaceae and the high survival rate of artificial afforestation, Pinaceae is an excellent tree species for barren mountain greening [1].

## 2. Analysis of Landscaping Mode

### 2.1. Community Configuration of Pinaceae

The soil and water conservation forest belt is mainly composed of pine plants and then matched with tree species with better soil and water conservation effects, such as Pinaceae, trees, shrubs, and grasses, which can not only maintain water and soil but also achieve a specific landscape effect.

(1) Yunnan Pine + Huashan Pine + Quercus Quercus - Upland Winter Gourd + Columbago + Silverwood Lotus - Myrica Rubra + Beautiful Horse Drunken + Yunnan Hansmile + Yunnan Stone Quercus + Yunnan Rhododendron - Lawn

According to the survey of the sample area, the top community plant landscaping patterns such as Yunnan pine + Huashan pine + Quercus Quercus - Upland winter melon + Radix japonica + Yinmu lotus - Yangmei + beautiful horse drunk wood + Yunnan Hanxiao + Yunnan stone oak + southern Yunnan rhododendron, etc. The landscaping model was finally determined based on ecology, nature, and artificial psychology requirements.

(2) Yunnan Chinese cedar + Yunnan pine + Sapindus japonica + Poplar + dry wax gourd + Yangmei + Yunnan Hanxiao + Yunnan stone oak + pearl flower + ivy

(3) Analysis of community structure: Oil fir Yunnan and Pinus Yunnan Ensis are the backbone tree species; important tree species are Sapindus japonica and Poplar; secondary tree species include wax gourd, Yunnan smile, myrica Chinensis, Yunnan stone oak, etc. The canopy of the plant community The density is 0.6~0.7, and the sparse density is 0.5~0.8, which belongs to the vertical canopy closure type. The vertical structure belongs to the tree layer-shrub layer-herb layer-ground cover layer. The upper layer of the tree is Yunnan Chinese fir and Yunnan pine, the lower layer of the tree is a dry wax gourd, Sapindus japonica, and Poplar, and the shrub layer is Yunnan Hanxiao, Yangmei, Yunnan stone. Oak, pearl flower, and ivy are the ground cover. The community has a rich hierarchical structure and healthy soil and water conservation ability. The seasonal structure is mainly ornamental flowers. Yunnan Hanshaw is an ornamental plant. The flowering period is from March to September. The leaves of Sapindus japonica turn yellow in autumn. The red fruit of Yangmei is from March to April, with white flowers, red fruits, and yellow leaves. Complement each other interestingly. Sapindus japonica, Poplar, and wax gourd are deciduous tree species, and the branches after deciduous have high ornamental value.

(4) Application analysis: Pine Yunnan Ensis and Chinese oil fir have strong adaptability, resistance to drought and barrenness, and strong resistance to SO2. Poplar is a tree species with strong adaptability, low requirements on climate and soil, a developed root system, and strong wind resistance. The dry wax gourd has strong adaptability and does not require a high climate and soil. The lower shrub, bayberry, is also resistant to drought and barrenness [2]. This landscaping mode can maintain water and soil and form a good community landscape. At the same time, this landscaping mode can also break the current situation of single tree species and lack of canopy line and forest edge line in the soil and water conservation forest belt. However, within a 10m\*10m plane, the proportion of plants shall not exceed the limit values shown in Table 1.

**Table 1.** Comprehensive table in Plant Community Structure

Community structure	Trees (large trees - small trees) - shrub layer - ground cover layer			
Natural species	Yunnan pine, huashan pine, quercus dry wax gourd, coleus chinensis, silver wood lotus	Myrica rubra, beautiful horse drunk wood, yunnan smile, yunnan stone oak, southern yunnan rhododendron	---	Lawn
Garden tree species	Yunnan oil cedar, yunnan pine, sapindus japonica, poplar, and winter melon	Myrica rubra, yunnan smile, yunnan quercus	Pearl flower	Ivy
Planar structure ratio limit	2	1	---	---
Vertical structure ratio limit	4.4	1	---	---
Evergreen to deciduous ratio limit	25:1	7:3	---	---

Note: "—" means there is no such data.

(5) Example analysis: Figure 1 shows the Pinaceae plant community in the soil and water conservation forest in the source region of the Pearl River. The main landscapes are Yunnan pine and Huashan pine. The community plane structure is a multi-layer vertical canopy closed type, and the vertical structure is a tree layer-shrub layer-herb-ground cover layer. It has a rich seasonal structure suitable for soil and water conservation forest belts, see Figure 1.



**Figure 1.** Natural distribution of Pinaceae community

## 2.2. Community Configuration of Pinaceae

(1) Sample source: *Quercus quercus* + Yunnan pine + Bai Ke + *Dendrobium denticola* + bayberry + Sichuan *Quercus* + Cangshan bilberry + Yunnan *Rhododendron* + lawn

According to the survey of the sample plot, *Quercus Quercus* + Yunnan pine + Bai Ke + *Dendrobium Serrata* + bayberry + Sichuan *Quercus* + Cangshan bilberry + Yunnan *Rhododendron* - top community plant landscaping model, combined with the requirements of garden tree species and plants in soil and water conservation zones, Based on the requirements of ecology and human psychology, the landscaping model was finally determined.

(2) Garden landscaping mode: Phoenix tree-Yunnan pine+Shan Duying-Houpi incense+Southern Yunnan *Rhododendron*+Ryanberry-Grass along with the steps-

(3) Community structure analysis: The phoenix tree is the backbone tree species; the main tree species are Yunnan pine and Shan Duying; the secondary tree species are *Pachyderm*, Southern Yunnan *Rhododendron*, Yangmei, and so on. The community canopy closure is 0.5~0.7, and the sparse density is 0.6~0.8, which belongs to the vertical canopy closure type. The vertical structure belongs to the tree layer-shrub layer-herb layer. The upper layer of the tree is Phoenix, the lower layer of *Pittosporum* is the lower layer, the thick bark, the southern Yunnan *Rhododendron*, the bayberry, and the step grass are the ground cover layer. The seasonal structure is mainly based on the viewing posture and leaves. The *pachyderm* and Shanduying are small evergreen trees, and the leaves turn crimson after winter, which is an excellent tree species for ornamental leaf color. From May to July, the flowers are white or pink. The community is dominated by evergreen species, which can form a green sea full of green and spectacular.

(4) Application analysis: The community is a coniferous and broad-leaved mixed forest, mainly highlighting the graceful phoenix tree as the main scene or a unique appreciation to enhance the ornamental value of the community. Yunnan pine is a significant tree species with a large number. The pine leaves accumulated on the ground all year round play a significant role in maintaining soil and water and enhancing the environmental performance of the community. Shan Duying is a drought-tolerant plant that is highly resistant to toxic gases such as sulfur

dioxide. Bayberry is a drought-tolerant plant that grows in rocky, sunny locations and bears beautiful results in June-July [3]. This community configuration has played a good role in maintaining soil and water. It can be used as the preferred model for soil and water conservation forest belts. However, within a 10m\*10m plane, the proportion of plants shall not exceed the limit values shown in Table 2.

**Table 2.** Comprehensive table in Plant Community Structure

Community structure	Tree-shrub layer-ground cover layer		
Natural species	Quercus quercus, yunnan pine, bai ke, dendrobium denticola, myrica rubra, western sichuan quercus	Cangshan bilberry, southern yunnan rhododendron	Lawn
Garden tree species	Phoenix wood, yunnan pine, shan duying	Thick skin incense, southern yunnan rhododendron, bayberry	Grass along the steps
Planar structure ratio limit	2	1	---
Vertical structure ratio limit	2	1	---
Evergreen to deciduous ratio limit	17:1	7:1	---

Note: "—" means there is no such data.

(5) Example analysis: As shown in Figure 2, the plant community on the banks of Jiaozi Snow Mountain is dominated by the fir and Rhododendron families. The community has a reasonable degree of airtightness and a rich vertical structure, which meets the needs of soil and water conservation forest belts.



**Figure 2.** Natural distribution of Pinaceae community

### 3. Conclusions

Protected green space refers to the green land set up to meet the city's sanitation, isolation, and safety needs. Its function is to protect the city to a certain extent or weaken urban pollution, but it should not be used as green park space. Protective green spaces are industrial parks, urban fringes, urban-rural junctions, and other areas. The altitude of the plant landscaping area is higher than that of the city center. Therefore, selecting the primary tree species of high-altitude fir, alpine pine, and other tree species is necessary to ensure the pine community. Ornamental, but also reflect the principle of "appropriate tree for the right place."

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