



Food and Agriculture Organization
of the United Nations

GIAHS Proposal

Qingyuan Forest-Mushroom Co-culture System in Zhejiang Province

Location: Qingyuan County, Zhejiang Province, P.R. China



The People's Government of Qingyuan County, Zhejiang Province

November, 2022

Abbreviations

UN: United Nations

FAO: Food and Agriculture Organization of the United Nations

WHO: World Health Organization

GIAHS: Globally Important Agricultural Heritage Systems

QFMCS: Qingyuan Forest-Mushroom Co-culture System

SDG: Sustainable Development Goals

China-NIAHS: China Nationally Important Agricultural Heritage Systems

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I. Summary Information Table

<p>Name/Title of the Agricultural Heritage System: Qingyuan Forest-Mushroom Co-culture System in Zhejiang Province</p>
<p>Requesting Agency/Organization: The People's Government of Qingyuan County, Zhejiang Province, P.R. China</p>
<p>Responsible Ministry: Ministry of Agriculture and Rural Affairs, P.R.China</p>
<p>Location of the Site: The heritage is located in Qingyuan County, Zhejiang Province, China, covering 13 administrative villages of 2 townships (Baishanzu, Wudabao) and 1 subdistrict (Songyuan) and 1 state-owned forest farm, and spanning 119°03'18"-119°15'04"E and 27°39'04"-27°51'12"N.</p>
<p>The figure consists of three maps. The top-left map shows the location of Qingyuan County within China, with a scale of 1:27,000,000. The bottom-left map shows Qingyuan County with a scale of 1:300,000. The right map, titled 'The Proposed Site' with a scale of 1:110,000, shows a detailed view of the site area with various land use types and labels for locations: Longyan, Fengping, Zhaitang, Wanku Forest Farm, Ciqian, Tongzi, Huarangpi, Houguangjiadiao, Dongkeng, Bandaibouxiyang, and Xiabushan Dongdai. A legend is provided for the detailed map, listing various land use types such as Quercus (Planted), Oak forest (Planted), Chestnut forest (Planted), Chestnut forest (Planted), Leguminiferous Genesome (Natural), Leguminiferous Genesome (Planted), Other broad-leaved forest, Coniferous forest, Bamboo forest, Shrubland, Pasture, Orchard, Vegetable garden, Tea garden, Coniferous and broad-leaved mixed forest, Paddy field, Dry land, Barren land, Residential land, Road, Infrastructure, and Water body.</p>
<p>Accessibility of the Site to Capital City or Major Cities: The site is about 20 km away from downtown of Qingyuan County, 200 km away from the downtown of Lishui City, and 500 km away from Hangzhou City, the capital of Zhejiang Province.</p>
<p>Area of Coverage: 14,117.43 ha</p>
<p>Agro-Ecological Zones: Mountainous agroforestry ecological zone</p>
<p>Topographic Features: This area is known for its rolling mountains and hills. With an average altitude of 1000 m, the proposed site is one of the highest regions in East China. <i>Baishanzu</i> Mountain, the highest peak in the area and the second highest in Zhejiang Province, stands 1856.7 m above the sea level. Most of the lands in the area</p>

are consisted of ancient igneous rock. Under the influence of the orogeny, the crust had uplifted for several times and at the same time the surface had sunk, forming mountains and valleys lining both sides of winding rivers. The main land use types include natural forest, artificial forest, shrubland, pasture, paddy field, dryland, residential land, other construction land and water body.

Climate Type: Subtropical monsoon climate

Approximate Population: 5,022 persons (2019)

Ethnicity/Indigenous Population: 99% of the population is Han Nationality and the left 1% consists of five ethnic minorities, the majority of which is She ethnic group.

Main Source of Livelihoods: The total agricultural production value of the site is 37.634 million RMB Yuan, accounting for 45.4% of the total production value of the site, which is an important source of local farmers' income.

II. Executive Summary

Qingyuan County with rich forest and species resources, located in the southwest mountain area of Zhejiang Province, is the county-level administrative area with the best ecological environment in China and one of China's 17 key regions of global significance for biodiversity. Located in the northern mountain area of Qingyuan County, Qingyuan Forest-Mushroom Co-culture System (QFMCS), formed from the mushroom cultivation through rational use of forest resources by *Gumin* (referring to the farmers who mainly cultivate mushrooms) for thousands of years, is an agroforestry system in high mountainous region, focusing on the sustainable forest management, development of mushroom industry and resource cyclic utilization, including the unique forest and mushroom co-culture technique, rich forest ecological culture and mushroom culture, and the ecological landscape with reasonable structure.

QFMCS is the guarantee of food and livelihood security for local residents living in the high mountain areas, the birthplace of *Xianggu* (a kind of mushroom, also called shii-take; the scientific name is *Lentinus edodes*) cultivation technique, the base of the inheritance and spread of forest and mushroom co-culture technique and culture. Because of high mountains and dense forests, less cultivated land and inconvenient transportation, there are few ways for local residents to make a living. Through forest conservation, mushroom cultivation and agricultural production, local residents have achieved the food and livelihood security, and created the forest and mushroom co-culture technique system of harmonious co-existence between human and nature, and keeps a complete cultivation technique evolution chain from *Duohua* (chopping a small slit in a fallen tree) method to wood log method and then to substitute material method, formed rich forest ecological culture and mushroom culture, as well as a rational structure of land use types and ecological landscape. Meanwhile, the site is a key area for the origin and evolution of flora in East China, the only distribution area of relict plant *Abies beshanzuensis* in the world, and an important distribution area of wild macro fungus resources in China. Just relying on the QFMCS, the livelihood security of local residents has been guaranteed, the farming culture has been continued and inherited, and the harmonious development between man and nature has been realized.

The unique mountain utilization mode and creative ecological cycle of QFMCS mode are of great significance to deal with the serious destruction of forest resources, decrease of biodiversity, degradation of ecosystem services, increasingly contradiction between ecological conservation and economic development, poverty and food security, etc. The forest conservation thoughts and ecological cycle mode of forest and

mushroom co-culture, formed by *Gumin* based on the ecological principle of mutual benefit and symbiosis between forest and fungi, not only effectively protects the biodiversity and ecological environment, but also is in line with the current concept of sustainable development. Meanwhile, a series of agricultural and forestry products with mushrooms as the core guarantee the needs of food and nutrition of local residents, and diversified industries have contributed to the development of local economies and the alleviation of poverty among farmers in mountain areas. What's more, the mushroom cultivation technique promoted the development of mushroom industry worldwide.

QFMCS is also facing some threats and challenges due to rapid urbanization and industrialization, introduction of modern production technologies, relative shortage of labor force and low efficiency of agricultural production. Since it has been listed as a China Nationally Important Agricultural Heritage System (China-NIAHS) in 2014, local government and *Gumin* have attached great importance to it, which brings this heritage system a new turning point. It is believed that the recognition of GIAHS will promote the protection, inheritance and development of QFMCS, and also provide demonstration for the world on forest conservation, mushroom cultivation and multi-functional agricultural and forestry development in mountain areas.

III. Significance of the Proposed Site

1 Specific Features of the Proposed Site as Global Importance

1.1 Description of the Proposed System

The site is located in the mountainous area of southwest Zhejiang, with various landforms such as valley, basin, hill and mountain. Both sides of the river are mostly high mountains and deep valleys, with a relative height of about 1000 m above sea level. Meanwhile, the subtropical monsoon climate with four distinct seasons enables the site to have abundant rainfall, no severe cold in winter and no severe heat in summer, and large temperature difference between day and night. Such topography and climatic conditions are very conducive to the formation of mushroom fruiting bodies.

For thousands of years, local residents made rational use of forest resources to cultivate mushrooms, invented and developed an agroforestry system with mushroom and forest co-culture technique as the core, forest conservation, mushroom cultivation and agricultural production integrated organically, formed a rational land use type and ecological landscape with forest, terrace, village and river cooperating with each other (Figure 1). As a habitat of wild animals and plants, the forests not only offer local residents traditional mushroom production sites, mushroom cultivation materials, forest products and herbal medicine, but also provide important ecosystem services such as soil and water conservation, biodiversity and climate regulation. Terraces accept and consume the waste of mushroom production, guarantee the food supply of local residents such as grains and vegetables. Villages provide living places for residents and processing places for agricultural and forestry products. The rivers meet the demand for production and living water, providing aquatic products for local residents and serving as a transportation channel in history. All the components coordinate with each other to maintain the stability and sustainable development of the ecosystem.

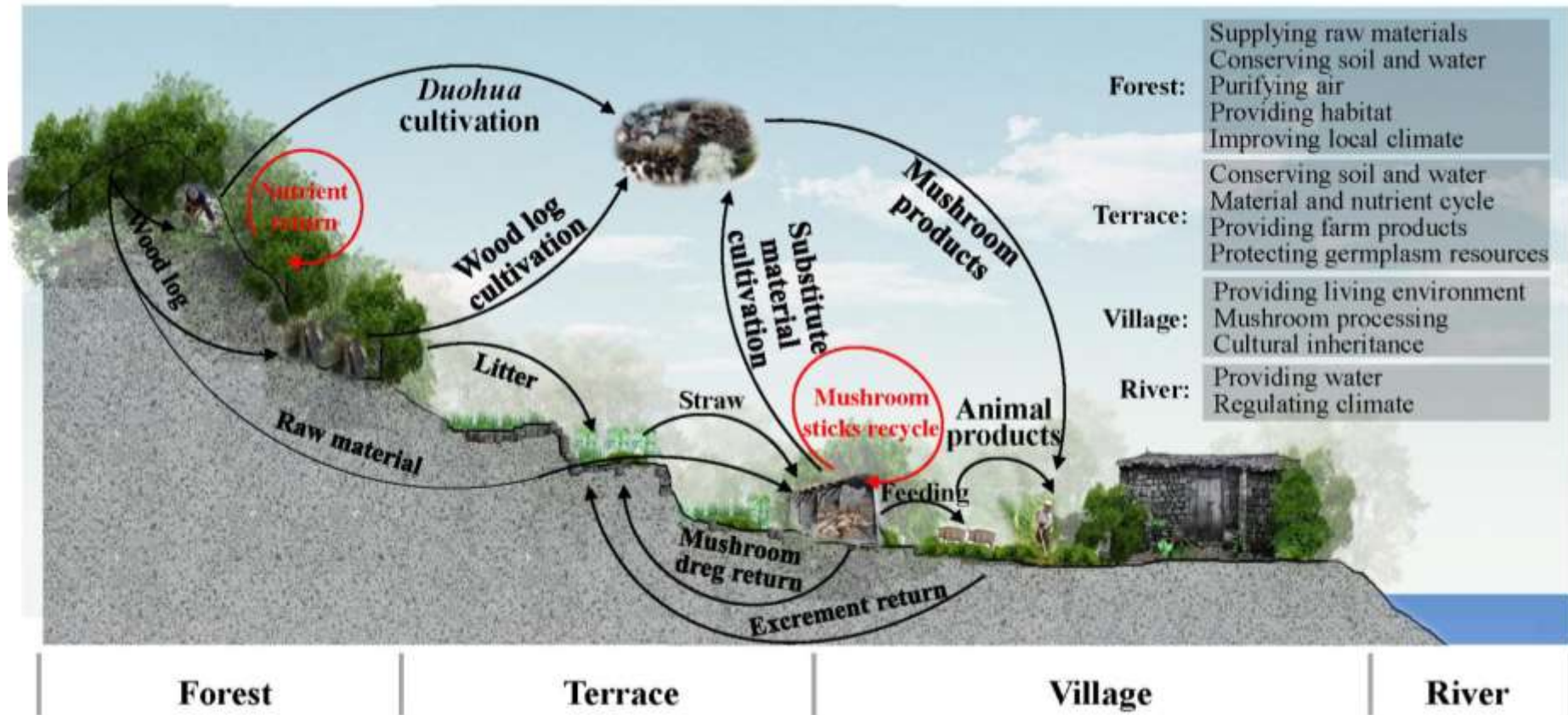


Figure 1 Qingyuan Forest-Mushroom Co-culture System, formed from the mushroom cultivation through rational use of forest resources by local residents for thousands of years, is an agroforestry system in high mountainous region.

QFMCS has unique mountain utilization mode and creative ecological cycle mode, and its most unique ecological value is to realize "zero" pollution to the ecological environment. Throughout the heritage system, the forests provide a growing environment and nutrients for edible fungi, which accelerate the decomposition of organic matter in the forests, and the decomposition of dead woods and litters increases the nutrients in the forests. Trees and logging residues use as raw materials for mushroom cultivation. Forest litters are burned and spread on farmland to prevent the plant diseases and insect pests and enhance the soil fertility. Farmland produces all kinds of agricultural products, and its crop straw can be mulched to increase soil fertility, or mixed into culture materials for mushroom cultivation. After recycling, the remaining culture material can be used for mushroom cultivation again, or used as organic fertilizer for farmland, or burned to bake mushroom, or used as livestock feed to feed livestock. The excrements of livestock and poultry are collected and applied to farmland to increase soil nutrients. Nutrients and production wastes in the system are recycled in the system over and over again without causing pollution to the ecological environment outside the system, which plays an important role in protecting the ecological environment and promoting sustainable economic development.

1.2 Features According to the GIAHS Selection Criteria

Firstly, it guarantees the food and livelihood security of local residents. Through various production methods such as forest resource cultivation and utilization, collection of wild resources under the forests, planting and breeding in the farmlands and under the forests, intercropping and interplanting of forests and crops, a variety of agricultural, forestry, animal husbandry and fishery products, such as mushrooms, forest trees, nuts, fruits, oil plants, traditional Chinese herbal medicines, cereals, potatoes, vegetables and aquatic products, are produced to meet the food, nutrition and daily life needs of local residents. On this basis, agricultural experience, cultural education, eco-tourism and other new forms of business are extended. Traditional industries and new forms of business continue to merge, which greatly increased the output of agriculture and the income of farmers, and contributed to meeting the requirements of the continuous improvement of local people's living standards. According to the statistical data, the Farmers' income from the QFMCS accounts for 46.9%, which is an important livelihood source for local people.

Secondly, it preserves rich biodiversity, especially the diversity of fungi resources. There have a large number of native or semi-native forest vegetation in the site, which preserves many primitive and ancient biological populations. Because of the rich forest resources, animal and plant resources are abundant and many of them are rare and

endangered creatures. The site is an important fungal resource bank in China, rich in wild fungus resources and genetic diversity, and 398 species of macro fungi have been identified. Superior geographical location and climatic conditions of the site provides excellent conditions for the growth of many crops. At present, there are about 60 kinds of main cultivated crops in the site. Many of them are local traditional varieties.

Thirdly, it contains a relatively perfect and harmonious technical system of forest and mushroom co-culture. The traditional knowledge and techniques formed by *Gumin*, such as natural forest conservation, mushroom forest management, forest utilization, utilization of resources under the forest and resource cyclic utilization, which help to realize the organic integration of forest conservation, mushroom cultivation and agricultural production. In the production process, the waste such as forest logging residues, crop straw, mushroom dregs, excrement of livestock and poultry, etc., have been recycled, which is a typical model of ecological circular agriculture. During the whole production process and postpartum processing and utilization, wastes have not been discharged to the environment, thus achieving the objective of comprehensive, cyclic and green utilization. The site is also the birthplace of *Xianggu* cultivation technique and keeps a complete cultivation technique evolution chain from *Duohua* to wood log and then to substitute material methods, which can be called “The Living Museum of Mushroom Cultivation Technologies”.

Fourthly, it has bred rich and diverse farming cultures. *Gumin* have worked in mountain forests for generations, created a unique language and customs and wrote lots of folk ballads, proverbs, and legendary stories to reflect the bitterness and joy of *Gumin* experienced in the process of cultivating mushroom. All such things have derived a distinctive forest ecological culture and mushroom culture with local characteristics. The most typical culture is centered on the natural worship of mountain forests such as worshipping *Shanshen* (the god of mountain), acknowledging *Shuniang* (taking a tree as a mother), sacrificing *Fengshui* forest, etc.; the ancestor worship of *Gushen* (the god of mushroom, namely Wu Sangong) such as *Gushen* Temple Fair, *Xiyang* Temple, Wu Sangong Ancestral Temple, etc.; the folk customs focusing on confidentiality and inheritance of cultivation techniques and personal safety protection such as *Gushan* (forests used for the *Duohua* method mushroom cultivation) Dialect, *Xianggu Kungku*, etc., architectural art focusing on harmonious interpersonal relationship and convenient market transaction such as *Langqiao* (Corridor Bridge); social organizations focusing on cooperation and mutual assistance such as *Sanhe* hall, mushroom guild, etc.

Fifthly, it embodies the rational structure of land use types and ecological landscape perfectly. There have rich landscape types, and forest is the dominant landscape type. "Forest-Terrace-Village-River" was successively distributed from high mountains to

river valleys. Villages are generally built along the river valleys near water sources, terraces are often distributed in the areas between the villages and mountainside with relatively gentle slope, and forests are distributed in the areas with steep slopes. The unique geographical environment of “90% of the area is covered with mountains, 5% with water and 5% with field” and the corresponding production methods together in the site formed the spatial pattern of forests dominated, dense streams, rare croplands, as well as village, artificial mushroom forests and mushroom cultivation scattered distribution. There also have many cultural landscapes such as ancient village, ancient bridge, ancient road and ancient architecture. Especially, *Langqiao* construction is unique in the world.

2 Contemporary Relevance

2.1 Contribution to the Sustainable Agricultural Development in Mountainous Areas

The Sustainable Development Goals (SDG) of the United Nations in 2030 include to eliminate hunger, realize food security, improve nutrition condition and promote sustainable agriculture, etc. QFMCS can provide an important reference for the realization of SDG (Table 1). Compared with plain areas, the livelihood of farmers in mountain areas faces more risks and uncertainties, and it is more difficult to achieve sustainable development. The site is a typical alpine area in China, in which rich forest resources play an important role in water conservation and continuously provide sufficient clean water resources for downstream areas. The forest and mushroom co-culture technique realized the coordinated development of forest resources conservation and mushroom industry in the site.

Relying on QFMCS, a variety of industries including agricultural production, processing and sales, as well as forest and rural cultural tourism has been formed, and the absolute poverty of "less than 4,600 RMB Yuan" was eliminated in 2015 in the site. Meanwhile, the cultivation of mushroom is not difficult, which is the main way of making a living for stay-at-home women in the site. The cultivation technique of mushroom has also promoted the development of mushroom industry worldwide. What's more, the mushroom is a good source of protein and amino acid because of their high protein content and a full range of amino acids.

2.2 Contribution to the Conservation of Biocultural Diversity

In the *Convention on Biological Diversity*, the protection of biological diversity is recognized as a common concern of all mankind, and it is also one of the sustainable development goals of the United Nations in 2030 to restrain the loss of biological diversity. The site is a key area for the origin and evolution of flora in East China, and an important natural ecological barrier in Zhejiang and even East China. Ten thousand *mu* (1 *mu* equals to 666.67 m²) of typical zonal natural forests have been preserved up to now and a lot of primitive and ancient biological populations have been preserved, providing a stable habitat for more than 100 kinds of rare and endangered wild plants. At the same time, there have very rich fungus resources, because the special geological and geomorphic differences of the site not only create conditions for biodiversity, but also provide a good space and environment for the diversity of fungus species and their reproduction and evolution. Therefore, the site is of great significance to China and the world in terms of biodiversity and gene resource protection.

Table 1 Comparison between QFMCS and the Sustainable Development Goals of the United Nations in 2030

Sustainable Development Goals	The Proposed Site
Goal 1: No Poverty	The absolute poverty of "less than 4,600 RMB Yuan" was eliminated in 2015 in the site.
Goal 2: Zero Hunger	QFMCS guarantees the food and livelihood security of local residents through different production methods.
Goal 3: Good Health and Well-Being	Mushroom are good sources of protein and amino acids.
Goal 4: Quality Education	
Goal 5: Gender Equality	The cultivation of mushroom is not difficult, which is the main way of making a living for stay-at-home women in the site.
Goal 6: Clean Water and Sanitation	Rich forest resources play an important role in water conservation and continuously provide sufficient clean water resources for downstream areas
Goal 7: Affordable and Clean Energy	
Goal 8: Decent Work and Economic Growth	Relying on QFMCS, the site has formed a variety of industries including agricultural production, processing and sales, as well as forest and rural cultural tourism.
Goal 9: Industry, Innovation, and Infrastructure	
Goal 10: Reduced Inequalities	The mushroom cultivation technique promoted the development of mushroom industry worldwide.
Goal 11: Sustainable Cities and Communities	
Goal 12: Responsible Consumption and Production	The resource cyclic utilization patterns formed by the <i>Gumin</i> help to realize the perfect harmony of forest resource conservation and mushroom industry development.
Goal 13: Climate Action	The recognition of GIAHS will help to protect the ecological environment.
Goal 14: Life Below Water	
Goal 15: Life on Land	The forest and mushroom co-culture technique system has realized the harmony between man and nature.
Goal 16: Peace, Justice and Strong Institutions	
Goal 17: Partnerships	

Cultural diversity is the common heritage of human beings. Thousands of years of forest conservation and mushroom cultivation in the site have bred rich forest ecological culture and mushroom culture. These cultures are vivid and plain, and form the rich connotation of QFMCS. They have greatly enriched the cultural diversity of human beings and should be cherished and maintained for the benefit of all mankind.

2.3 Contribution to Enriching Ecosystem Management Practice

When cutting the mushroom trees, *Gumin* in the site followed the strict selection principle of the mountain forests and mushroom trees, and only chose to cut the big trees. In addition, the appropriate management and protection measures are taken to promote the forest renewal. Owing to the reasonable natural forest protection technique, the cutting volume is always kept to be less than the growth volume. For thousands of years, no forests were destroyed due to the production of mushroom.

Generally, logging is carried out regardless of time period, season, and ecological choice. But cutting mushroom trees must be carried out in winter. Firstly, the trees cut down in the period of dormancy have sufficient nutrients stored in the tree body. The bark is close to the trunk, and it is not easy to peel off. Secondly, the trees cut down in the period of dormancy are easy to sprout and renew. Because the mushroom cultivation is highly harmonious to the forest ecosystem, the forest land after cultivating mushroom is growing better and better. Many *Gumin* cultivated mushrooms in mountain forests by generations, forming the best mountain forests with alternation of generations. Due to special cutting operation and behavior in the mountain forests, QFMCS maintains a high degree of harmony between human and nature. Therefore, it has a strong vitality and is a model of sustainable management of forest ecosystem.

2.4 Contribution to Promoting the Spread of Forest and Mushroom Co-culture Techniques

Throughout the ages, the development and transmission of science and technology have driven the progress of human society. At present, traditional and modern cultivation techniques coexist in QFMCS, which formed the most complete technique system of forest resource conservation and mushroom cultivation and made it the best inheritance and transmission carrier for forest and mushroom co-culture technique. For thousands of years, the forest and mushroom co-culture technique has been inherited and developed in the site and has become the main means for local people to maintain their livelihood. *Gumin* engaged in the production of mushrooms across the country, which covers more than 200 cities and counties in 13 provinces. Meanwhile, the ecological wisdom of forest and mushroom co-culture has also profoundly affected the development of the mushroom industry in other countries and regions. Various

communication activities have effectively promoted the transmission of mushroom cultivation techniques from the site. Documents showed that the *Tuomu* method in Japan are technically similar with the *Duohua* method in the site.

As mushroom industry is receiving more and more attention in poverty-stricken areas around the world, a comprehensive understanding of QFMCS' value has an important theoretical and practical significance for the inheritance of global farming cultures, sustainable agricultural development, and expansion of agricultural functions.

2.5 Contribution to Realizing Diet Structure of "One Meat, One Vegetable and One Mushroom"

Diversified food demand has become the primary symbol of improvement of people's life quality. Fungus food is the third generation of healthy food after plant and animal food. The Food and Agriculture Organization (FAO) of the United Nations and the World Health Organization (WHO) have proposed that the best structure of human diet is "one meat, one vegetable and one mushroom". The residents in the site cultivate mushrooms with fungal spores to provide human beings with multi-purpose edible, medicinal and health care products, thus playing an important role in maintaining human food safety and improving human health.

2.6 Contribution to Rural Development in the Site

With the development of industrialization and urbanization, the rural labor force in the site has transferred from agriculture to non-agricultural industry, which weakens the necessary human, material and financial resources required by the development of agriculture and rural areas. It mainly reflected in the excessive reduction of rural resident population and a large number of "hollow villages" in the site. At the same time, it is accompanied by *aging* of resident population and agricultural employees, slow development of rural industry, disappearance of traditional rural cultures, and deterioration of rural ecological environment, as well as outflow of rural talents.

QFMCS contains rich biological, technical and cultural genes, and is of great practical significance for the rural development of the site. Being an important part of the QFMCS, forest ecological culture and mushroom culture is an essential part of Chinese excellent traditional cultures, and also of great significance for inheritance of farming cultures and harmony of rural society. Heritage protection in the site can boost the development of rural economy, the inheritance of local culture, the harmony of rural society, and the health of rural ecological environment, which will contribute to the implementation of rural development strategy. In addition, by exploring a path to protect agricultural heritage system integrating economic development, ecological conservation and cultural inheritance, this heritage system can contribute to the

sustainable development of world agriculture and rural areas.

3 Historical Relevance

Human beings have managed and utilized forests consciously and unconsciously, and have experienced the evolution process from natural harvesting to artificial cultivation of mushroom in the forests, thus promoting the formation of QFMCS with forest conservation and mushroom industry development in a coordinated way. The proposed system, located in subtropical monsoon climate zone and southern Zhejiang mountainous area, is the best representative of the system evolution and a good embodiment of the sustainable forest management technique and ecological cycle thought of harmonious co-existence of “mushroom and forest” and “human and nature”. According to the coevolution relationship of human-forest-mushroom in the site, the development of QFMCS can be divided into four stages (Figure 2).

The first stage: natural forest conservation - natural collection and utilization of fungi

Human reproduction was found in the site as early as 5000 years ago, and the economic status was closed or semi-closed at that time due to high mountains and poor transportation. Because of the natural conditions of “90% of the area is covered with mountains, 5% with water and 5% with field” and the long-term self-sufficiency economy, the natural forests occupy the absolute advantage, and local people depended on the forests for survival primarily. The mushroom widely distributed in the forests were their very important source of food.

The second stage: protective utilization of natural forest - natural inoculation of mushroom

With the increase of population, the need of people for mushroom cannot be satisfied by merely natural harvesting, and then the forest management and utilization of fungus resources under the forest entered the second stage. Over 800 years ago, Wu Sangong (1130-1208), a villager from Longyan Village, invented the *Duohua* method (Figure 3), a kind of *Xianggu* cultivation technique. It was a natural inoculation technique of *Xianggu* cultivation and created a precedent in the artificial cultivation and utilization of forest fungi. After that, *Xianggu* began its history of benefiting human beings and Wu Sangong was honored as “*Gushen*” by descendants as well.

There are about 200 to 300 tree species of suitable *Xianggu* cultivation selected by *Gumin*, which are collectively called miscellaneous trees, namely broad-leaved forests, such as *Castanopsis fargesii*, *Liquidambar formosana*, *Castanea mollissima*, *Castanopsis carlesii*, *Elaeocarpus sylvestris*, *Quercus glauca*, etc. To maintain the sustainable management of mushroom forests, local farmers have strict measures to

conserve the forests. When cultivating mushroom, only older mushroom trees can be cut down, and the seedlings under the forests will be conserved carefully, thus promoting the natural regeneration of the forests.



Figure 2 Historic process of Qingyuan Forest-Mushroom Co-culture System. According to the coevolution relationship of human-forest-mushroom in the site, the development can be divided into four stages.



Figure 3 Wu Sangong invented *Duohua* method, a kind of *Xianggu* (*Lentinus edodes*) cultivation technique.

Duohua method was elaborated in “Chapter Fungi” of *Wang Zhen Nongshu* (one famous agricultural book published in 1313 by Wang Zhen, a great agronomist in *Yuan* Dynasty). The contents are as follows (Figure 4): “This method is also used for cultivating *Xianggu* in the mountains, but they are oriented to shady land, and choose suitable trees such as maple, *castanopsis* to cut down and chop slits with axes, and cover them with earth. The trees decay with years, evenly distribute *Xianggu* in the cut marks, and cover them with tallow leaves and soil, water them from time to time. After days, hitting the trees with the mallet to catalyze the growth of *Xianggu*, which is called *Jingxun*. After rain, when the weather is warm, *Xianggu* will pop up. One may gain profits over the years, and the benefits will be hefty. Leave the seeds in the marks, and the sprout will burgeon forth next year. One should spot a suitable plot of land, cultivate *Xianggu* with the elapse of years. The freshly picked *Xianggu* is delicious when cooked raw. Dry *Xianggu* can be got when exposed to air. The people residing in deep mountains and impoverished valleys can cultivate *Xianggu*, replacing farming. The natural environment makes it thrive, which generates profits.”

Because of the invention of *Duohua* method, generations of *Gumin* in the site have been engaged in mushroom cultivation, and accumulated rich practical experience in cultivation, management and processing. The production area has been expanding and the number of employees has been increasing. During the reign of *Song Jiayi* (1237

A.D.-1240 A.D.), the *Duohua* method spread from Qingyuan to the surrounding areas of Jingning and Longquan counties. By the *Ming* Dynasty (1368 A.D.-1644 A.D.), Qingyuan mushroom was well-known and was decreed as a tribute. The *Gumin*'s inhabiting areas also extend to Fujian, Guangxi, Jiangxi, Anhui, Sichuan, Yunnan, Shaanxi, Hunan and Guizhou provinces.

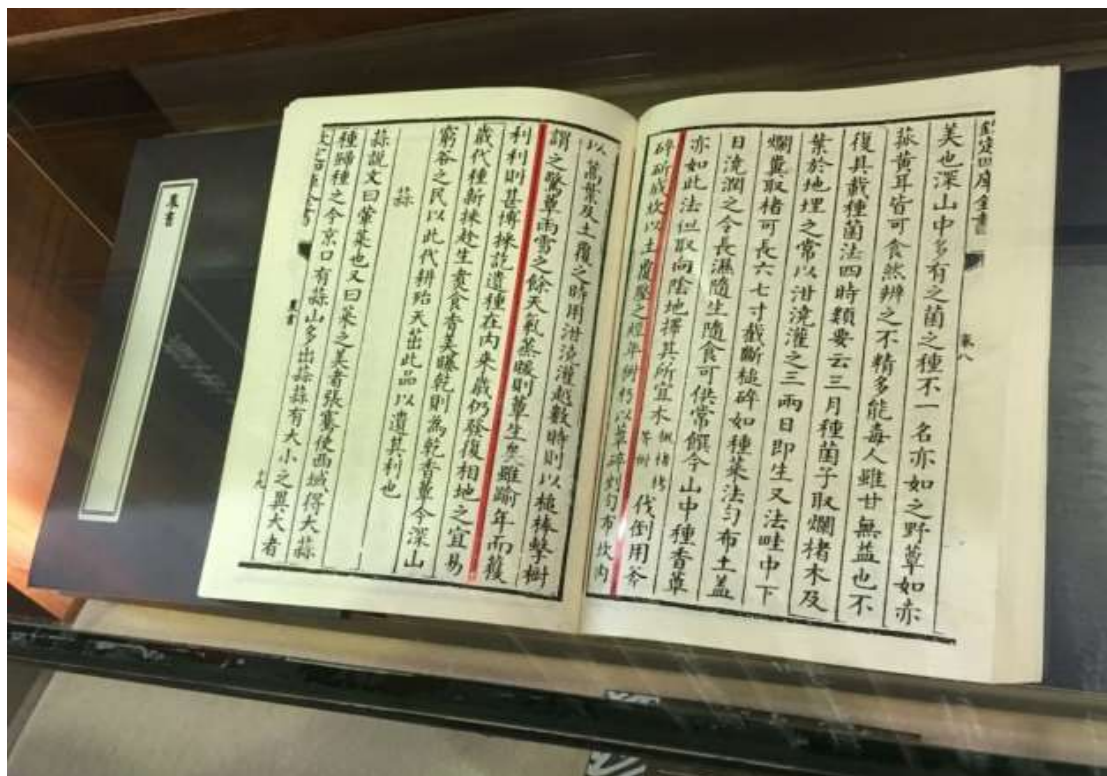


Figure 4 Record of *Xianggu* cultivation in ancient agricultural literature

The third stage: protective utilization of natural forest and cultivation of artificial mushroom forest - equal emphasis on natural and artificial inoculation

Around the 1960s, owing to the introduction of artificial strain production technique, the mushroom began to be cultivated with wood log, pressed sawdust, sawdust rod and so on, which greatly promoted the industrial development of mushroom. With the development of cultivation techniques and the increase of market demand for mushrooms, the demand for mushroom forest resources has also increased. To satisfy the needs of production and development, people began to cultivate mushroom forest resources consciously, and the stage of protective utilization of natural forest and cultivation of artificial mushroom forest started.

The fourth stage: substitute materials with assistance of forest trees - artificial inoculation with assistance of natural inoculation

After the 1990s, benefiting from the development of cultivation techniques, the mushroom industry in the site has entered a rapid development period. Owing to the

innovation of cultivation techniques, the utilization rate of wood has been greatly improved. The crop and waste of forest production are used as the raw material of cultivation, greatly reducing the dependence on mushroom forest resources. At present, the mushroom cultivation materials which come directly from natural forest and mushroom forest only account for 30% in the site.

After hundreds of years of development, the utilization of forests and edible fungus resources by *Gumin* in the site has changed from simply obtaining woods and edible fungi to conscious forest conservation and mushroom cultivation, and then to making full use of all kinds of forest resources to cultivate mushrooms by means of substitute material cultivation. It has formed the pattern of co-existence of traditional technique and modern technique, and co-existence of natural forest conservation, mushroom forest cultivation, and substitute material utilization. Although the resource utilization techniques and production efficiency of QFMCS have changed in different development stages, the core thought of forest resource conservation, fungus resource conservation, resource recycling, as well as the formed culture have not changed.

4 Comparative Analysis

The site has an original and complete ecosystem, a long-standing ecological culture, and rich and unique natural and cultural landscapes, as well as a rare broad-leaved forest of ten thousand *mu* in East China. It is also the birthplace of Oujiang River, Minjiang River and Fu'an River, the only distribution area of relict plant *Abies beshanzuensis* in the world, an important distribution area of wild macro fungus germplasm resources in China. Forest and mushroom co-culture technique has been passed down for thousands of years, and the cultivation technique of *Xianggu* originated from here.

(1) Unique forest and mushroom co-culture technique. The continuous evolution of QFMCS is mainly due to its unique forest and mushroom co-culture technique. This technique is a kind of sustainable management technology with forest and mushroom compound and ecological cycle. Different measures have been taken to realize the recycling of forest resources, including the use of large fungi in the forest to promote the cycle of forest materials and nutrients, the reuse of residues of substitute material cultivation, etc. At present, the mushroom cultivation has achieved a technological leap from *Duohua* to wood log and then to substitute materials methods. However, the core concept of "forest and mushroom co-culture" has been inherited all the time. Up to now, the forest coverage rate of the site is as high as 90%. This heritage system provides people with delicious food but does not destroy the natural environment, which vividly reflects the harmonious development between man and nature.

(2) The birthplace of *Xianggu* cultivation technique in the world. There are many

descriptions of ecology or cultivation about macro fungi, such as *Ganoderma lucidum*, *Poria cocos*, and *Collybia velutipes* in human history, especially in many historical documents of China, but only the description of *Xianggu* cultivation technique is the most complete and practical. It is different from the cultivation of grain, cotton and hemp recorded in general historical materials, and also different from the domestication and breeding of poultry and livestock. As it fills the gap of the cultivation of fungal spores in the history of the development of human agricultural civilization, it seems particularly valuable. Spores are both elusive and recognizable. It is necessary to understand the *Duohua* on felled trees to accept spores to colonize, germinate and grow. In order to meet the requirements of light, heat, water and air, the whole process is very strict and complicated, which takes two years. People cultivate *Xianggu* with only an axe but they can control it freely, the difficulty of which can be imagined.

(3) China's important fungal resource bank. The site is of a large area of forests, with an altitude of 240-1856.7 m. Diverse vegetation types provide extremely favorable natural conditions for the growth of fungi, create rich wild fungus resources and genetic diversity, and make the site the most suitable area for fungus germplasm resources to be protected on-site and off-site in China. In addition, owing to the large cultivation base of mushroom and the large genetic variation of varieties in the cultivation process, rich strain resources with natural variation have been formed and give the site a natural advantage in the selection of new and fine varieties of mushroom. Abundant fungus resources also play an important role in accelerating the circulation of matter and energy, maintaining biodiversity, integrity and stability of forest ecosystem.

(4) "Living Museum" with the most complete evolution chain of mushroom cultivation techniques. At present, 62 GIAHS sites are identified in the world and only the GIAHS site of Kunisaki Peninsula Usa Integrated Forestry, Agriculture and Fisheries System in Japan related to mushroom cultivation, in which local residents use wood log to cultivate mushrooms. In contrast, QFMCS keeps a complete cultivation technique evolution chain from *Duohua* method to wood log method and then to substitute material method, as well as retains a forest management technique system consistent with the development of mushroom industry, which has better integrity.

IV. Characteristics of the Site

1 Food and Livelihood Safety

1.1 Food Supply under Multiple Agricultural Production

(1) Diversified agricultural production modes

The agricultural production of the site mainly includes cultivation of mushrooms, timber and economic forests, planting and breeding in farmlands and under forests.



Lentinus edodes



Grifola frondosa



Auricularia auricula



Tremella fuciformis



Dictyophora indusiata



Ganoderma lucidum



Morchella esculenta



Russula vinosa

Figure 5 Main artificial cultivation mushrooms and wild mushrooms in the site

The artificially cultivated mushrooms mainly include *Xianggu* (*Lentinus edodes*), *Grifola frondosa*, *Auricularia auricula*, and *Tremella fuciformis*. In 2019, the yield of *Xianggu* reached up to 250.5 tons in 3.631 million bags in the site; the output of *Grifola frondosa* was 3.7 tons in 45,000 bags; and that of *Auricularia auricula* was 4.2 tons in 53,000 bags. There are also abundant wild fungi in the site, with *Dictyophora indusiate*, *Ganoderma lucidum*, *Morchella esculenta* and *Russula vinosa* utilized the most by local residents (Figure 5).

The cultivation of timber and economic forests is common (Figure 6). Timber forests mainly include bamboo forest and mushroom forests. Almost all villages therein plant bamboo. The total area of bamboo forest is 12,526 *mu*. The products are bamboo timber and bamboo shoots. Mushroom forests mainly include *Castanopsis fargesii*, *Liquidambar formosana*, *Castanea mollissima*, and *Castanopsis carlesii*, with an area of 39,355 *mu*. The economic forests are diversified. Among them, *Castanea henryi* has been cultivated in the site for more than 200 years. Called "iron crop" by farmers, it is an ecotype economic forest tree species, with a total area of 496 *mu*. The planting of *Torreya grandis*, mainly wild and transplanted *Torreya grandis*, also has a long history with an area of 23 *mu*. *Camellia oleifera* is mostly planted in patches with an area of 165 *mu*. The main varieties are small fruit camellia, pink columnar camellia and Zhejiang safflower camellia. The sweet orange pomelo cultivation herein was awarded the Agro-product Geographical Designation by the Ministry of Agriculture and Rural Affairs of China in 2018, and its planted area in the site is 113 *mu*. And kiwifruit, commonly known as "Chenli" has been cultivated artificially since the 1990s, reaching an area of 46 *mu* in 2019.

Planting and breeding under forests mainly include the planting of traditional Chinese herbal medicines and breeding of *Apis cerana*. *Poria cocos* planted under forests is a traditionally famous Chinese herbal medicine, and has reached an area of 11 *mu* in the site in 2019. Breeding of *Apis cerana* under forests can produce honey products of extremely high nutritional value, and meanwhile support the growth of forest plants with healthy pollination. In all, it has higher economic and ecological value. The breeding scale in the site has reached 214 boxes.

Planting and breeding in farmlands is mainly grain and vegetable planting, and aquaculture in paddy field (Figure 7). Rice is the main food crop, with a planting area of 296 *mu*. *Eleusine coracana* is tolerant of drought, floods, and barren soil, with a planting area of 31 *mu*. Aquatic products such as carps and field snails will simultaneously be raised in some paddy fields, with a total breeding area of 37 *mu*. Snails and carps are nutritious, delicious and thrive in muddy waters, with prices higher than those of similar aquatic products cultured in ponds. In addition to planting food

crops such as rice, *Chenopodium quinoa*, *Eleusine coracana* and *Ipomoea batatas*, mountain vegetables such as *Raphanus sativus* and *Zizania latifolia*, are also planted on terraces usually in spring or autumn and harvested in summer or winter. At present, a total of 517 *mu* of vegetables is planted, of which 380 *mu* are mountain vegetables (over 800 m above sea level).



Bamboo forest



Mushroom forest

*Castanea henryi**Torreyya grandis*

Sweet orange pomelo

*Camellia oleifera**Poria cocos**Apis cerana*

Figure 6 Timber forests such as bamboo forest and mushroom forest. Economic forests such as *Castanea henryi*, *Torreyya grandis*, Sweet orange pomelo and *Camellia oleifera*. Planting and breeding under forests such as *Poria cocos* planting and breeding of *Apis cerana*.



Figure 7 Crops such as rice, *Chenopodium quinoa*, *Eleusine coracana*, *Ipomoea batatas*, *Raphanus sativus* and *Zizania latifolia*. Aquatic products such as carps and field snails.

(2) Food supply and nutrition security

Multiple agricultural production modes within the site have brought a variety of agricultural products including mushrooms, forest trees, nuts, fruits, oil plants, traditional Chinese herbal medicines, cereals, potatoes, vegetables and aquatic products (Figure 8). In addition to forest trees and herbal medicines, all the other agricultural products can be used as food sources for local residents.

Figure 8 Multiple agricultural production modes within the site bring people all kinds of products such as mushrooms, forest trees, nuts, fruits, oil plants, traditional Chinese herbal medicines, cereals, potatoes, vegetables and aquatic products.

According to the statistics, QFMCS can provide about 52.21 kg of mushrooms, 7.15 kg of nuts, 35.13 kg of fruit, 2.09 kg of oil plants, and 19.04 kg of cereals, 172.50 kg of potatoes, 64.16 kg of vegetables and 0.48 kg of aquatic products for each resident in the site (Table 2), having served as the well-stocked "barn" for them. In actual consumption, local people have a strong dependence on indigenous agricultural products. According to a survey, up to 77.5% of their food is produced by this system. Mushrooms are rich in protein and amino acids and a kind of must-have food for most residents in the site. The average per capita annual consumption is 28.67 kg, much higher than that in non-mushroom production areas.

Table 2 Major food products from agriculture in the site in 2019

Food type	Agricultural products	Production scale	Output /ton	Per capita share /kg	Output value /ten thousand yuan
Mushroom	<i>Lentinus edodes</i>	3,631,000 bags	250.5	49.88	1496.0
	<i>Grifola frondosa</i>	45,000 bags	3.7	0.74	26.5
	<i>Auricularia auricula</i>	53,000 bags	4.2	0.84	140.2
	<i>Tremella fuciformis</i>	4,000 bags	0.6	0.12	20.0

Food type	Agricultural products	Production scale	Output /ton	Per capita share /kg	Output value /ten thousand yuan
	<i>Dictyophora indusiata</i>	0.5 ha	0.4	0.08	49.0
	<i>Ganoderma lucidum</i>	0.3 ha	2.8	0.56	20.0
Nuts	<i>Castanea henryi</i>	33.1 ha	35.8	7.13	52.5
	<i>Torreya grandis</i>	1.5ha	0.1	0.02	10.0
Fruits	Sweet orange pomelo	7.5 ha	157.6	31.38	1304.7
	Kiwifruit	3.1 ha	18.8	3.74	36.7
Oil plants	<i>Camellia oleifera</i>	11.0 ha	10.5	2.09	25.9
Cereals	Rice	19.7 ha	47.2	9.40	1100.6
	<i>Chenopodium quinoa</i>	13.3 ha	30.0	5.97	132.0
	<i>Eleusine coracana</i>	2.1 ha	7.9	1.57	63.8
Potatoes	<i>Ipomoea batatas</i>	10.7 ha	116.3	23.16	118.7
	Potato	8.9 ha	750.0	149.34	79.3
Vegetables	Bamboo shoots	835.5 ha	265.8	52.93	749.3
	<i>Zizania latifolia</i>	2.8 ha	56.4	11.23	338.0
Aquatic products	Field carp	2.0 ha	1.1	0.22	16.9
	Field snail	1.4 ha	1.3	0.26	19.8

Present Knowledge in Nutrition emphasizes a "balanced diet" that meets the body's nutritional needs through a reasonable dietary structure. In the 1990s, WHO and FAO recommended that countries formulate "dietary guidelines" to guide the population to keep a well-balanced diet to obtain nutrients needed, resulting in various forms of "food pyramids" thereafter. In general, the "food pyramids" are composed of 4 to 5 categories of food, encouraging residents to consume cereals and potatoes the most, meat, egg, milk in moderation, more fruits and vegetables, and less oil and salt. This heritage system contains a variety of agricultural products, just complying with the dietary guidelines of food pyramids (Figure 9), so it can serve as a relatively comprehensive source of nutrients for residents in the site.

Among others, mushrooms (such as *Xianggu*) provide important nutrients for people, and has certain medicinal and health benefits; nuts (such as *Castanea henryi*) have a preventive effect on cardiovascular diseases, and can also serve to improve eyesight and boost brain power; fruits (such as sweet orange pomelo) and vegetables (such as *Zizania latifolia*) are the main sources of carbohydrates and vitamins in the diet, and also contain various organic acids, aromatic substances and pigment components, conducive to mediating people's taste; oil plants (such as camellia oil), rich in unsaturated fatty acids, can prevent arteriosclerosis, and promote the body's absorption of fat-soluble fibers and such trace elements as calcium, iron, and zinc; cereals (such as *Chenopodium quinoa*) are rich in dietary fiber, facilitating intestinal peristalsis, and

improving cardiovascular function; aquatic products (such as field carp) provide rich and complete protein for residents, and are a good source of some vitamins and minerals. Therefore, this heritage system provides a strong guarantee for the food security of local residents in terms of both food quantity and nutritional structure.

Figure 9 Relationship between the supply of agricultural products and the well-balanced dietary pyramid. Mushrooms, nuts, fruits, oil plants, cereals, potatoes, vegetables and aquatic products, etc. in the site can provide a full and balanced diet for local people.

1.2 Livelihood Maintenance with Different Industry Types

(1) Rich and diverse industry types

Relying on rich forest resources, the site has formed a variety of industries including agricultural production, processing and sales, as well as forest and rural cultural tourism. Among others, the agricultural industry is mainly composed of the forestry and fruit growing industry (including forest tree, fruit tree cultivation, etc.), mushroom cultivation industry, grain and vegetable planting industry; the aquaculture, animal husbandry and other commercial crop cultivation industries are relatively small in production scale. Starting from the agricultural production, other industries such as agricultural product processing, marketing, and rural tourism have gradually developed. Qingyuan County has established relatively complete industry chains of forestry and fruit growing and mushroom cultivation (Figure 10), which is of great leading effect to the industry development of the site.

Figure 10 Industry chain of forestry and fruit growing, mushroom cultivation, and their interrelations in Qingyuan County.

According to the statistics, the total output value of the site was 82.83 million RMB Yuan in 2019 (Table 3), accounting for 45.4%, 24.0%, and 30.6% of the primary, secondary and tertiary industries, respectively (Figure 11), which was a balanced distribution in industrial structure. Among others, the output values of forestry and fruit growing, mushroom cultivation, and grain and vegetable planting account for 15.1%, 24.2% and 4.0% respectively, with a total proportion of 43.3%.

Table 3 Total output value of the site in 2019

Township	GDP /ten thousand yuan	Primary Industry				Secondary industry /ten thousand yuan	Tertiary industry /ten thousand yuan
		Forestry and fruit growing industry /ten thousand yuan	Mushroom cultivation industry /ten thousand yuan	Grain and vegetable planting industry /ten thousand yuan	Others /ten thousand yuan		
Baishanzu	4408.3	694.2	834.9	54.3	39.9	900.0	1885.0
Wudabao	1793.7	326.1	730.3	240.5	28.9	180.9	287.0
Songyuan	2081.0	234.1	439.8	36.7	103.7	904.8	361.9
Total	8283.0	1254.4	2005.0	331.5	172.5	1985.6	2533.9

Note: The township statistics in the table is only about the administrative villages located within the site.

Figure 11 Proportions of output value of the primary, secondary and tertiary industries are 45.4%, 24.0%, and 30.6% respectively in the site.

Forestry and fruit growing industries. In 2019, the cultivated area of timber and economic forests in the site reached 12,300 *mu*, accounting for 7.5% of Qingyuan County, with a gross output value of 9.178 million RMB Yuan. Most timber woods have been roughly or finely processed into wood products like bamboo chopsticks, pencils, wooden doors, and furniture (Figure 12), and some broad-leaved timber have been processed into raw materials for mushroom cultivation. Besides, agricultural products such as *Castanea henryi*, bamboo shoots, and sweet orange pomelos, are exquisite gifts for people to give to relatives and friends after processing. The output value of processing of forestry and fruit growing industry therein reached 6.328 million RMB Yuan in 2019. What's more, the beautiful forest landscape and ecological environment have also attracted many tourists to come for sightseeing. In 2019, the natural forest scenic spot in the site received 35,600 tourists, generating 8.942 million RMB Yuan in revenue, accounting for 35.2% of the output value of the tertiary industries.



Figure 12 Major processed products of forestry and fruit growing industry

Mushroom cultivation industries. In 2019, the yield of mushroom in the site reached 11.032 million bags, accounting for 9.6% of Qingyuan County, with a total output value of 20.05 million RMB Yuan. A variety of intensively processed products, dominated by dried products of *Xianggu* and *Grifola frondosa*, snack food, seasonings and herbal medicines, have been developed in the site (Figure 13), in order to give full play to the edible and medicinal value of various mushrooms. In 2019, there were 3 enterprises processing mushroom in the site, with an output value of 7.844 million RMB

Yuan. Since being listed in China Nationally Important Agricultural Heritage Systems in China (China-NIAHS) in 2014, the site has witnessed a great leap in rural cultural tourism. In 2019, cultural attractions related to mushroom cultivation received 84,600 visitors, achieving a tourism revenue of 11.065 million RMB Yuan, accounting for about 43.7% of the output value of the tertiary industries therein.



Lentinula edodes sauce



Grifola frondosa biscuits



Auricularia auricula



Tremella fuciformis beverage



Dictyophora indusiata



Spore powder of *Ganoderma lucidum*



Hericium erinaceus biscuits



Russula

Figure 13 Main processed products of mushroom cultivation industry

In 2002, "Qingyuan Mushroom" was awarded as a geographical indication product by the General Administration of Quality Supervision, Inspection and Quarantine of the PRC. In 2003, it was approved to be registered as a certification trademark. In 2013, it was awarded as a well-known trademark in China. In 2020, it has passed the certification of agricultural products geographical indication by the Ministry of Agriculture and Rural Affairs of the PRC, and has been selected into the first batch of protection list of geographical indications in China and Europe. As the most distinctive mushroom products in the heritage site, in addition to using the "Qingyuan Mushroom" public brand (Figure 14), the mushrooms produced by *Duohua* cultivation will also be marked with the words "Produced by *Duohua* Cultivation" in a prominent position.



Figure 14 The agricultural product geographical indications registration certificate of Qingyuan mushroom

Grain and vegetable planting industries. The grain and vegetable planting in the site is dominated by the production of grains, potatoes, beans, vegetables, etc. Most of these products are consumed, marketed, or used in agritainment business without processing, and few of them are put to reprocess. Compared with the forestry and fruit growing industry and the mushroom cultivation industry, the output value of the grain and vegetable planting-based secondary and tertiary industries is relatively low. In 2019, the output value focused on food supply of grains and vegetables and packaging and processing of herbal medicines was up to 1.356 million RMB Yuan.

In all, various industries supported by this heritage system have formed a closely linked industrial system, dominating the economic development of the site. According to the statistics, the total output value of the forestry and fruit growing, mushroom cultivation, and grain and vegetable planting industries reached 27.932 million RMB Yuan, 39.807 million RMB Yuan, and 5.036 million RMB Yuan respectively, totaling 72.775 million RMB Yuan, accounting for 87.9% of the site' GDP.

(2) Employment and economic income of local farmers

In 2019, the population of the site was 5,022 with a total of 2,173 households, and the number of employees was 2,973 (Table 4), accounting for 59.2% of the total population. With the acceleration of urbanization and the expansion in employment channel for migrant workers, the industrial system of this heritage system still functions to guarantee the most basic employment for local residents, and the residents involved in the system account for nearly 41.4% of the labor force under employment, with the middle-aged and old laborers at an even higher proportion.

Table 4 Employment of the labor force in the site in 2019

Township	Number of employees /person	Agricultural production based on forestry and fruit growing, mushroom cultivation and grain and vegetable planting industries /person	Processing and service businesses related to forestry and fruit growing, mushroom cultivation and grain and vegetable planting industries /person	Migrant workers /person	Other occupations /person
Baishanzu	1691	326	179	1070	116
Wudabao	1042	487	148	368	39
Songyuan	240	64	28	136	12
Total	2973	877	355	1574	167

Note: The township statistics in the table is only about the administrative villages located within the site.

The permanent laborers in the site take quite a variety of occupations, and the forestry and fruit growing, mushroom cultivation, grain and vegetable planting industries, together with directly related processing and service businesses such as marketing and tourism, are the major channels for local employment. The survey shows that there are 877 laborers engaged in the production activity associated with the above major industries; there are 355 laborers involved in the processing, sales of agricultural products and raw materials, and rural tourism associated with the above major industries. The total number of two parts is 1,232, accounting for 88.1% of the total permanent labor force in the site (Figure 15).

Figure 15 Distribution of permanent labor force in the site in 2019. Among others, the total number of permanent laborers engaged in the the forestry and fruit growing, mushroom cultivation, grain and vegetable planting industries, together with directly related processing and service businesses, account for 88.1% of the total permanent labor force in the site.

There are three mushroom cultivation methods: *Duohua* cultivation, wood log cultivation and substitute material cultivation. Meanwhile, there are 63, 70 and 494 labors engaging in the three mushroom cultivation methods, with economic output value of 318,000 RMB Yuan, 261,000 RMB Yuan and 9,942,000 RMB Yuan respectively. Because of labor shortage and forest conservation, substitute material cultivation technique is widely adopted by most farmers. However, the mushroom produced by traditional *Duohua* method has much higher price due to its unique flavor, making some farmers still adopt traditional *Duohua* method to cultivate mushrooms (Table 5).

Correspondingly, the forestry and fruit growing, mushroom cultivation, grain and vegetable planting industries, and directly related processing and service businesses are important income sources for local residents. In 2019, the rural per capita net income was 17,399.8 RMB Yuan in the site. Among others, the income from the forestry and fruit growing, mushroom cultivation, grain and vegetable planting industries as well as corresponding processing and service businesses were 3,091.4 RMB Yuan, 4,340.5 RMB Yuan and 1,680.4 RMB Yuan respectively (Table 6), accounting for about 17.8%, 24.9% and 9.7% of the rural per capita net income respectively (Figure 16). The total proportion of 52.4% was a litter more than that as migrant workers of 41.6%.

Table 5 Production of three cultivation methods of mushroom in 2019

Mushroom cultivation techniques	Number of participant farmers (person)	Annual output (kg)	Unit mushroom price (Yuan/kg)	Manpower required per mushroom output (labor/kg)	The amount of wood needed per mushroom output (m³/kg)
<i>Duohua</i> cultivation	63	635.9	500	4.17	2.20
Wood log cultivation	70	1305.5	200	0.61	0.13
Substitute material cultivation	494	248558.6	40	0.14	0.015

Note: The output of mushrooms in the table is dry mushrooms; some farmers use two or three cultivation methods to produce mushrooms in the site.

Table 6 Rural per capita net income and main sources in 2019

Township	Per capita net income /yuan	Forestry and fruit growing industry, and related processing and service businesses /yuan	Mushroom cultivation industry, and related processing and service businesses /yuan	Grain and vegetable planting industry, and related processing and service businesses /yuan	As migrant workers /yuan	Other sources /yuan
Baishanzu	16306.2	3126.4	3859.3	1253.5	7331.4	735.6
Wudabao	19011.8	2832.3	4653.2	2375.2	7709.4	1441.7
Songyuan	19347.8	3865.3	6794.7	2176.4	4532.9	1978.5
Total	17399.8	3091.4	4340.5	1680.4	7231.3	1056.2

Note: The township statistics in the table is only about the administrative villages located within the site.

Based on above statistics, it can be seen that the proportion of the labor force (41.4%) engaged in the production, processing and related services of the forestry and fruit growing, mushroom cultivation and grain and vegetable planting industries is lower than that of the labor force (52.9%) engaged in out-migrating for work, but the proportion of its per capita income (52.4%) is higher than that of the per capita income (41.6%) of out-migrating for work. The results showed that the average labor productivity of above industries was higher than that of out-migrating for work. It can be expected that with the protection and development of QFMCS, the above related industries can attract more migrant workers to return home for employment, thus promoting the sustainable development of agriculture and rural areas in the site.

Figure 16 Distribution of rural per capita net income sources in 2019. Among others, the income from the forestry and fruit growing, mushroom cultivation, grain and vegetable planting industries as well as corresponding processing and service businesses account for about 17.8%, 24.9% and 9.7% of the rural per capita net income respectively.

2 Agro-biodiversity

2.1 Mushroom Forest Biodiversity

(1) Tree biodiversity

According to the survey of three typical mushroom forest plots, a total of 27 species of arbor were recorded. The top 10 tree species of important values were *Castanopsis hystrix*, *Schima superba*, *Castanopsis clerophylla*, *Castanopsis carlesii*, *Cinnamomum septentrionale*, *Alniphyllum fortunei*, *Cunninghamia lanceolata*, *Castanopsis fabri*, *Pinus massoniana*, and the important value totally of them accounts for 72.57% of all tree species. Among them, *Castanopsis hystrix*, *Castanopsis clerophylla*, *Castanopsis carlesii*, *Castanopsis fabri*, *Elaeocarpus decipiens*, *Castanea henryi*, *Elaeocarpus Sylvestris*, *Castanopsis sclerophylla*, *Quercus chenii* and *Cyclobalanopsis glauca* are suitable species for cultivating mushrooms (Table 7).

Table 7 Importance value of the arbor layer of mushroom forest

NO	Latin name	Relative dominance	Relative abundance	Relative frequency	Importance value
1	<i>Castanopsis hystrix</i>	36.43	20.89	7.32	64.63
2	<i>Schima superba</i>	11.33	7.59	7.32	26.25
3	<i>Castanopsis sclerophylla</i>	5.9	13.29	4.88	24.07
4	<i>Castanopsis carlesii</i>	7.65	9.49	2.44	19.58
5	<i>Cinnamomum septentrionale</i>	4.05	8.23	4.88	17.15
6	<i>Alniphyllum fortunei</i>	3.15	6.33	7.32	16.79

NO	Latin name	Relative dominance	Relative abundance	Relative frequency	Importance value
7	<i>Cunninghamia lanceolata</i>	6.25	5.7	2.44	14.39
8	<i>Castanopsis fabri</i>	6.5	4.43	2.44	13.36
9	<i>Pinus massoniana</i>	7.14	1.9	2.44	11.47
10	<i>Phoebe zhennan</i>	0.77	2.53	4.88	8.18
11	<i>Elaeocarpus decipiens</i>	0.82	1.9	4.88	7.59
12	<i>Castanea henryi</i>	0.48	1.9	4.88	7.26
13	<i>Machilus pingii</i>	3.44	1.27	2.44	7.14
14	<i>Armeniaca mume</i>	0.31	1.27	4.88	6.45
15	<i>Melia azedarach</i>	0.09	0.63	4.88	5.6
16	<i>Elaeocarpus sylvestris</i>	0.47	2.53	2.44	5.44
17	<i>Castanopsis sclerophylla</i>	1.02	1.27	2.44	4.72
18	<i>Myrica rubra</i>	0.41	0.63	2.44	3.49
19	<i>Machilus kusanoi</i>	0.41	0.63	2.44	3.49
20	<i>Vernicia fordii</i>	0.4	0.63	2.44	3.47
21	<i>Cinnamomum subavenium</i>	0.26	0.63	2.44	3.33
22	<i>Symplocos paniculata</i>	0.25	0.63	2.44	3.32
23	<i>Quercus chenii</i>	0.25	0.63	2.44	3.32
24	<i>Cyclobalanopsis glauca</i>	0.21	0.63	2.44	3.28
25	<i>Camellia oleifera</i>	0.04	0.63	2.44	3.11
26	<i>Dendropanax dentiger</i>	0.03	0.63	2.44	3.11
	Total	100	100	100	300

(2) Shrub biodiversity

According to the survey of three typical mushroom forest plots, a total of 38 species of shrubs were recorded. The top 10 tree species of important values were *Ardisia crenanta*, *Camellia oleifera*, *Symplocos paniculate*, *Lindera aggregate*, *Ilex chinensis*, *Rhododendron simsii*, *Eurya japonica*, *Loropetalum chinense*, *Castanopsis fargesii*, *Viburnum dilatatum*, and the important value of them totally accounts for 49.41% of all shrub species. Among them, *Castanopsis fargesii*, *Castanopsis carlesii*, *Castanopsis sclerophylla*, *Cyclobalanopsis glauca* and *Castanea henryi* are renewal tree species suitable for cultivating mushrooms, and provide species resources for the succession and regeneration of the mushroom forests (Table 8).

Table 8 Importance value of the shrub layer of mushroom forest

NO	Latin name	Relative dominance	Relative abundance	Relative frequency	Importance value
1	<i>Ardisia crenanta</i>	12.95	16.05	3.57	32.57
2	<i>Camellia oleifera</i>	12.20	4.32	3.57	20.09
3	<i>Symplocos paniculata</i>	7.70	4.94	1.79	14.43
4	<i>Lindera aggregata</i>	4.48	5.56	3.57	13.61
5	<i>Ilex chinensis</i>	3.41	4.32	5.36	13.09

NO	Latin name	Relative dominance	Relative abundance	Relative frequency	Importance value
6	<i>Rhododendron simsii</i>	3.32	4.94	3.57	11.83
7	<i>Eurya japonica</i>	6.64	3.09	1.79	11.51
8	<i>Loropetalum chinense</i>	4.12	4.94	1.79	10.84
9	<i>Castanopsis fargesii</i>	2.91	4.32	3.57	10.80
10	<i>Viburnum dilatatum</i>	3.98	3.70	1.79	9.47
11	<i>Symplocos grandis</i>	3.19	3.70	1.79	8.68
12	<i>Gardenia jasminoides</i>	1.33	1.85	5.36	8.54
13	<i>Castanopsis carlesii</i>	0.65	1.85	5.36	7.86
14	<i>Cyclobalanopsis glauca</i>	1.43	2.47	3.57	7.47
15	<i>Phoebe zhennan</i>	1.99	1.85	3.57	7.42
16	<i>Argyrea seguinii</i>	2.49	3.09	1.79	7.36
17	<i>Castanopsi sclerophylla</i>	3.49	1.85	1.79	7.12
18	<i>Photinia serrulata</i>	1.00	2.47	3.57	7.04
19	<i>Symplocos sumuntia</i>	2.59	2.47	1.79	6.84
20	<i>Schima superba</i>	2.99	1.85	1.79	6.63
21	<i>Rubus swinhoei</i>	1.00	1.85	3.57	6.42
22	<i>Boehmeria nivea</i>	0.55	1.85	3.57	5.97
23	<i>Ligustrum lucidum</i>	0.91	1.23	3.57	5.72
24	<i>Dendropanax dentiger</i>	0.83	1.24	3.58	5.64
25	<i>Castanea henryi</i>	1.99	1.85	1.79	5.63
26	<i>Symplocos stellari</i>	1.33	2.47	1.79	5.58
27	<i>Ginkgo biloba</i>	2.16	1.23	1.79	5.18
28	<i>Eurya spp.</i>	1.25	1.85	1.79	4.88
29	<i>Camellia sinensis</i>	1.66	1.23	1.79	4.68
30	<i>Cinnamomum septentrionale</i>	1.00	0.62	1.79	3.40
31	<i>Lindera eythrocarpa</i>	1.00	0.62	1.79	3.40
32	<i>Ilex latifolia</i>	1.00	0.62	1.79	3.40
33	<i>Cinnamomum camphora</i>	0.66	0.62	1.79	3.07
34	<i>Lindera glauca</i>	0.50	0.62	1.79	2.90
35	<i>Machilus pingii</i>	0.50	0.62	1.79	2.90
36	<i>Ligustrum quihoui</i>	0.33	0.62	1.79	2.74
37	<i>Lindera pungens</i>	0.33	0.62	1.79	2.74
38	<i>Gardenia jasminoides</i>	0.17	0.62	1.79	2.57
	Total	100.00	100.00	100.00	300.00

(3) Herb biodiversity

According to the survey of three typical mushroom forest plots, a total of 5 species of herb were recorded, among them, ferns have an absolute advantage (Table 9).

Table 9 Importance value of the herb layer of mushroom forest

NO	Latin name	Relative dominance	Relative abundance	Relative frequency	Importance value
1	<i>Pteridium aquilinum</i>	86.35	81.43	33.33	201.11
2	<i>Cymbidium</i> ssp.	5.94	5.71	22.22	33.88
3	<i>Smilax glabra</i>	5.68	5.71	22.22	33.61
4	<i>Melastoma candidum</i>	1.97	4.29	11.11	17.36
5	<i>Osmunda japonica</i>	0.07	2.86	11.11	14.03
	Total	100	100	100	300

2.2 Fungus Resource Diversity

According to *State of the World's Fungi 2018*, the site is an important distribution area for wild macro fungus germplasm resources in China. At present, a total of 398 species of wild macro fungi have been identified in the site, belonging to 13 orders, 61 families and 147 genera. Among them, there are 2 species of endangered macro fungi, and 3 species of endemic macro fungi (Table 10, Figure 17- 20). More than 10 species of macro fungi have realized artificial cultivation (Figure 21).

Table 10 Macro fungus resources in the site

Category	Major species
Wild macro fungi	<i>Morchella esculenta</i> , <i>Boletus edulis</i> , <i>Meripilus giganteus</i> , <i>Tremella foliacea</i> , <i>Isaria cicadae</i> , <i>Cordyceps militaris</i> , <i>Xylaria polymorpha</i> , <i>Lycoperdon perlatum</i> , <i>Amanita alboflavescentes</i> , <i>Amanita avellaneosquamosa</i> , <i>Dictyophora multicolor</i> , <i>Russula fragilis</i> , <i>Russula nigricans</i> , <i>Hypholoma fasciculare</i> , etc.
Artificially cultivated macro fungi	<i>Lentinus edodes</i> , <i>Auricularia auricula</i> , <i>Grifola frondosa</i> , <i>Agaricus bisporus</i> , <i>Tremella fuciformis</i> , <i>Dictyophora indusiata</i> , <i>Boletus</i> spp., <i>Volvariella volvacea</i> , <i>Agaricus blazei</i> , <i>Pleurotus eryngii</i> , <i>Pleurotus geesteranus</i> , <i>Pholiota nameko</i> , etc.
Endangered macro fungi	<i>Thelephora ganbajun</i> , <i>Entoloma subclitocyboides</i>
Endemic macro fungi	<i>Thelephora ganbajun</i> , <i>Entoloma subclitocyboides</i> , <i>Boletus roseoflavus</i>

*Morchella esculenta**Boletus edulis**Meripilus giganteus**Tremella foliacea**Isaria cicadae**Cordyceps militaris**Xylaria polymorpha**Lycoperdon perlatum**Amanita alboflavescens**Amanita avellaneosquamosa***Figure 17 Part of wild macro fungi in the site (1)**



Dictyophora multicolor

Russula fragilis

Russula nigricans

Hypholoma fasciculare

Figure 18 Part of wild macro fungi in the site (2)



Figure 19 Freehand drawing of edible fungi in the heritage site (1)



Figure 20 Freehand drawing of edible fungi in the heritage site (2)



Lentinus edodes



Grifola frondosa



Auricularia auricula



Tremella fuciformis

Figure 21 Part of artificially cultivated macro fungi in the site

2.3 Agricultural Species Diversity

At present, there are about 60 kinds of main cultivated crops (excluding mushrooms) in the site, among them, 10 kinds of food crops; 1 kinds of oil crops; 27 kinds of

vegetable crops; 12 kinds of melon and fruit crops; 36 kinds of medicinal products; other crops include tea, bamboo forest, etc. (Table 11, Figure 22).

There are also many livestock and poultry breeds in the site, including pigs, cattle, sheep, rabbits, chickens, ducks, geese, bees and so on.

Table 11 Agricultural species diversity in the site

Category	Agricultural species resources
Grain crops	Rice (<i>Taibai</i> *, variant red rice*, <i>Changmao</i> red rice*, <i>Heiyigu</i> red rice*), soybean, quinoa, millet (red millet*, <i>Eleusine coracana</i> *), corn, potato (<i>Pingyang</i> potato*, local potato*), sweet potato (<i>Hongpi</i> sweet potato*, local sweet potato*, <i>Xiaoyegu</i> sweet potato*), sorghum (local sugar sorghum*), barley
Oil crops	Rapes
Vegetable crops	Spring radish, summer radish (local radish*), pakchoi, Chinese cabbage, bolt, kale, cauliflower, broccoli, lettuce (local lettuce*), celery (cress*, local celery*), water spinach, spinach, cowpea (<i>Hongbayue</i> cowpea*, <i>Huabayue</i> cowpea*), kidney bean (<i>Hongsizao</i> kidney beans*), green soybean (local small green soybean*), sweet pea, bottle gourd, sponge gourd (local <i>Baleng</i> gourd*), pumpkin (local pumpkin*), watermelon, cocozelle, eggplant (white eggplant*), tomato, chilli, pimento, <i>Zizania latifolia</i> , lily, taro, etc.
Fruit crops	Qingyuan sweet orange pomelo, Qingyuan <i>Castanea henryi</i> (oil hazel*, yellow hazel*, <i>Wukechangmang</i> hazel*), Chestnut (<i>Jianye</i> chestnut*), <i>Torreya grandis</i> , <i>Camellia oleifera</i> , Citrus, Pear (local pear*, <i>Zhufen</i> pear*, local <i>Lypi</i> pear*), peach, plum, bayberry (<i>Heitan</i> bayberry*, white bayberry*, small bayberry*), loquat, persimmon (local persimmon*, local small persimmon*), grape (local wild grape*), kiwi (<i>Baihuamao</i> kiwi*, <i>Ruanmaolypi</i> kiwi*, <i>Ruanmaotuhuangpi</i> kiwi*, <i>Ruanmaohuangxin</i> kiwi*, <i>Qiucui</i> kiwi*), etc.
Medicinal crops	<i>Polygonatum sibiricum</i> , <i>Paris polyphylla</i> , <i>Tetrastigma hemsleyanum</i> , <i>Rubus idaeus</i> , <i>Lilium brownie</i> , <i>Atractylodes macrocephala</i> , <i>Alternanthera sessilis</i> , <i>Helianthus tuberosus</i> , <i>Dendrobium officinale</i> , <i>Osmorhiza aristata</i> , <i>Platycodon grandifloru</i> , <i>Lonicera japonica</i> , <i>Impatiens balsamina</i> , <i>Coix lacryma-jobi</i> , <i>Crocus sativus</i> , <i>Belamcanda chinensis</i> , <i>Magnolia officinalis</i> , <i>Eucommia ulmoides</i> , <i>Hydrangea macrophylla</i> , <i>Euodia rutaecarpa</i> , <i>Taxus wallichiana</i> , <i>Trichosanthes rosthornii</i> , <i>Lycium</i> , <i>Anoectochilus roxburghii</i> , <i>Vallisneria natans</i> , <i>Clematis henryi</i> Oliv, <i>Hedyotis diffusa</i> , <i>Patrinia scabiosifolia</i> , <i>Phellodendron chinense</i> , <i>Geranium wilfordii</i> , <i>Fritillariae Thunbergii</i> , <i>Odontosoria chinensis</i> , <i>Polygonatum kingianum</i> , <i>Litsea cubeba</i> , <i>Coptis chinensis</i> , <i>Cinnamomum tamala</i> , etc.
other crops	Tea, Bamboo, etc.

Note: The local varieties are marked with "*".

At present, 4 local rice varieties, 2 local millet varieties, 2 local potato varieties, 3 local sweet potato varieties, 2 local cowpea varieties, 3 local cone chestnut varieties, 3 local pear varieties, 3 local plum varieties, 5 local kiwi varieties, 3 local bayberry varieties are still planted in the site (Figure 23).



Figure 22 Part of agricultural species in the site



Figure 23 Part of local agricultural varieties in the site

2.4 Relevant Biodiversity

(1) Vegetation diversity

There are various types of vegetation in the site. Common vegetation types can be divided into coniferous forest, coniferous and broad-leaved mixed forest, broad-leaved forest, bamboo forest, shrub, grass and meadow, include 7 vegetation-type groups, 23 vegetation types, 40 formations (Table 12). The coniferous forest is mainly composed of Form. *Pinus taiwanensis*, Form. *Pinus taiwanensis*, Form. *Pinus taiwanensis*. Coniferous and broad-leaved mixed forests are mainly composed of Form. *Pinus taiwanensis* + *Schima superba*, Form. *Tsuga chinensis* + *Fagus lucida*, Form. *Fokienia hodginsii* + *Rhododendron simiarum*, Form. *Cunninghamia lanceolata* + *Liriodendron chinense*. There are three types of broad-leaved forests: deciduous broad-leaved forest, evergreen deciduous broad-leaved mixed forest and evergreen broad-leaved forest. Among them, deciduous broad-leaved forest has Form. *Alniphyllum fortunei*; evergreen deciduous broad-leaved mixed forest has Form. *Fagus lucida* + *Rhododendron latoucheae*, Form. *Fagus lucida* + *Cyclobalanopsis multinervis*; evergreen broad-leaved forest has Castanopsi forest, Cyclobalanopsis forest, Lithocarpus forest, Machilus forest. Bamboo forest has Form. *Phyllostachys pubescens*, Form. *Yushania baishanzuensis*. The shrubs have Form. *Stranvaesia davidiana*, Form. *Rhododendron fortunei*, Form. *Rhododendron latoucheae* + *Rhododendron simsii*. The grass has Form. *Miscanthus floridulus*. The meadow has Form. *Ligularia japonica* - *Carex jiuxianshanensis*.

Table 12 Forest vegetation types in the site

Vegetation-type groups	Vegetation types	Formations	Name
Coniferous forest	1		Temperate pine forest
		(1)	Form. <i>Pinus taiwanensis</i>
		(2)	Form. <i>Pinus taiwanensis</i> + <i>Chamaecyparis obtusa</i> + <i>Cryptomeria fortunei</i>
		(3)	Form. <i>Pinus taiwanensis</i> + <i>Cryptomeria fortunei</i>
		(4)	Form. <i>Pinus taiwanensis</i> + <i>Cunninghamia lanceolata</i>
	2	(5)	Form. <i>Cryptomeria fortunei</i>
	3		Warm temperate forest
		(6)	Form. <i>Pinus massoniana</i>
	4		Form. <i>Cunninghamia lanceolata</i>
		(7)	Form. <i>Cunninghamia lanceolata</i> + <i>Pseudolarix amabilis</i>
5	(8)	Form. <i>Pseudolarix amabilis</i>	

Vegetation-type groups	Vegetation types	Formations	Name
Coniferous and broad-leaved mixed forest	6		<i>Pinus taiwanensis</i> mixed forest
		(9)	Form. <i>Pinus taiwanensis</i> + <i>Castanopsi eyrei</i>
		(10)	Form. <i>Pinus taiwanensis</i> + <i>Schima superba</i>
		(11)	Form. <i>Pinus taiwanensis</i> + <i>Cunninghamia lanceolata</i> + <i>Schima superba</i>
		(12)	Form. <i>Pinus taiwanensis</i> + <i>Lithocarpus brevicaudatus</i>
	7		<i>Tsuga chinensis</i> mixed forest
		(13)	Form. <i>Tsuga chinensis</i> + <i>Fagus lucida</i>
	8		<i>Fokienia hodginsii</i> mixed forest
		(14)	Form. <i>Fokienia hodginsii</i> + <i>Rhododendron simiarum</i>
	9		<i>Cunninghamia lanceolata</i> mixed forest
		(15)	Form. <i>Cunninghamia lanceolata</i> + <i>Liriodendron chinense</i>
	10		<i>Pinus massoniana</i> mixed forest
		(16)	Form. <i>Pinus massoniana</i> + <i>Schima superba</i>
Broad-leaved forest	11		<i>Alniphyllum fortunei</i> broad-leaved forest
		(17)	Form. <i>Alniphyllum fortunei</i>
	12		<i>Fagus longipetiolata</i> mixed forest
		(18)	Form. <i>Fagus lucida</i> + <i>Rhododendron latoucheae</i>
		(19)	Form. <i>Fagus lucida</i> + <i>Cyclobalanopsis multinervis</i>
	13		<i>Castanopsi</i> forest
		(20)	Form. <i>Castanopsi eyrei</i>
		(21)	Form. <i>Castanopsi eyrei</i> + <i>Schima superba</i>
		(22)	Form. <i>Castanopsi eyrei</i> + <i>Lithocarpus brevicaudatus</i>
		(23)	Form. <i>Castanopsi eyrei</i> + <i>Ternstroemia gymnanthera</i>
		(24)	Form. <i>Castanopsi carlesii</i> + <i>Castanopsi fordii</i>
	14		<i>Cyclobalanopsis</i> forest
		(25)	Form. <i>Cyclobalanopsis glauca</i> + <i>Castanopsi carlesii</i>
		(26)	Form. <i>Cyclobalanopsis glauca</i> + <i>Daphniphyllum oldhamii</i> + <i>Sloanea sinensis</i>
		(27)	Form. <i>Cyclobalanopsis multinervis</i> + <i>Rhododendron latoucheae</i>
	(28)	<i>Cyclobalanopsis multinervis</i> + <i>Lithocarpus brevicaudatus</i>	
	(29)	Form. <i>Cyclobalanopsis multinervis</i> + <i>Schima superba</i>	
15		<i>Lithocarpus</i> forest	

Vegetation-type groups	Vegetation types	Formations	Name
		(30)	Form. <i>Lithocarpus brevicaudatus</i> + <i>Cyclobalanopsis multinervis</i>
		(31)	Form. <i>Lithocarpus brevicaudatus</i> + <i>Rhododendron latoucheae</i>
		(32)	Form. <i>Lithocarpus glaber</i> + <i>Castanopsis eyrei</i> + <i>Schima superba</i>
	16		Machilus forest
		(33)	Form. <i>Machilus thunbergii</i> + <i>Magnolia maudiae</i>
Bamboo forest	17		Hilly mountain bamboo forest
		(34)	Form. <i>Phyllostachys pubescens</i>
	18		Mountain bamboo forest
		(35)	Form. <i>Yushania baishanzuensis</i>
Shrub	19	(36)	Form. <i>Stranvaesia davidiana</i>
	20	(37)	Form. <i>Rhododendron fortunei</i>
	21	(38)	Form. <i>Rhododendron latoucheae</i> + <i>Rhododendron simsii</i>
Grass	22		Gramineae grass
		(39)	Form. <i>Miscanthus floridulus</i>
Meadow	23	(40)	Form. <i>Ligularia japonica</i> - <i>Carex jiuxianshanensis</i>

(2) Plant diversity

There are 2018 species, 854 genera and 194 families of vascular plants in the site, including 201 species, 78 genera and 34 genera of ferns; 49 species, 28 genera and 7 families of gymnosperms; 1355 species, 572 genera and 128 families of dicotyledons, 413 species, 176 genera and 25 families of monocotyledons of angiosperm.

There are 4 species under first class state protection include *Abies beshanzuensis*, *Taxus mairei*, *Isoetes sinensis* and *Bretschneidera sinensis* (Figure 24); 23 species under second class state protection such as *Fokienia hodginsii*, *Zelkova schneideriana*, *Liriodendron chinese*, *Magnolia officinalis* and so on (Table 13).

The number of rare plants listed in the *China Plant Red Data Book* is about 34 species, which include *Abies beshanzuensis*, *Pseudotsuga gaussenii*, *Tsuga chinensis*, *Pseudolarix kaempferi*, *Fokienia hodginsii*, *Pseudotaxus chienii*, *Ginkgo biloba*, *Torreya jackii* etc.

*Abies beshanzuensis**Taxus mairei**Isoetes sinensis**Bretschneidera sinensis***Figure 24 Plants under first class state protection in the site****Table 13 List of plants under special state protection in the site**

1. Plants under first class state protection (4 species)	
<i>Isoetes sinensis</i>	<i>Taxus mairei</i>
<i>Abies beshanzuensis</i>	<i>Bretschneidera sinensis</i>
2. Plants under second class state protection (23 species)	
<i>Pseudolarix kaempferi</i>	<i>Nelumbo nucifera</i>
<i>Pseudotsuga gaussenii</i>	<i>Fagopyrum dibotrys</i>
<i>Fokienia hodginsii</i>	<i>Trapa incisa</i>
<i>Torreya grandis</i>	<i>Ormosia henryi</i>
<i>Torreya jackii</i>	<i>Ormosia hosiei</i>
<i>Cinnamomum camphora</i>	<i>Glycine soja</i>
<i>Phoebe bournei</i>	<i>Platycrater arguta</i>
<i>Phoebe chekiangensis</i>	<i>Toona ciliata</i> var. <i>pubescens</i>
<i>Liriodendron chinese</i>	<i>Emmempopterys henryi</i>
<i>Magnolia officinalis</i>	<i>Ulmus elongate</i>
<i>M.officinalis.ssp.biloba</i>	<i>Zelkova schneideriana</i>
<i>Euchresta japonica</i>	

(3) Animal diversity

Among the wild animals in the site, there are 22 orders, 255 families, 1363 genera and 2203 species of insects, and more than 250 species of vertebrates, including 8 orders, 23 families and 57 species of mammals; 13 orders, 34 families, 132 species of birds; 3 orders, 9 families and 50 species of reptiles. There are 2 orders, 8 families and 36 species of amphibians, and 5 orders, 13 families, 44 genera and 60 species of fish.

There are 67 species national key protected animals in the site, among them, 10 species under first class state protection such as *Tragopan caboti*, *Panthera pardus*, *Neofelis nebulosa* and *Mintiacus crinifrons* (Table 14, Figure 25); 57 species under second class state protection such as *Andrias davidianus*, *Rana rugulosa*, *Lophura nycthemera*, *Pucrasia macrolopha*, *Glaucidium brodiei*, *Manis pentadactyla* and so on. There are 30 species provincial-level key protected animals such as *Rana versabilis*, *Platysternon megacephalum*, *Elaphodus cephalophus* and so on. Among them, *Andrias davidianus* is critically endangered (CR) species. There are 6 endangered (EN) species such as *Manis pentadactyla* and *Cuon alpinus*, 17 vulnerable (VU) species such as *Tragopan caboti*, *Neofelis nebulosa*, *Mintiacus crinifrons* and 15 near threatened (NT) species such as *Pucrasia macrolopha*, *Viverra zibetha*, *Panthera pardus*, *Felis temmincki*, *Capricornis sumatraensis* and so on.

Table 14 List of animals under special state protection in the site

List of animals under special state protection	
1. Animals under first class state protection (10 species)	
<i>Tragopan caboti</i>	<i>Aquila chrysaetos</i>
<i>Mintiacus crinifrons</i>	<i>Mergus squamatus</i>
<i>Neofelis nebulosa</i>	<i>Ciconia boyciana</i>
<i>Panthera pardus</i>	<i>Grus leucogeranus</i>
<i>Syrmaiticus ellioti</i>	<i>Pelochelys bibroni</i>
2. Animals under second class state protection (57 species)	
<i>Macaca mulatta</i>	<i>Aquila fasciata</i>
<i>Macaca thibetana</i>	<i>Spilornis cheela</i>
<i>Manis pentadactyla</i>	<i>Microhierax melanoleucos</i>
<i>Cuon alpinus</i>	<i>Falco peregrinus</i>
<i>Selenarctos thibetanus</i>	<i>Falco subbuteo</i>
<i>Martes flavigula</i>	<i>Falco columbarius</i>
<i>Lutra lutra</i>	<i>Falco vespertinus</i>
<i>Viverra zibetha</i>	<i>Falco tinnunculus</i>
<i>Viverricula indica</i>	<i>Aviceda leuphotes</i>
<i>Catopuma temmincki</i>	<i>Tyto capensis</i>

List of animals under special state protection	
<i>Felis temmincki</i>	<i>Otus scopo</i>
<i>Capricornis sumatraensis</i>	<i>Otus bakkamoena</i>
<i>Naemorhedus goral</i>	<i>Bubo bubo</i>
<i>Hydropotes inermis</i>	<i>Glaucidium brodiei</i>
<i>Muntiancus crinifrons</i>	<i>Glaucidium cuculoides</i>
<i>Aix galericulata</i>	<i>Ninox scutulata</i>
<i>Cygnus columbianus</i>	<i>Strix leptogrammica</i>
<i>Milvus korschun</i>	<i>Asio otus</i>
<i>Accipiter gentilis</i>	<i>Asio flammeus</i>
<i>Accipiter soloensis</i>	<i>Numenius minutus</i>
<i>Accipiter nisus</i>	<i>Lophura nycthemera</i>
<i>Accipiter virgatus</i>	<i>Pucrasia macrolopha</i>
<i>Buteo hemilasius</i>	<i>Pitta brachyura</i>
<i>Buteo buteo</i>	<i>Anguilla marmorata</i>
<i>Buteo lagopus</i>	<i>Andrias davidianus</i>
<i>Butastur indicus</i>	<i>Rana rugulosa</i>
<i>Spizaetus nipalensis</i>	<i>Carabus lafossei</i>
<i>Aquila clanga</i>	<i>Cheirotonus jansoni</i>
<i>Ictinaetus malayensis</i>	

*Tragopan caboti**Panthera pardus**Neofelis nebulosa**Mintiacus crinifrons**Aquila chrysaetos**Mergus squamatus**Ciconia boyciana**Grus leucogeranus**Symaticus ellioti**Pelochelys bibroni***Figure 25 Animals under first class state protection in the site**

2.5 Biodiversity Values

QFMCS is a typical mountainous agroforestry production system. The various elements cooperate with each other to play the functions of raw material supply, species conservation, water and soil maintenance, climate regulation, nutrient cycling, landscape aesthetics and other services.

(1) Supplying raw materials. Forests provide abundant wood resources for the mushroom industry. On the one hand, people fell mushroom trees to cultivate *Xianggu* by *Duohua* method in the forests or wood log method on a gentle slope. On the other hand, people turn woods into culture materials to cultivate mushrooms by substitute material method. Terraces ensure the food supply for local residents and maintain the biodiversity of the farmland; at the same time, the crop straw is also the culture materials for the mushroom cultivation.

(2) Conserving species. The site has rich forest resources and it is a natural gene bank for species (Figure 26). There are 326 species of bryophytes and 2241 species of vascular plants; animal resources include 2203 species of insects and 254 species of vertebrates. The site is also a natural refuge for rare and endangered species. There have 94 species (27 species of plants and 67 species of animals) under national key protection, which have important values for scientific research and popular science. The 3 *Abies beshanzuensis* preserved through quaternary glaciers, known as the "plant giant panda" and listed as one of the 12 most endangered plants in the world by the International Species Protection Committee in 1987, is an ancient relic species unique to *Baishanzu* Mountain, which is a "living fossil" for the study of the occurrence and changes of paleogeography and climate. The site is also a locality of biological model specimens. So far, 286 species of new biological specimens were collected from *Baishanzu* area, including 36 species of plant and 250 species of insect.

(3) Conserving water and soil. The function of water and soil conservation offered by forests, especially in the source of rivers and areas where geological hazards are prone, has made important contributions to disaster prevention and mitigation in the site. The climate of this place is warm and humid, and annual precipitation is high. Rich forest resources have played a positive role in water and soil conservation. Closed canopy can intercept a considerable amount of precipitation, reduce the intensity of rainstorm and prolong the rainfall time. Preservation of weeds and branches under the forest also cushions the impact of rainwater. In addition, forest plays a good role in water storage and purifying water quality by intercepting, absorbing and accumulating precipitation through its huge canopy, undergrowth shrub layer, thick litter, forest soil layer and developed root system. These measures have weakened the intensity of soil erosion and played the role of water and soil conservation. It is estimated that every

square kilometer of forests can reduce soil loss by 7500 t/a, conserve water by 4.2×10^4 m³/a, and reduce soil fertility by 600 t/a compared with non-forest land.

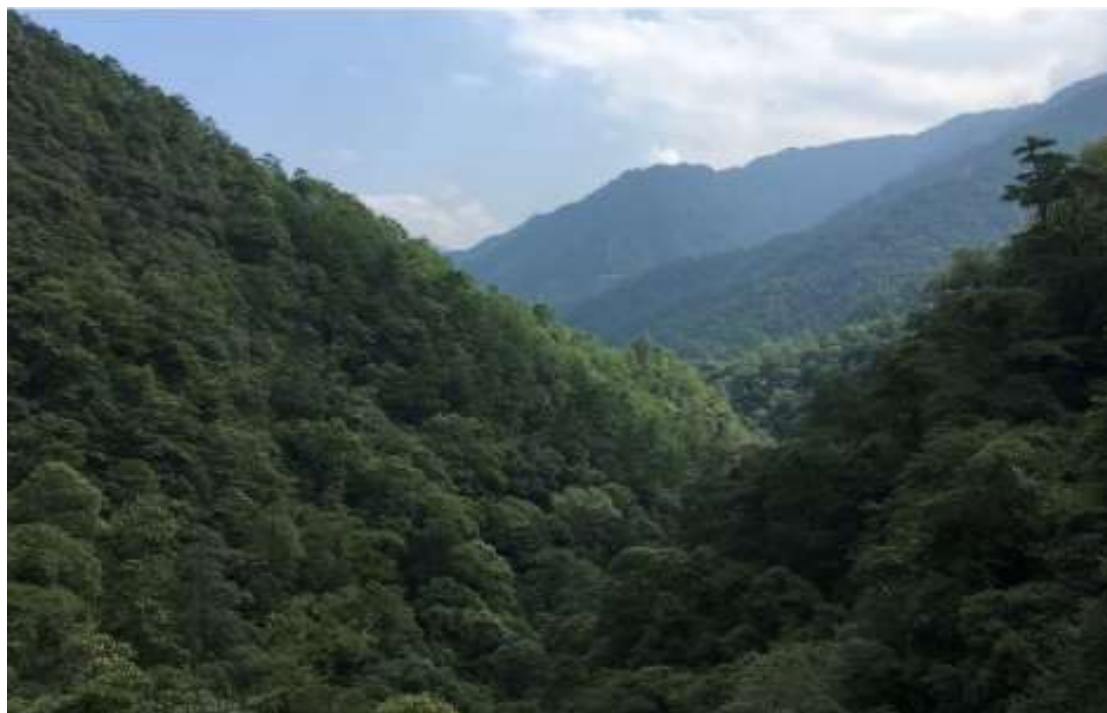


Figure 26 There have rich forest resources in the site. It is a natural gene bank for species and also a locality of biological model specimens.

(4) Adjusting climate and purifying environment. Because of the high ecosystem services of QFMCS, the site has pleasant climates, with no severe cold in winter, no heat in summer. The shading effect of forest crown and the transpiration effect of forest growth can regulate the temperature, humidity, evaporation, transpiration and rainfall of the region. Forest absorbs carbon dioxide through photosynthesis, fixes carbon in the atmosphere, produces organic matter and releases oxygen at the same time, which is also an important mechanism of atmospheric balance of the earth system. Forests also plays an important role in improving negative oxygen ions in the air. The annual average of negative oxygen ions in *Baishanzu* scenic spot is 7623/cm³, which is much higher than the average number of 2100/cm³ in other counties. Forests also have the function of environment purification, such as noise reduction, bacteria elimination, pollutant and dust absorption. Preliminary estimates show that each square kilometer of forests can fix about 3050 t/a of CO₂, equivalent to 830 t/a of pure carbon, and release about 2250 t/a of oxygen; each square kilometer of forests can absorb about 9 t/a of SO₂, purify 600 kg/a of nitrogen oxides and retain 1000 t/a of dust.

(5) Promoting nutrient cycling. Nutrient cycling is the basis for the survival and development of organisms in forest ecosystem. In the QFMCS, forests provide habitat

and nutrients for fungi, and fungi promote the nutrient cycling of the forests. Studies have shown that mycorrhizal fungi can form mycorrhizal symbiosis with more than 80% of tree species in the forests, which can improve the host's ability to absorb soil nutrients and affect the growth of forest plants. That is to say, mycorrhizal fungi plays an important role in the cycle process of carbon (C), nitrogen (N), phosphorus (P) of forest ecosystem. In addition, the mushroom dreg of substitute material cultivation can be made into feed for raising livestock or made into mushroom dreg fertilizer. The excrements of poultry and livestock as well as the mushroom dreg fertilizer can return to the farmlands to provide nutrients for the crops.

(6) Providing landscape and aesthetics value. The site has beautiful mountains and rivers, and rich natural landscapes, including *Baishanzu* natural reserve, *Jinzifeng* forest park, alpine wetlands, alpine meadows and others. The average annual temperature of *Baishanzu* natural reserve is 12.8°C and suitable for tourist. Because the mountains are high and fog, the sea of clouds has become a major landscape of *Baishanzu* natural reserve. In *Jinzifeng* forest park, there have a large number of pond, shallow, spring and waterfalls with different appearance. Meanwhile, there also have a lot of ancient villages, ancient bridges, ancient roads, ancient buildings, etc. in the site.

3 Local and Traditional Knowledge Systems

3.1 Natural Forest Conservation Techniques

The technical measures of natural forest conservation in the site mainly include closing hillsides to facilitate afforestation, intermediate cutting and stand improvement. Based on the principle of forest conservation, people carry out forest management activities and harvest various forest products at the same time.

Closing hillsides to facilitate afforestation technique: For *fengshui* forests around the villages or inaccessible areas in the site, the mountain area will be completely closed and all production activities are prohibited. Other forest land with a certain amount of well-grown trees species and high forest coverage rate will apply the semi-closed method. The mountains are closed and access is not allowed usually except in the particular season. At that time, people are able to go to the mountains for certain production activities in the premise of no damage to the forest, e.g. firewood cutting, grass cutting, mushroom and wild fruits picking.

Intermediate cutting technique: In order to foster suitable trees for mushroom cultivation, the thinning is exercised according to the stand density in forest management, and the tending of related tree species is carried out to meet the cultivation requirements of mushroom forest.

Stand improvement technique: For forests with few trees and serious pests and disease, the original trees are cut and the target species are planted under the crown canopy to form high-value broad-leaved forests or coniferous and broad-leaved mixed forests based on the canopy density of the stand, the area of the open space in the forests and the quantity and distribution status of the target tree species.

3.2 Mushroom Forest Management Techniques

Mushroom forest management techniques formed in the process of mushroom cultivation are coordinated development techniques of forest resource conservation and mushroom cultivation, including mushroom forest selection, mushroom tree selective cutting, mushroom forest management, mushroom tree planting and so on.

Mushroom forest selection technique: Firstly, *Gumin* select forests with fertile soil and appropriate temperature and humidity for the growth of broad-leaved trees, which can guarantee the harvest of mushrooms and the rapid renewal of tree species suitable for mushroom cultivation. Secondly, they select forests with proper tree species. In high altitude area, tree species such as *Castanopsis carlessi*, *Castanopsis hystrix*, *Santalum album* and *Liquidambar formosana* are selected. In low altitude area, tree species such as *Elaeocarpus decipiens*, *Castanopsis eyrei*, *Castanopsis tibetana* and *Castanea henryi* are selected. Because of the multiple choices for mushroom trees, *Gumin* are able to avoid the excessive cutting of single tree species.

Mushroom tree selective cutting technique: *Gumin* manage the mushroom forests by means of selective cutting. Considering the shade of crown closure of mushroom trees and the rotation of the mountain forests, the trees with the diameter at breast height of less than 12 cm are not allowed to cut by principle. The actual amount of timber cutting is controlled to below 15% of the total wood volume per unit area of the forests. Under such circumstance, the forest vegetation will not be destroyed and the upgrading of the forests is promoted objectively, which comply with the current code of forest harvesting (Figure 27).

Mushroom forest management technique: *Gumin* often climb on the trees and cut the large branches and then fell the trees to reduce the damage to the plants under the forests. When mushroom trees were felled, it would not be moved to avoid the damage to other plants and the shade trees would be reserved to control the forest canopy density. Because of above methods, a suitable forest environment for the growth of renewal tree species and mushrooms was created. Meanwhile, the washing effect of rainwater to the forest ecosystem is reduced and the rainfall interception of stand is enhanced. Furthermore, the trunks, branches and leaves of mushroom trees are left in the forests, which can increase the soil humus and promote the soil and water conservation.

Mushroom tree planting technique: *Gumin* always plant mushroom trees on barren mountains, open forest land or cutover land to develop the mushroom forest resources. The seedlings of mushroom trees used to plant are usually dug directly from mushroom forests with soil, and then transplanted to the growth site by *Gumin* in spring. Before transplanting, 1/3 of branches are cut off properly.



Figure 27 Trees with the diameter at breast height of less than 12 cm are not allowed to cut by principle. The actual amount of timber cutting is controlled to below 15% of the total wood volume per unit area of the forests.

3.3 Forest Utilization Techniques

In addition to cutting mushroom trees to cultivate mushrooms, *Gumin* also use other trees widely. The woods of *Pines*, *Cinnamomum camphora* and *Phoebe zhennan* are used to build houses or process into pots, buckets and other living utensils; miscellaneous trees are used to make charcoal for life heating; the barks of *Cinnamomum subavenium* are peeled to make cooking spices; the leaves or fruits of plants such as *Dendropanax dentigerus*, *Eurya japonica* and *Choerospondias axillaris* are picked to make all kinds of foods; bamboo woods are used to make daily necessities such as bamboo strips and weave, etc.(Figure 28).



Pine sink



Cinnamon



Dendropanax dentigerus



Huangguo



Fruit of *Choerospondias axillaris*



Jujube cake



Bamboo baskets



Bamboo fire cages

Figure 28 In addition to cutting mushroom trees to cultivate mushrooms, *Gumin* also use other trees widely to make daily necessities or all kinds of foods.

***Pines spp.* utilization:** Besides building *Gumin*'s shacks, pine wood is often used to bake mushrooms. Because pine wood contains natural oil and has a unique rosin flavor, mushrooms baked with it has a strong unique fragrance. In addition, *Gumin* use pine as a water tank to store water in mountain forests. Because pine responds quickly to the temperature, it is easy to swell, but it is extremely difficult to air-dry naturally, the water tank made of pine wood is durable and not easy to crack.

***Cinnamomum subavenium* utilization:** *Gumin* often peel the barks of *Cinnamomum subavenium* with the age more than 10 years and its phloem forming oil layer to make spices. When baking mushroom, *Gumin* usually put the bark on the wooden shelf to make it been dried and then store it. The bark is called cinnamon after drying.

***Dendropanax dentigerus* utilization:** In April and May, *Gumin* always eat the tender leaves of *Dendropanax dentigerus*. Tender leaves can be picked throughout the growth period and pickled before storage and used for cooking, soup, stuffing, dipping sauce and cold vegetable dish in sauce or served with noodles with enjoyable flavor.

***Eurya japonica* utilization:** *Gumin* usually take the juice of *Eurya japonica* leaves mixed with japonica rice and then steam them in a can. After that, the rice is poured into the mortar, hit with a hammer, until it is all fused like a cotton ball. *Gumin* cut it into small pieces, knead and press it into a round strip while hot, and then store for several months. As well as, some *Gumin* burn branches or leaves of *Eurya japonica* to ash, drain the plant alkali, and soak japonica rice with them to make *Huangguo*.

***Choerospondias axillaris* utilization:** The fruits of *Choerospondias axillaris* are usually eaten directly by *Gumin* or washed to make wine. Sometimes, the fruits are peeled skin and removed kernel, added some sucrose to be condense by boiling with soft fire, and then made into wild jujube cake after natural withering.

Bamboo utilization: *Gumin* often use bamboo slices to make various agricultural tools. The most common ones are bamboo baskets for mushroom picking and drying, bamboo fire cages for daily heating. Since the bamboo slices is easily made and woven, they are seen in the site commonly. There are also complex processes to utilize bamboo to make furniture. Bamboo chair is the common furniture here, which is made after bamboo cutting, drying, hole-digging, scraping and joint fixation.

3.4 Utilization Techniques of Resources under the Forests

The utilization of resources under the forests includes picking and eating wild fungi, as well as using the herbs, thus forming a special wild fungus identification methods and traditional medical knowledge in the site.

(1) Wild fungus identification methods

There are rich wild fungus resources in the forests. For non-toxic wild fungi, it is

needed to be boiled with fresh water and then cooked to avoid the intoxication when fresh-eating, or it can be dried and stored for use later. The medicinal wild fungi are usually dried and then used for wine or soup (Table 15).

Table 15 Common Wild Fungus Identification Methods

Identification elements	Toxic wild fungus	Non-toxic wild fungus
Growing zone	The fungus usually grows in wet, dark and dirty zone.	The fungus usually grows on the clean pasture, or on the pine trees, oak trees and other withered tree stumps.
Color	Bright in colors, including golden, pink, white, green, inkiness, cyanosis, purple (highly toxic), etc. Color will change after picking.	Natural color, mostly brown, pale purple or red without other mixed colors.
Shape	Weird shape, surface thick and stiff, ring on the fungus stem, fungus rod slender or thick and easy to break.	Surface flat and smooth without rings and no collarium on the lower part.
Secretion	Dense and brown, color of broken fungus surface easy to fade in the air.	Clear (white for some), no color fading for the broken part of the fungi surface.
Odor	Weird odor, smelling like potato or radish, often spicy, sour and stench.	Special fragrance, smelling like amaretto or fruits.
Other	The fungus does not attract birds, insects, mice and other animals, which means it is not edible.	

(2) Traditional medical knowledge

When *Gumin* get injured or sick in mountains, they are often treated with herbs from nearby forests, except for some valuable medicinal materials which are prepared by themselves and brought to shacks for reserve, thus a unique set of "*Gushan* Medical First-aid Method" has gradually been formed. The medicinal materials mainly come from the common herbaceous plant in forests. In addition, *Gumin* are easy to be bitten by poisonous snakes or insects when they go out, so they gradually form herbal remedies to treat pains caused by bites in mountains (Figure 29).



Figure 29 When *Gumin* get injured or sick in mountains, or were bitten by poisonous snakes or insects, the medicinal materials mainly come from the common herbaceous plant in forests.

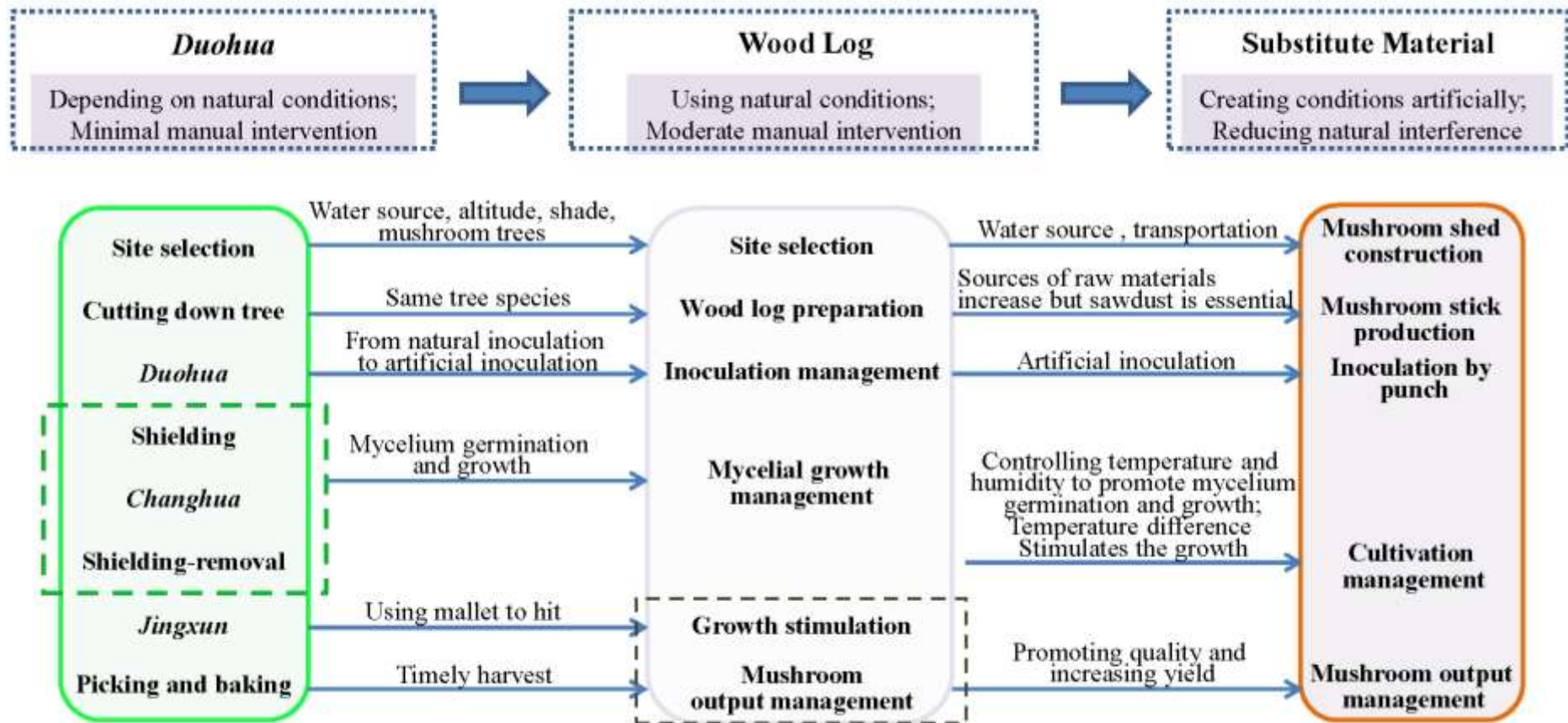


Figure 30 Evolution of mushroom cultivation techniques. Though wood log and substitute material methods based on artificial inoculation have improved the production efficiency greatly, they share the similar cultivation principle with *Duohua* method.

3.5 Mushroom Cultivation Techniques

The mushroom cultivation techniques in the site has successively experienced three development stages, there are *Duohua*, wood log, and substitute material methods. Though wood log and substitute material methods based on artificial inoculation have improved the production efficiency greatly, they share the similar cultivation principle with *Duohua* method. Ever to this day, *Duohua* method still play an important reference value for modern mushroom cultivation (Figure 30).

(1) *Duohua* cultivation technique

Duohua cultivation technique is a comprehensive technical measure, which can be divided into eight successive processes, including site selection, cutting down tree, *Duohua*, shielding, *Changhua*, shielding-removal, *Jingxun* (hitting mushroom tree), picking and baking (Figure 31).

Site selection: Site selection is to find a suitable forest for mushroom cultivation (Same as the mushroom forest selection technique). *Duohua* method relies on natural spore inoculation, and the cultivation process is completed in the forest, so the site selection is particularly important.

Cutting down tree: *Gumin* call mushroom tree as "*Qiang*". From solstice (late December) to early spring (early February), at the latest before Tomb Sweeping Day (early April), *Gumin* cut down mushroom trees with predetermined orientation according to the topography, eliminate excess branches, leave a small number of branches and tail branches, and then use them to cultivate *Xianggu*.

***Duohua*:** *Duohua* is to cut different depth and sloping slits by axe based on the specie, size, age of mushroom tree, and then natural spores fall in the scars and form mycelium to yield *Xianggu*, which is a key process of cultivating *Xianggu*.

Shielding: After *Duohua*, mushroom trees should be covered with a certain number of branches, leaves and other things to prevent the sun from exposure. This link is called "Shielding". Shielding can avoid excessive drying of mushroom trees, thus maintaining relatively stable humidity. Shielding should be evenly covered with moderate thickness, to shield sunlight, keep ventilation, maintain moisture, and let it germinate.

***Changhua*:** After a year, if the microenvironment is suitable, the mycelium will grow and develop faster, and a small amount of *Xianggu* grows on the mushroom trees, which is called "*Changhua*". But this kind of *Xianggu* is small and thin, *Gumin* intend to keep it, so that its spores and mycelia can extend to other mushroom trees nearby.

Shielding-removal: Two years later, at the beginning of winter or slight snow, mushroom trees began to produce *Xianggu*. The covering branches and leaves would be removed, so that the mushroom trees can increase oxygen content and stimulation of natural temperature difference to the mycelium, and then grow more fruiting bodies.

This link is called "shielding-removal". The harvest amount in this year accounted for 1/3 to 1/4 of the total yield in the whole cycle according to different tree species.



Site selection



Cutting down tree



Duohua



Shielding



Changhua



Shielding-removal



Jingxun (hitting mushroom tree)



Picking and baking

Figure 31 *Duohua* cultivation technique can be divided into eight successive processes, including site selection, cutting down tree, *Duohua*, shielding, *Changhua*, shielding-removal, *Jingxun* (hitting mushroom tree), picking and baking.

Jingxun: When some mushroom trees have better mycelium yet fail to produce *Xianggu* or the nutrition of them decrease in later period, farmers often use mallet to hit them, so that the mycelium in the mushroom trees is broken, and the oxygen demand of the mycelium is adjusted and improved, which can promote the formation of fruiting bodies and achieve the purpose of *Xianggu* production. This link is called "Jingxun". After hitting, it usually becomes effective in 7 to 8 days. If it still doesn't work, the next hitting will be ineffective.

Picking and baking: The key point of picking *Xianggu* is to be adept in watching the weather and pick at the right time. The key point of baking *Xianggu* is to control the time of duration and the temperature of heating, and checking carefully. This is also an important skill related to the quality of dry *Xianggu*.

Because *Duohua* method must be finished in forests, *Gumin* generally spend four to five months in mountains during the production period, namely from the beginning of December to the end of April of the next year (Figure 32).



Figure 32 Production rhythm of *Duohua* method

(2) Wood log cultivation technique

The invention of strain inoculation technique has promoted the mushroom cultivation technique to covert from relying on natural spore inoculation (that is *Duohua* method) to artificial strain inoculation. The initial artificial inoculation mushroom cultivation in the site was carried out on the wood log. Wood log cultivation refers to cutting the trunk into logs with the length of 1 m or 1.2 m, and then intensive mushroom cultivation are carried out on the logs. By changing the humidity, light, air, etc. of the mushroom cultivation site, the production efficiency of wood logs will be improved. The wood log cultivation technique consists of six processes (Figure 33).



Site selection



Wood log preparation



Inoculation management



Mycelial growth management



Growth stimulation



Mushroom output management

Figure 33 Wood log cultivation refers to cutting the trunk into logs with the length of 1 m or 1.2 m to cultivate mushrooms by artificial strain inoculation.

Site selection: The site should be flat dryland or hillside fields with an altitude of 400-800 m, part-gravel soil, natural shadow, and close to the water source.

Wood log preparation: The trees suitable for *Duohua* cultivation are also applicable for wood log cultivation. *Gumin* cut down the selected trees, removed the branches, cut the trunk into logs, and then deliver to the site for drying slowly.

Inoculation management: Before inoculation, wood logs should be sterilized to avoid the microbial contamination. The inoculation by punch is applied for the strains. After the strains are put into the hole, they should be sealed with paraffin or bark.

Mycelial growth management: Wood logs should be covered properly after being stacked in order to avoid the direct sunshine. The thick wood logs should be placed outside and the thin ones inside. The place and stacking way should be beneficial to ventilation, but wood logs cannot be placed in the draught. The stacking methods should

vary in accordance with seasons, terrain and temperature. Special attention should be paid to the temperature and ventilation, to avoid the moisture.

Growth stimulation: The stimulating methods of accelerating the fruiting body formation of mushrooms include soaking by water or sprinkling water, tapping log and stimulation by temperature difference.

Mushroom output management: According to the growth season of fruiting body, mushrooms can be divided into autumn mushrooms, winter mushrooms and spring mushrooms, and the management focus for different mushrooms is different. Generally, *Gumin* pick mushrooms on a sunny day, and harvest them in time when the fruiting body grows to six or seven mature. In case of a large number of mushrooms need to be picked, the mature and high-quality mushrooms are picked firstly. After picking, wood logs should be piled in the cross form with the height of 1.5 m and the spacing of above 10 cm, which is conducive to the next mushroom output.

(3) Substitute material cultivation technique

Substitute material cultivation is to use waste such as sawdust, bagasse, cotton seed hull and crop straws as main raw materials, combining with proper amount of wheat bran and rice bran, to make culture materials for mushroom cultivation, which can replace the traditional cultivation with woods as the main materials. It generally includes five main steps (Figure 34).

Mushroom shed construction: Mushroom shed should be built on dry wasteland, open land or rice fields with convenient transportation and abundant water resources. Local people often use China fir tail or small fir as the main skeleton, bamboo and bamboo tail as the upper-frame and ferns as the cover on the top.

Mushroom stick production and sterilization: Culture materials of substitute material cultivation are mainly composed of sawdust, bran, brown sugar and plaster according to a certain proportion. The sawdust is made of high-quality broad-leaved trees and the bran is byproduct of flour processing. When mixing and packaging to make mushroom stick, the plastic bag should be sealed tightly and the culture materials on the bag mouth should be cleaned. It is needed to be treated gently and check whether the bag is intact. After that, the bacteria in the mushroom sticks should be killed by high temperature.

Inoculation by punch: The inoculation will begin when the temperature of the mushroom stick drops to the point of not feeling hot. The time for inoculation should be as soon as possible in order to reduce the exposure time of culture materials, thus the invasion opportunity of other bacteria will reduce greatly.

Cultivation management: During this process, special attention should be paid to temperature and humidity control of shed, as well as ventilation of sticks.

Mushroom output management: After a long term of cultivation, fruiting bodies will come up after removing the plastic bags. Mushroom output management is to grasp the moisture content of the mushroom sticks, temperature, humidity and light of the shed, and coordinate the relationship between them.



Mushroom shed construction



Mushroom stick production



Sterilization



Inoculation by punch



Cultivation management



Mushroom output management

Figure 34 Substitute material cultivation is to use sawdust and crop straws, etc. as main raw materials to cultivate mushrooms by artificial strain inoculation.

In Qingyuan Forest-Mushroom Co-culture System in Zhejiang Province, the three methods of *Duohua* cultivation, wood log cultivation and substitute material cultivation complement each other. Their technical principles are derived from the same origin and develop iteratively, implementing the development concept of human-land harmony and forest-mushroom co-culture, and realizing the systematic circulation and sustainable development of forest conservation and mushroom cultivation. Also, the three methods have certain competition relationship through the comparison of market

benefits, but they have different positioning to meet the market demand of different levels. Because the earliest invented method of *Duohua* cultivation is a near-natural method, the mushrooms produced by this method have better quality and taste. This method has been inherited and used among local *Gumin*, but the yield of mushrooms produced by this method is relatively low. At present it is used only by *Gumin* or as a high-end product in the market circulation. Wood log cultivation is a semi-natural method, and the mushrooms produced by this method have higher yield and belong to the middle-end products. Substitute material cultivation is a production method of artificial nature, and the mushrooms produced by this method are characterized by high yield and common taste, which belong to the popular products.

Substitute material cultivation, like *Duohua* cultivation, realizes the circulation and balance of the agroforestry system. Firstly, it has lower raw material standard with more available tree species to be chosen and without limit on their size, which can be branches, dead wood and straw. Secondly, it has higher yield. Compared with *Duohua* cultivation which relies on natural spore inoculation, substitute material cultivation is changed into artificial inoculation, greatly improving the production efficiency, so that more mushrooms can be obtained from the same amount of wood. Thirdly, it can be used for a wide range of purposes. Unlike *Duohua* cultivation in which the mushroom woods rot on the spot and are returned to the forest, as for substitute material cultivation, after the mushrooms grow on the mushroom sticks, the residues can not only be processed into organic fertilizer for returning to the field and forest, but also can be used as feed and firewood, which can be recycled in multiple ways.

3.6 Forest-Mushroom Co-culture Techniques

(1) Forest-mushroom co-culture techniques of *Duohua* method

Forest-mushroom-forest pattern: There have abundant vegetation types in the site. Different vegetation types are suitable for the growth of different mushrooms. *Gumin* often pick *Poria cocos* and *Boletus* spp. under the *Pines*, and pick *Ressula* spp. under the broad-leaved forests. In this process, the forests provide growth environment and nutrients for mushrooms, and then mushrooms can accelerate the decomposition of organic matters, dead woods and litter to increase the nutrients of the forests.

Meanwhile, *Gumin* use *Duohua* method to cultivate mushrooms, but the trunks, branches, leaves and roots of the mushroom trees were left in forests for decomposition and rot. This method not only increases the soil humus and provides nutrients for the regrowth of trees, but also is beneficial to maintain the water and soil conservation functions of the forests (Figure 35).

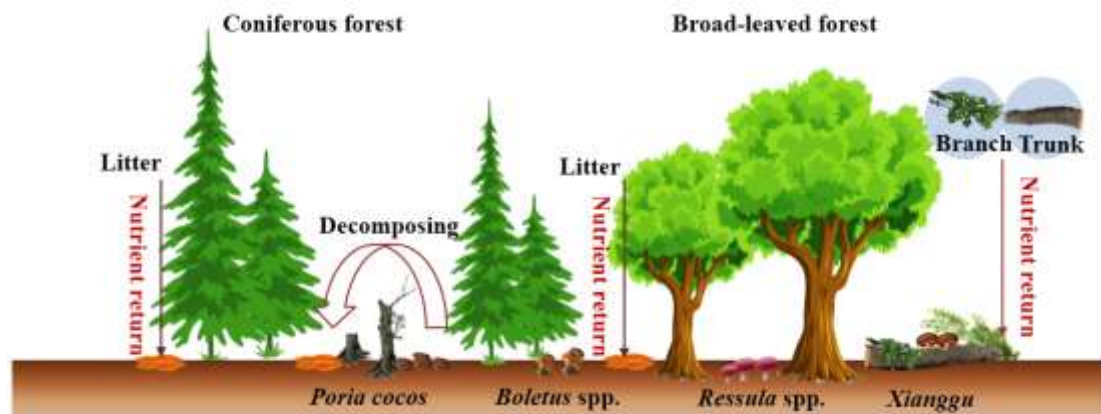


Figure 35 In the forest-mushroom-forest pattern, forests provide a growing environment and nutrients for edible fungi; edible fungi accelerate the decomposition of organic matter in the forests, which increases the nutrients in the forests.

(2) Forest-mushroom co-culture techniques I of modern cultivation method

Forest-mushroom-farmland pattern: In addition to cultivating mushrooms by forests, the litter of forests is also a good fertilizer for agriculture. *Gumin* do not have the custom of storing plant ash. In case of in need of fertilizer, they will carry the litter down the mountains, burn it into ash and then scatter it on the farmland, which can prevent the plant diseases and insect pests and enhance the soil fertility. When planting rice, the ash is directly scattered in the paddy field. When planting dry crops, the seed is sown and covered with ash before covering the soil. As for the straws of the rice, corn and vegetables on the farmlands, they will remain on farmlands by mulching treatment and then be chopped and buried in the soil to increase the soil organic matters when ploughing. After the introduction of artificial strain production technique, some of the crop straws can be chopped and mixed with sawdust, bagasse, wild grass and other matters to form culture materials for mushroom cultivation. After cultivation, some of the mushroom sticks can be recycled, and those that cannot be recycled can be returned to the farmlands as fertilizers (Figure 36).

(3) Forest-mushroom co-culture techniques II of modern cultivation method

Mushroom forest-mushroom-livestock breeding-farmland (economic forests) pattern: When farmers fell mushroom trees and use wood log or substitute material method to cultivate mushrooms, the residues of wood log cultivation are often returned to the farmland or used as firewood to bake mushroom. As for the residues of substitute material cultivation, some of them is recycled for mushroom cultivation, some of them for livestock breeding or organic fertilizers, and the rest for firewood. Meanwhile, *Gumin* will store the excrements of men, pigs, chicken, ducks and sheep, and then apply them as fertilizers of farmland or orchard to increase the soil nutrients. Crop straws will be used as the culture materials for mushroom cultivation (Figure 37).

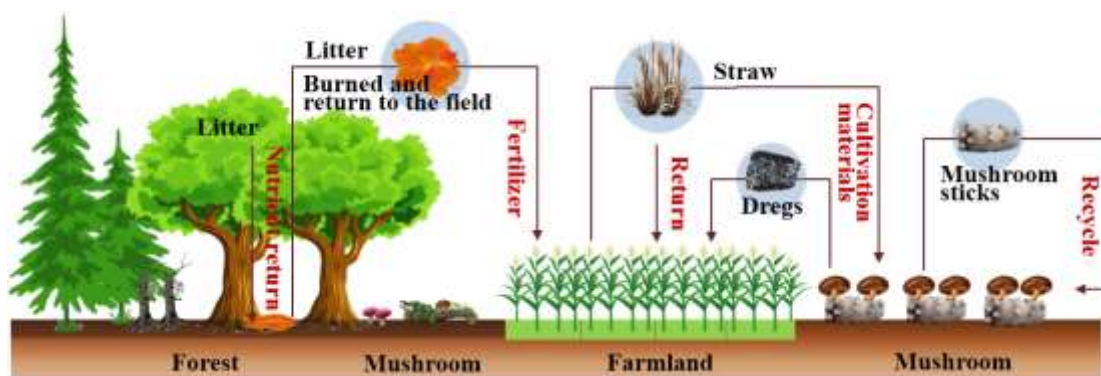


Figure 36 In the forest-mushroom-farmland pattern, forest litters are burned and spread on farmland. Crop straw can be mulched to increase soil fertility, or mixed into culture materials for mushroom cultivation.



Figure 37 In the mushroom forest-mushroom-livestock breeding-farmland pattern, woods and crop straws use as raw materials for mushroom cultivation. The remaining culture material can be used for mushroom cultivation again, or used as organic fertilizer, or burned to bake mushroom, or used as livestock feed to feed livestock. The excrements of livestock and poultry are collected and applied to farmland to increase soil nutrients.

The rich and diverse resource recycling modes formed by wood log cultivation and substitute material cultivation have realized the agroforestry use and sustainable forest management. Firstly, *Gumin* recycle the residues of mushroom cultivation. Residues of wood log cultivation are usually returned to fields and forests as organic fertilizers or used as firewood instead of wood. Part of the residues of the substitute material cultivation are recyclable and again used for the cultivation of mushroom, and the rest are used as livestock and poultry feed or organic fertilizer. The packaging bags of mushroom stick are also recycled to be made into plastic particles for secondary processing and utilization, so that the recycling of the bags are realized. Secondly, the diversity of mushroom tree species in the heritage site has been preserved. There are dozens of tree species in the mushroom forest, which are very rich. *Gumin* will fully

consider the type and scale of mushroom tree species when cutting, so as to avoid excessive cutting of single tree species.

4 Culture, Value System and Social Organization

4.1 Forest Ecological Culture

(1) Ecological view of forest and mushroom co-culture

The ecological view of forest and mushroom co-culture guarantees the stability and sustainable development of the heritage system.

Firstly, local people develop mushroom industry to make a living with forest resources and retain the original ecological environment of the forest to ensure its sustainable utilization and the sustainability of its function. Local people choose to cultivate mushrooms in the forests and formed a traditional forest conservation and mushroom cultivation skill, is not only the ability to make a living which considers the adaption to the forest environment, but also a core technique of understanding, adapting to and utilizing nature. What's more, it ensures the harmonious unity of forest ecology, agricultural ecology and human settlement environment.

Secondly, *Gumin*'s workplace embodies the simple nature view of Chinese traditional culture, which is "taking from nature and returning to nature". *Gumin*'s shacks for housing themselves and baking *Xianggu* and mushroom sheds for mushroom cultivation were built based on local materials, minimizing the use of modern materials such as steel rods and cement. After discarding, these materials will decay and degrade on their own, then return to nature, thus becoming a nutrient for the growth of trees.

Thirdly, during the process of cutting trees, *Gumin* strictly adhere to the principles of "cutting old trees while keeping new trees, cutting dense forests while leaving thinning forests, cutting at certain intervals, and rotating the mushroom forests", which reflects the superb ecological wisdom of harmony between human beings and nature.

(2) Worshipping *Shanshen* - a custom to protect forests

Shanshen means the god of mountain. The custom of worshipping *Shanshen* is a unique folk activity in the site, which shows the *Gumin*'s reverence and gratitude for mountains. Villagers live in the mountains for generations, on which all their basic necessities depend. *Shanshen* governs everything there, so local residents place great reverence as well as much hope and desire on him. This taboo, characterized by primitive belief, is beneficial to protect the forest resources (Figure 38).

(3) Acknowledging *Shuniang* - a custom of revering and getting close to trees

Acknowledging *Shuniang* means to take a tree as a mother. This custom has been prevailing up to now in the site, which is why many villages have a lot of century-old

trees. *Gumin* take mushroom cultivation as their principal works and treat trees with deep affection. They hope for trees' protection on children. In the thought of the villagers, old trees are antiquated and merciful and can keep children away from sickness and disasters, which help them to grow up healthily (Figure 39).



Figure 38 Worshipping *Shanshen* in the site. *Shanshen*, the god of mountain, governs everything there.



Figure 39 Acknowledging *Shuniang* means to take a tree as a mother. Villagers thought old trees can help children to grow up healthily.

(4) Sacrificing *Fengshui* forest - a custom for overall forest protection

Fengshui is a traditional ecological thought in China. *Fengshui* forest is the location where the villagers make home. Moreover, the forest is specially reserved by villagers of the proposed site to maintain a good ecological environment. For ecological safety, local people tend to build their villages near the dense forests, which can become the green barrier behind the village to conserve water, prevent soil erosion, purify air and beautify environment. There are many *Fengshui* forests in the site (Figure 40).

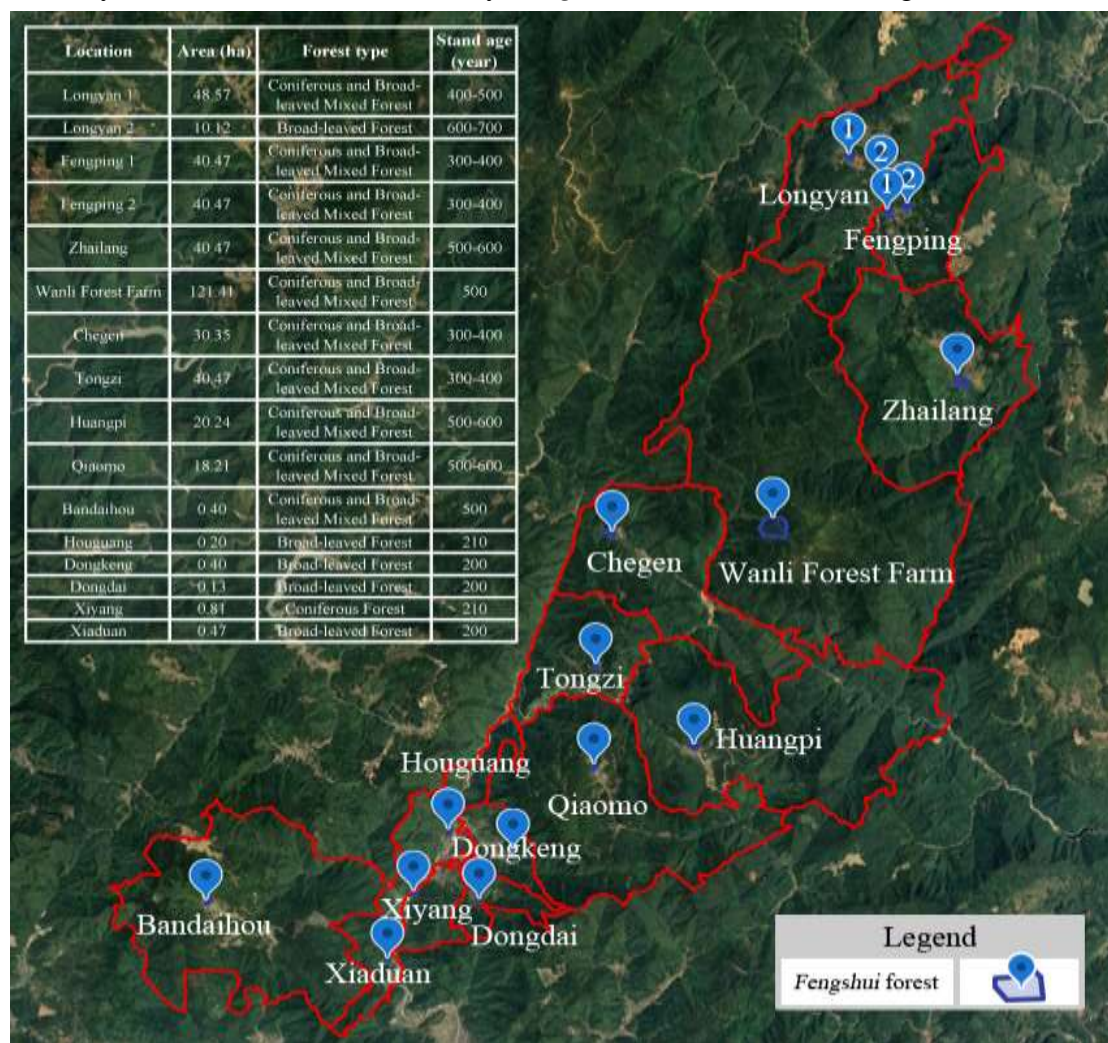


Figure 40 Distribution of *Fengshui* forests in the proposed site

Fengshui forest is reserved for the sake of maintaining a good living environment. Local people believe that it has the meaning of “auspiciousness” and “prayer”. It can also guarantee the clean and steady flow of the water (Figure 41). Both logging and grazing are prohibited in *Fengshui* forests. *Fengshui* forests are not only an ancient forest community and a gene bank of tree species resources, but also an important embodiment of the forest conservation consciousness of *Gumin*. Due to its meaning, everyone consciously protects *Fengshui* forests.

There are many local rules and regulations for the protection of *Fengshui* forests established by local people through long social practice. Firstly, the residents are not allowed to burn charcoal, cut firewood or saw wood in the *Fengshui* forests. Secondly, it is not allowed to raise livestock, especially cattle, sheep and other herbivores in the *Fengshui* forest, so as to prevent damage to undergrowth. Thirdly, it is not allowed to excavate building stones and dig soil in the *Fengshui* forest, so as to avoid to damage the original aboveground vegetation and landscape. The local residents have been consciously followed the above-mentioned rules and regulations, so that the forest resources in the site has been effectively protected.



Figure 41 *Fengshui* forests often locate on the water source where the trees grow densely. Local people believe it can become the green barrier of the village and guarantee the clean and steady flow of the water.

(5) Obtaining *Yinshu* - a custom for a good harvest of mushroom

Yinshu is a kind of tree for mushroom cultivation and means wealth in *Gumin*'s minds. Every year after breakfast on the first day of the first lunar month, *Gumin* go to mountains to obtain *Yinshu*. The size of *Yinshu* is unlimited. In order to protect the leaves well, *Gumin* digged and carried the tree on his back, go back and put it in front of the *Gumin*'s shack. The *Yinshu* is pasted with red paper around the trunk for a circle, placed until Lantern Festival, and then burned down. The ceremony implies a bumper mushroom harvest in the coming year and a rolling source of money. At the same time, the ceremony adds a festive and lively atmosphere.

4.2 Mushroom Culture with a Long History

(1) Belief of *Gumin* related to mushroom cultivation

A. *Gushen* Temple Fair. *Gushen* means the god of mushroom, namely Wu Sangong. *Gushen* Temple Fair held every year from July 16 to 19 of the lunar calendar is a major sacrificial festival for *Gumin* who go out to cultivate mushrooms. Because *Gumin* cultivate mushrooms in deep mountains from December to April and come back home in other times, migratory bird life leads them to have few festivals such as Spring Festival and Lantern Festival. *Gumin* must go to *Gushen* temple to thank god and offer sacrifices when they go out to cultivate mushrooms. The annual *Gushen* Temple Fair becomes the carnival after a year's hard work for *Gumin*. During the temple fair, thousands of *Gumin* jointly worship Wu Sangong (Figure 42). At the same time, they take the temple fair as an exchange opportunity to discuss major plans, carry out technical exchanges and theatrical entertainment, celebrate harvest, practice boxing and martial arts, meet relatives and friends and so on. In 2007, *Gushen* Temple Fair was included in the second batch of Zhejiang Intangible Cultural Heritage List.



Figure 42 *Gushen* Temple Fair is a major sacrificial festival for *Gumin* who go out to cultivate mushrooms. During the temple fair, thousands of *Gumin* jointly worship their ancestor Wu Sangong, who is also regarded as the god of mushroom (*Gushen*).

B. Greeting God Temple Fair. Greeting God is an important traditional folk activity in the site. It has been handed down for more than 600 years, and its importance is no less than the Spring Festival. Greeting God Temple Fair is held at a specific time of the

year, usually in early July each year around the Slight Heat, but the specific time of each village is different. The duration usually varies from two to four days, and there are as many as ten days and a half month. During this time, local residents carry all the gods in the Buddhist temple to the lobby of Greeting God Hall for worship, and then hold a grand sacrificial worship activity. After the ceremony of sacrifice and prayer, the gods are invited back to the Buddhist temple (Figure 43). This custom is a kind of sacrificial prayer for a year's good weather and prosperous grain. It also takes into account the functions of celebration, entertainment and cultural promotion.



Figure 43 Greeting God Temple Fair - carrying the gods. After the ceremony of sacrifice and prayer, the gods are invited back to the Buddhist temple.

C. *Gushan* Altar. *Gushan* Altar is a place where gods are worshiped in the *Gumin*'s shack when *Gumin* go up the mountains. Most of these gods are brought out from their homes by the principal of the shack, and the gods are placed in the center of the shack, facing the eastern door. In the middle is "the throne of the Great Emperor of the Five Immortal Officers", on the left is "the *Xiyang* Temple Wu Sangong", and on the right is "the National Master Liu Bowen"; there are also left and right writings such as "Land God for the Hill, *Qiwu* King of the Southern Upper Palace" or "Fortune boy, the God of Recruiting Money Every Day". There are also couplets and batches at the entrance of this kind of shacks. The arrangement of the god's position in shacks reflects the belief mentality of the *Gumin* in a specific historical period. *Gumin* have lived far away from home for generations in remote and deep mountains, in the face of difficulties, they

wish for God's blessings to protect them. Therefore, special attention is paid to the worship of gods on the altar. Among them, the Five Immortal Officers are the most widely worshiped gods in villages. Folk legend goes that this God commands all kinds of gods, disseminates production technique to *Gumin*, and blesses *Gumin* with auspicious seasons and plentiful clothes and food. Wu Sangong is the first one on the left and Liu Bowen is the first one on the right. Both of them are the gods revered by *Gumin*. The *Qiwu* king is the god who can subdue the world's poisonous insects and beasts. *Gumin* use its divine power to protect themselves from the poisonous insects and beasts. Then there is the *Shanshen*. The *Gumin* pray that he will bless the mushroom harvest and safety (Figure 44).

D. *Gumin* Incense List. *Gumin* have been following the custom of believing in *Gushen*. Almost every mushroom family has a shrine dedicated to Wu Sangong, the god of mushroom. On the top of the desk there is a list of incense. The ranking of the gods is similar to that of the *Gushan* Altar. Sacrifice activities are held on the 14th and 29th days of the lunar month (Figure 45).



Figure 44 Worship of gods in the shack. *Gumin* pray that gods will bless mushroom harvest and safety.



Figure 45 Incense list in *Gumin* family. On the top of the desk there is a list of incense showing the ranking of the gods.

E. Redeem a vow to a god and pray for blessings. There is a custom of redeeming a vow to a god and pray for blessings, which is a prayer activity for *Gumin* to go out to the mountain forests in other places. The event is held every other year, and the specific

date is chosen by folk diviner (Mr. *Yin* and *Yang*). When the auspicious day is coming, the folk diviner is invited to choose the time. As soon as the lucky hour arrives, the *Gushen* or incense burner in the temple is carried to the ancestral house of the village to let the *Gushen* "watch" *Gumin* Opera performance and pray for a good harvest for *Gumin* in the coming year. On this day, *Gumin* volunteered to pay money and food for the play and to make a large number of rice steamed bread distributed to the public, in order to show happiness and auspiciousness. The scenes are very lively, with the beating of gongs and drums resounding to the skies (Figure 46).



Figure 46 Redeeming a vow to a god and praying for blessings. The *Gushen* or incense burner in the temple is carried to the ancestral house of the village to let the *Gushen* "watch" *Gumin* Opera performance and pray for a good harvest for *Gumin* in the coming year.

F. Enshrining master in the *Gumin*'s shack. Wu Sangong is respected by *Gumin* for generations as the god of mushroom and master. Every lucky day of the 14th and 29th days of the lunar month, *Gumin* will devoutly worship Wu Sangong and hold sacrificial activities such as greeting god. This kind of ceremony is called enshrining master, or "*Fenggoudeng*". At the beginning of the ceremony, Wu Sangong is sacrificed in the shacks. Firstly, *Gumin* write "the most favorable auspices" on red paper and stick it on the incense table. On the table, they put an axe on the left and a chopper on the right, sprinkle a handful of rice, and burn pork with hot water. Then they put the pork on the incense table to invite the master to pray for a good harvest in that year. Secondly,

it is to place some sacrifices at the entrance of the shack gate to worship the gods, in order to seek the blessings of the gods. Thirdly, *Gumin* set up a flat shelf not far from the entrance to the shack corner, then put a bowl of rice and several pieces of meat on the wooden board to worship the souls of the mountain and pray for a good harvest. Fourthly, in the lower terrain under the trees or near the rocks outside the shack, three stones are used to build a platform for offering sacrifices to the mountain elf. The mountain elf is a "ghost" tabooed by all *Gumin*. They dare not neglect it, and dare not kill it. At the end of the ceremony, the head of the shack will sort clothes, wash hands, burn incense paper, then grab two handfuls of rice from the rice box with incense inserted with both hands. While scattering the rice around, he murmurs "go up the hills to cut trees, cultivate mushrooms, burn charcoal, travel, clean the table for dinner". Then all the *Gumin* in the shack say in chorus "we come". So far, the ceremony is over and *Gumin* can talk, do things, burn fire, or cut meat to improve the usual bland meals.

(2) Living customs formed by forest and mushroom co-culture

A. *Guodan*. When *Gumin* cultivate mushrooms in mountain forests, they not only worship the Wu Sangong in the shed, but also worship the gods in the Mountain Elf Temple, which commonly known as "*Guodan*" (Figure 47). At the mouth of the mountain about one or two miles away from the *Gumin*'s shack, three huge stones are superimposed, which is called Mountain Elf Temple.



Figure 47 Three huge stones are superimposed at the mouth of the mountain near the *Gumin*'s shack, which is called Mountain Elf Temple. When *Gumin* cultivate mushrooms in mountain forests, they also worship the gods in the Mountain Elf Temple.

B. Taking a *Guyu* bath. Every autumn when maple leaves drift away, *Gumin* have

a tradition of having a *Guyu* bath. On this day, every household of *Gumin* has to make fried glutinous pudding and kill pigs. Women should eat vegetarian and bathe. After bathing, people worship the gods in Wu Sangong Temple at the entrances of villages with fried glutinous pudding and meat, pray for *Gushen* to bless relatives.

C. Having farewell meal. Farewell meal is a diet with folk rituals. *Gumin* go to mountain forests on auspicious days with the numbers of three, six and nine. On the night before leaving home, the whole family have to eat a farewell meal. The farewell meal is presided over by the elder in the family. The elder burns incense, lights candles before the meal, and then pours wine and raises glasses to pray to the "Heaven" and "Nether World" and wish a good luck and safe return to home for *Gumin*.

D. Making *Qiyueban* steamed bread. *Qiyueban* steamed bread is a specific folk eating customs, instead of usual traditional food, it includes specific sacrifice function and worship time. On the fifteenth day of the seventh month of the lunar calendar, every family in the site has to make *Qiyueban* steamed bread, burn incense to worship their ancestors. The best glutinous rice is chosen and soaked in water, ground into paste and pressed to dry, then kneaded into the skin of the filling. There are many kinds of stuffing for steamed bread. One is steamed red beans mashed and mixed with brown sugar to form a ball; the other is sticky rice mixed with brown sugar; another is to mix brown sugar with dried bitter vegetables. *Qiyueban* steamed bread is white, crystal-clear, soft and refreshing, it is very popular among people, especially the elderly and children.

E. Taking fried glutinous pudding to mountains. The eating of fried glutinous pudding contains specific folk rituals and eating scenes, so it's not a normal traditional food. In the past, folk proverbs spread in villages include the lyrics of "making fried glutinous pudding to leave Zhejiang" and "making more fried glutinous pudding to go to mountains". This is a warning for *Gumin* to save money and prepare enough dishes before going up the mountains to cultivate mushrooms, when they leave their homes, they should bring more fried glutinous pudding to eat on the road. The quantity depends on the number of people going out and the distance. Usually, each person prepares 2-3 blocks a day, and the *Gumin* will have the pudding for three meals. Eating method is also very simple, in the morning and evening, *Gumin* put salt and add cabbage to cook it in water in the inn; at noon, they can gather firewood on the road and cook it.

F. Having *Wufan*. *Wufan* is a kind of rice mixed with black juice of a shrub called *Wufanlu*. Having *Wufan* on the eighth day of April in the lunar calendar is a folk custom in the site, which has a long history and is handed down from generation to generation. To make *Wufan*, people boil the leaves of *Wufanlu* in a pot, put its black juice into glutinous rice, add some lean meat and mushrooms and stir. After that, all of them can be cooked through gentle heat to form a unique black rice.

G. Keeping a *Gushan* dog. *Gushan* dog is a domestic breed and very loyal to its owner. It is often brought to mountain forests to guard the shack. *Gumin* live in forests and often encounter various dangers. When venomous snakes or beasts invade the living area at night, the alert and loyal *Gushan* dog will bark loudly to remind the owner and at the same time help the owner to drive and fight the beast (Figure 48).



Figure 48 *Gushan* dog, a domestic breed and very loyal to its owner, is often brought to mountain forests to guard the shack.

(3) Folklore art related to mushroom production and trade

A. *Gumin* Opera. *Gumin* Opera originated in the eastern of Qingyuan, which was called *Erdu* in ancient times, so it is also called *Erdu* Opera (Figure 49). *Gumin* Opera originated in the mid-*Ming* Dynasty (1436 A.D.-1566 A.D.). At that time, *Erdu* farmers depend on going out to cultivate mushrooms to make a living. The *Gumin* who went to Jiangxi, Fujian and other provinces learned arias from *Jiangxi* Opera and *Luantan* Opera from the local people. After adding some dialects of Qingyuan and through several generations of oral communication, an embryo of *Gumin* Opera was formed. After a long period of development, *Gumin* Opera was formed as a multi-aria plate cavity opera combining song, dance and drama, based on Qingyuan dialect as a basic language, with beautiful arias and distinctive local features. In 2007, *Gumin* Opera was included in the second batch of Zhejiang Intangible Cultural Heritage List.



Figure 49 *Gumin* Oper, also called *Erdu* Opera, a is a multi-aria plate cavity opera combining song, dance and drama, based on Qingyuan dialect as a basic language, with beautiful arias and distinctive local features.

B. *Xianggu Kungku*. *Gumin* use simple poles, sticks, axes and other equipment, combine traditional martial arts movements such as kicking, beating, wrestling, holding, falling, hitting, splitting, stabbing to form a martial art suitable for the mountainous environment attack and defense fighting, which called *Xianggu Kungku* (Figure 50). *Xianggu Kungku* is also known as self-defense skills of *Gumin*, which is an important part of the mushroom cultures. In the past, *Gumin* need to live and work in the mountain forests for nearly half a year. There were many tigers and leopards in the dense forests of southern China, which attacked people and animals. In addition, the mushroom has been regarded as a precious mountain treasure since ancient times. It is inevitably plundered by bandits and gangsters. Therefore, *Gumin* need to practice a set of self-defense skills in order to strengthen their health and self-protection, and *Xianggu Kungku* came into being as the times require. *Xianggu Kungku*'s tactics and forms are all the needs of *Gumin* for self-defense and self-protection.

The peak period of *Xianggu Kungku* belonged to the late *Ming* and early *Qing* Dynasty (1600 A.D.-1644 A.D.). At that time, there were competitions during the temple fair held every year in the *Xiyang* Temple, and *Gumin* came from far and near to participate in the competitions. In 2012, *Xianggu Kungku* was listed in the Intangible Cultural Heritage List of Zhejiang Province.



Figure 50 *Xianggu Kungku* is a self-defense skill of *Gumin*. *Gumin* combine simple equipment and traditional martial arts movements to form a martial art suitable for the mountainous environment attack and defense fighting.

C. Xianggu Folk Song. *Xianggu* Folk Song is chanted by *Gumin* in work or daily life, which is different from the *Gumin* Opera performed on stage. The lyrics of *Xianggu* Folk Songs usually have three aspects. Firstly, it is to express the mushroom production scene and bitterness or joy in labor. Secondly, it is to reflect the spiritual belief and life pursuit of *Gumin*. Thirdly, it is to sing the secret of mushroom techniques. Therefore, *Xianggu* Folk Songs are formed with the mushroom cultivation and spread with the expansion of mushroom trade. *Xianggu* Folk songs eulogize the history of mushroom cultivation, inherit the unique mushroom cultivation techniques, and show the *Gumin*'s inner pursuit and labor scene. They are rich in content, easy to understand and catchy and have been handed down by generations (Figure 51).



Figure 51 *Xianggu* Folk Song is chanted by *Gumin* in work or daily life. They are formed with the mushroom cultivation and spread with the expansion of mushroom trade.

D. *Gushan* proverb. *Gushan* proverb is a popular and easy-to-understand, concise phrase and rhyme widely spread among the people of the site. It mostly reflects the daily life of *Gumin* and the practical experience of mushroom cultivation. It is usually passed down orally. The hard life of mountain forests has sharpened generations of *Gumin* who take mushrooms as their industry. *Gumin* have continuously explored and summarized various experiences and lessons of mushroom cultivation in countless times of work from year to year, leaving behind many *Gushan* proverbs.

For example, "one-year-snow, three-year-rest", it means that if there is heavy snow in winter, the production of mushrooms will be reduced in future three years, because overwintering mushrooms will be frozen. "Removing shielding in the first year, the second year will be *Dangwang*, there are two peak periods in the third year, and there will be empty production in the fourth year", it means that there is only a little harvest in the first year, good harvest in the second and third years, and little harvest in the fourth year. This is a proverb about the production cycle of *Duohua*. "When the maple leaves fall, the husband and wife are separated; when the maple tree is budding, the husband returns home", this is a proverb reflecting the season of mushroom production. The husband goes out to cultivate mushrooms when the maple leaves fall in autumn and returns home from the mountain when the maple tree is budding in spring.

E. *Gushan* Dialect. It is a special language used in the daily communication between

Gumin in the site and other places, also known as "*Guliaobai*", "*Xunshanhua*" or "*Shanliaobai*". In ancient times, there was no "patent" law for intellectual property protection, and all technical inventions needed to be protected by their own defense. *Gumin* have regarded the method of *Duohua* as a divine teaching, only allowing the father and son to pass it on orally, strictly abiding by the outside world, violators will be scolded by god. Mushroom cultivation is the main means of livelihood for *Gumin*. In order not to make the *Duohua* technique be mastered by outsiders, a unique secret language "*Gushan* Dialect" has been created, which can only be understood by oneself. *Gushan* Dialect was produced on the basis of Qingyuan local dialect. Its language, vocabulary and grammar are basically the same as that of Qingyuan local dialect. Its main difference is the change of word meaning, which makes it very different from the local dialect of Qingyuan and makes it difficult for the non-local people to understand it. In the past, *Gumin* use *Gushan* Dialect for information exchange after going out. All *Gumin* could not only understand but also speak *Gushan* Dialect. Those who do not speak will be regarded as laymen who do not understand the rules of *Gushan* (namely mountain forests). Therefore, whether or not to speak the "*Gushan* Dialect" has become a "standard" to test whether the farmers are real *Gumin*.

F. Folklore about two huge *Cryptomeria fortune* trees. In front of Wu Sangong Temple in Longyan Village, there have two huge *Cryptomeria fortune* trees. The trees are said to be sticks and poles inserted by Wu Sangong. Later, two *Cryptomeria fortune* trees grew, one like a stick and one like a pole. As legend has it, *Gumin* in Longyan Village held sacrificial activities on August thirteenth of the lunar calendar every year, Wu Sangong would ride the black tiger to the ancestral temple to participate in sacrificial activities with *Gumin* and often leave tiger footprints in the fields.

G. Patent given by emperor. It's said that in the early *Ming* Dynasty (A.D. 1368), the mushroom was tribute to the founding emperor Zhu Yuanzhang (1328-1398) and received his great appreciation. The founding hero of the *Ming* Dynasty, Liu Bowen from Zhejiang, told the emperor Zhu Yuanzhang about the difficulties of *Gumin*'s livelihood and expected more support from imperial court. The emperor issued an edict of granting Qingyuan mushroom as a court tribute, granted Qingyuan the patent for mushroom production, and conferred Wu Sangong the title of "The Prince of Food and Soup". In the three years of *Wanli* in *Ming* Dynasty (A.D. 1575), the emperor again awarded Wu Sangong with the title of "The Judgment of the Government".

(4) Catering culture formed from agricultural and forestry products

A. Hundred Mushroom Feast. Hundred Mushroom Feast is a traditional banquet in the site. Local people always pay attention to the forest and mushroom co-culture and protect forest ecosystems well. Therefore, a large number of wild edible fungi grow in

the forest and people call them "Delicacies", which is the most precious local cuisine. Using a variety of wild edible fungi to make Hundred Mushroom Feast to entertain guests has been a long-term history for several hundred years in the site. The ancients had the custom of "no ingredients without bamboo shoots, no banquet without mushrooms". The Hundred Mushroom Feast with main ingredients of wild edible fungi adopts a variety of cooking techniques such as stewed, smoked, quick-fry stewed and steamed, with more than 200 flavors. The products are various and elaborate, excellent in taste, color, fragrance and shape. It has a light and pleasant south taste and a fresh fragrant and salty north taste (Figure 52).



Figure 52 Local people use a variety of wild edible fungi to make Hundred Mushroom Feast to entertain guests.

B. *Sheguo*. At every spring temple in the site, there has the custom of making a kind of local pasta, which is *Sheguo*. Every spring, in the fields and wet slopes, there is a kind of yellow-flowering herb growing everywhere, commonly known as *Shequ* (the scientific name is *Gnaphalium affine*). At the season of spring temple, the tender buds of *Shequ* first grow, women go to the field to pick, and then put in the mortar to be pounded into a viscous sauce, mixed with glutinous rice pulp and caked into pancakes, known as *Sheguo*. The color is emerald green, sweet and palatable. It can relieve cough and regulate *Qi* (Figure 53).



Figure 53 *Sheguo* is a kind of local pasta made from a yellow-flowering herb at the season of spring temple.



Figure 54 *Qingmingguo*, the egg-shaped rice balls with mixed ingredients, is made by local people every year in Tomb Sweeping Day (about early April).

C. *Qingmingguo*. Every year in Tomb Sweeping Day (about early April), local people all made *Qingmingguo* in the site. *Qingmingguo* has strong characteristics of forest cultures, composed of green coriander, tender bamboo shoots, mushroom diced, and shredded meat with related spice. After all raw materials mix and cook thoroughly, japonica rice is poured into and mixed evenly, then it is knead into egg-shaped rice balls, which is called *Qingmingguo* (Figure 54).

D. *Huangguo*. Every year in November and December of the lunar calendar, almost every household in the site has to make a necessary food - *Huangguo*. *Huangguo* is made of Japonica rice as the main raw material and alkaloids from the baking of *Eucalyptus* branches and leaves as the auxiliary material. It is made by washing, soaking, cooking, stamping and shaping in more than 10 processes. After making *Huangguo*, they are green and transparent in appearance, easy to store for a long time and easy to cook. It tastes chewy, fragrant and delicious (Figure 55).



Figure 55 *Huangguo* is made of Japonica rice and alkaloids by every household every year in November and December of the lunar calendar.

E. *Lixia* soup. Beginning of summer is one of the traditional 24 solar terms in early May. At that moment, *Gumin* have returned home from the *Gushan*. On this day, people will cook *Lixia* soup and greet their neighbors to share it (Figure 56). The cooking method of *Lixia* soup is simple. The glutinous rice is ground into water powder, then mixed with ground meat, bamboo shoots, dried cuttlefish and mushrooms, and cooked

in a large pot. Local proverb says: "taking the *Lixia* soup of 7 families, people will have most brilliant looks in later ages".



Figure 56 *Lixia* soup is a glutinous rice soup people drink at the beginning of summer in early May. Locao people believe that having *Lixia* soup can bring good lucky.

F. *Sunzong*. *Sunzong* is a flavored food and can best embody the characteristics of mountain forests in the site. Because there has a large bamboo forest, so fresh bamboo shoots can be collected every year. This is the raw material for making *Sunzong*. It is called *Sunzong* because of the use of bamboo shoot oil in its production. Bamboo shoot soup will be condensed into gelatinous form by boiling, which is bamboo shoot oil. When making, the glutinous rice is washed and mixed with a proper amount of bamboo shoot oil to make the rice soak as much as possible. Then it is wrapped with bamboo shoot shell and boiled in a pottery stove for one day and one night. After being cooked, it is delicious and loved by people (Figure 57).

G. *Xiaomei*. *Xiaomei* is an indispensable snack at the banquet in the site, which is made of sweet potato flour mixed with lard and sugar. The cooking method is to fry sweet potato flour in a pan, sprinkle with sugar, add pure lard and stir evenly, and then knead it hard into small round balls, put it in the plates to be steamed. *Xiaomei* is shaped like plum, and that is the source of its name. After steaming, a transparent film is formed on the surface of *Xiaomei*, which is smooth, while inside it is crisp and soft, sweet and delicious. It is a unique local famous snack in the site (Figure 58).



Figure 57 *Sunzong* is a flavored food and can best embody the characteristics of mountain forests in the site. It is called *Sunzong* because of the use of bamboo shoot oil in its production.



Figure 58 *Xiaomei* is an indispensable snack at the banquet in the site, which is made of sweet potato flour mixed with lard and sugar.

(5) Traditional farm tools suitable for agricultural production

Farming tools serve as the historical witness of the farming cultures in the site. Most of the farm tools listed below have been replaced with modern production tools. Some of them can be seen occasionally as collections of *Gumin*.

A. Mushroom production tools. They are used for mushroom cultivation, including *Duohua* axes for chopping slits in bark to facilitate the growth of spores, hand saws for sawing thin wood, wood choppers for removing excess branches of trees, mushroom baskets for picking mushrooms, large bamboo baskets for transporting and storing mushrooms, sieve baskets for sunning fresh mushrooms picked and for drying them in a *Gumin*'s shack, and other common tools (Figure 59).



Duohua axe



Hand saw



Wood chopper



Mushroom basket



Bamboo basket



Sieve basket

Figure 59 Tools used for mushroom production commonly

B. Agricultural production tools. The first category is land preparation tools used for plowing, breaking soil, leveling ground, weeding and so on, such as plows used for breaking soil clods and plowing out furrows, harrows for leveling paddy fields after plowing, and hoes for farming, weeding and loosening soil. The second category is planting tools used for transportation, transplanting and fertilization, such as seedling clamps used for transporting vegetables or other seedlings from dry fields, rice seedling transplanters for transplanting operation, and fertilizing pots for carrying farmyard manure. The third category is crop harvesting tools, such as sickles for weeding or reaping, threshing buckets or threshing machines for separating paddy from stalks, grain sieves for removing stems, leaves, weeds, etc. from paddy, rice hullers for removing chaff of grains of rice, and grain blowers for grain cleaning (Figure 60, Figure 61).



Plow



Harrow



Hoe



Seedling clamp



Rice seedling transplanter



Fertilizing pot

Figure 60 Tools used for agricultural production commonly (1)

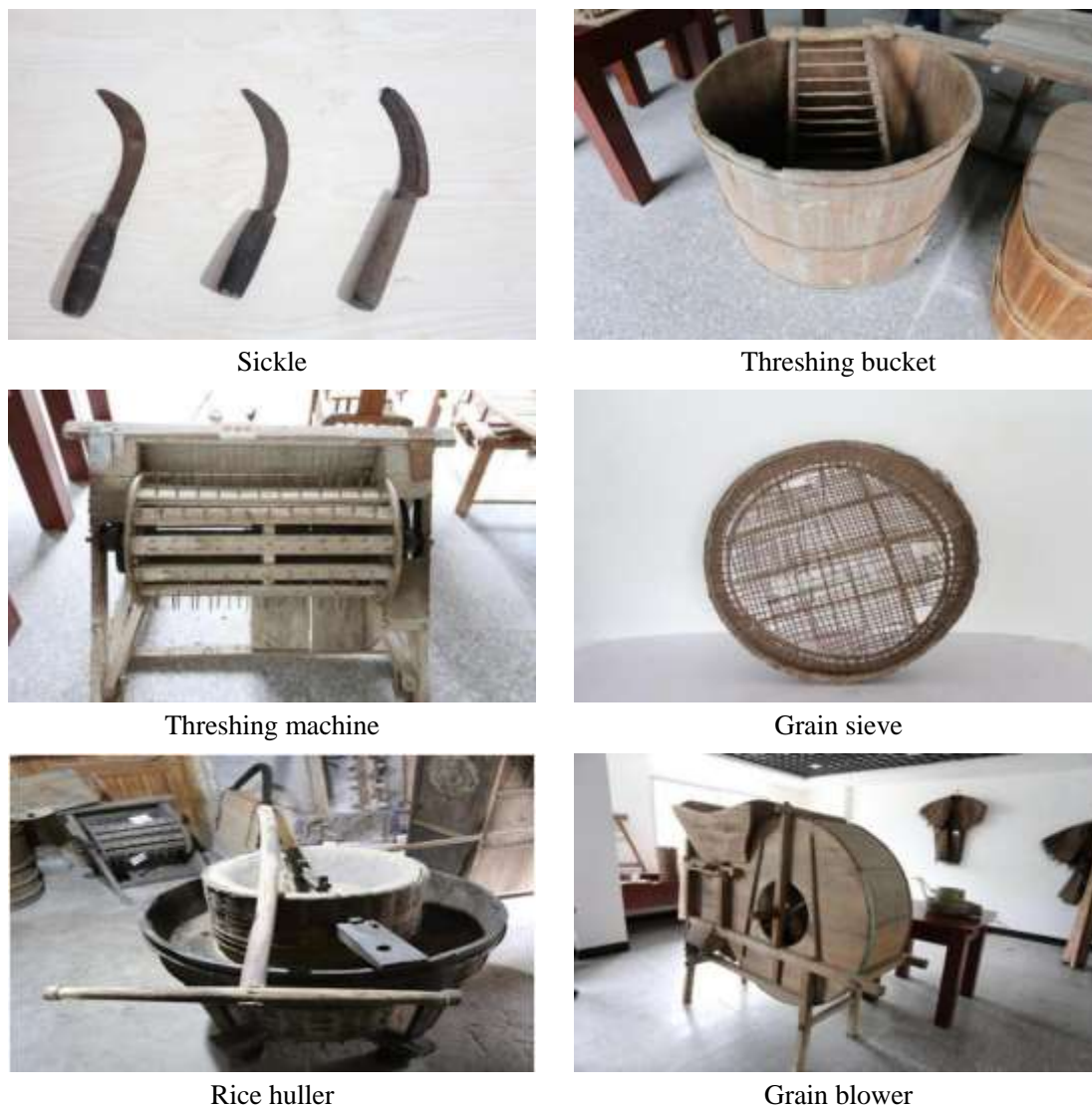


Figure 61 Tools used for agricultural production commonly (2)

(6) Cultural relics bearing the culture of forest and mushroom co-culture

A. *Gushen* temple. It is a place to worship *Gushen* and gathering site for *Gumin*. *Xiyang* Temple in the site, the largest *Gushen* temple in China, is located on the bank of *Songyuan* River in *Xiyang* village, adjacent to *Lanxi* Bridge. It is a memorial building built by ancient *Gumin* to commemorate Wu Sangong (Figure 62). Founded in the first year of *Xianchun* in the *Song* Dynasty (A.D. 1265), after several changes, in the first year of *Guangxu* in the *Qing* Dynasty (A.D. 1875), it was rebuilt by *Gumin* from Qingyuan, Longquan and Jingning counties. Most *Gumin* go to the *Xiyang* Temple to worship Wu Sangong when they leave home, praying for a good harvest, peace and prosperity, and a safe return to home. Today, the *Xiyang* Temple is the symbol of the "Source of *Xianggu*". Every year, from the July 16th to 19th of the lunar month is the

period for farmers to pay tribute in the *Xiyang* Temple. The *Gumin* from surrounding townships gather here to worship. In 2013, *Xiyang* Temple was included in the Seventh Group of National Key Cultural Relics Protection Units.



Figure 62 *Xiyang* Temple is the largest *Gushen* temple in China. It is a memorial building built by ancient *Gumin* to commemorate Wu Sangong. Today, the *Xiyang* Temple is the symbol of the "Source of *Xianggu*".



Figure 63 Wu Sangong Ancestral Temple, located in Longyan Vallige, was built by *Gumin* to

commemorate their ancestor Wu Sangong.

B. Ancestral temple. Ancestral temple is a sacred place for ancestor worship. Clans usually make the most of their financial and material resources to build magnificent ancestral temples with high-quality wood and stone. The ancestral temples in the site includes two categories: clan ancestral temples and memorial temples of historical celebrities. There are a large number of ancestral temples, which are widely distributed in the site. The famous ancestral temples include Ancestral Temple of Wu Family in Huangpi village and Wu Sangong Ancestral Temple in Longyan Village. Wu Sangong Ancestral Temple was built by *Gumin* to commemorate Wu Sangong (Figure 63). *Gumin* regularly offer sacrifices and carry out activities in Wu Sangong Ancestral Temple, celebrating the harvest through temple fairs, and praying for a bumper harvest in the coming year, and then forming a unique temple fair culture.

C. Langqiao. The site is surrounded by mountains and winding streams. *Gumin* built a large number of *Langqiao*, not only helps to facilitate the crossing of the river, but also provides shelters for passers-by. *Langqiao*, also known as Roof Bridge and wind-rain Bridge, is a special bridge formed by building gallery houses on the bridge deck, which is divided into three categories, including wooden arch, flat beam and stone arch. Among them, wooden arch *Langqiao* has scientific structure, beautiful shape, which is a wonder in the classical architectural art, and a unique category in the history of bridges in the world. *Langqiao* is not only exquisite in bridge construction technique, but also has a wide range of practical functions and profound cultural connotations. Most of the funds for building and repairing bridges are mainly derived from *Gumin*. The precipitation in the site is extremely abundant, the closed bridges body not only shelters the rain from *Gumin* who go up hills or return home, but also provide the places for mushrooms trading. In addition, there are shrines to enshrine *Gushen* and other gods in the middle of the bridge for *Gumin* to worship. When *Gumin* go out to cultivate mushrooms or return home, they often go to this place to offer sacrifices. In 2009, “Traditional construction technique of Chinese wooden arch *Langqiao*” was included in the UN’s first batch of *List of Intangible Cultural Heritage in Need of Urgent Safeguarding*, and Qingyuan County is one of the specific areas declared. In 2013, *Lanxi* Bridge and *Huangshui* Long Bridge (Figure 64) in the site were announced as the seventh group of the National Key Cultural Relic Protection Units in China.

D. *Gumin*’s shack. At the stage of waiting for the growth of mushrooms and baking mushrooms, *Gumin* need to live in the remote mountains for at least half a year. For this reason, they usually build simple shacks with stoves, beds, drying rooms and shrines with bamboo, wood and thatch as raw materials. Such a temporary residence is called a *Gumin*’s shack (Figure 65), also known as the second home of *Gumin*. With the

passage of time, *Gumin's* shacks have gradually evolved into a cultural landscape, witnessing the development of the mushroom cultures.



Figure 64 *Langqiao* (Corridor Bridge) formed by building gallery houses on the bridge deck. *Gumin* built a large number of *Langqiao* to facilitate the crossing of the river and to provide shelters for passers-by in the site.



Figure 65 *Gumin's* shack is *Gumin's* temporary residence at the stage of waiting for the growth

of mushrooms and baking mushrooms.

4.3 Cultural Characteristics of QFMCS

(1) Nature worship of animism

Nature worship is a behavior that consider natural things and natural forces as objects with life, will and great abilities and regard them with awe and belief. In ancient times, when facing incomprehensible natural phenomena, people felt alarmed at first and then worshiped them piously. Further, they prayed for god's blessings. Gradually, people formed their endogenous consciousness of observing the world and revering the nature, and *Gumin* were no exception in the site.

Gumin believe that everything has spirit, so they have the custom of worshipping *Shanshen*, acknowledging *Shuniang*, sacrificing *Fengshui* forest, etc. They explain natural phenomena by these cultures and customs, and construct the interactive relationship between human and the environment. In addition, they strengthen the collective consciousness of respecting and protecting forests through customs and ceremonies of mountain forest protection. Besides, the way of treating mountain forests by *Gumin* is regulated by local rules. Finally, they pray for god's blessings through sacrificial ceremonies in order to ensure the source of livelihood, safety and health.

(2) *Gushen* worship derived from people's gratitude to ancestors

Gushen worship is a major part of mushroom cultures in the site. The manifestation of *Gushen* worship is mainly composed of customs including god thrones, god temples, sacrificing *Gushen* and *Gushen* Temple Fair. The worship is entwined with the production and living environment of *Gumin* and has a variety of functions such as prayer for blessings, moral pursuit, behavior restraint and order maintenance. *Gumin* live in a harsh environment and need to seek psychological dependence, so they hope *Gushen* to bless them. Once this belief is formed, it is passed down as a custom.

In the past, *Gumin* cultivated mushrooms in remote mountains for a long time and exchanged them for food and daily supplies. They thought that cutting down the trees to cultivate mushrooms was a gift from the gods. And it was their ancestor Wu Sangong that sent them blessings on behalf of the gods. Therefore, Wu Sangong was regarded as the "God of Mushroom" by *Gumin* (Figure 66), and the *Gushen* temple was built as a special place of worship. Their vague understanding of mushroom cultivation technique explained why they are so devoted to Wu Sangong. With time going by, this piety forms the worship of Wu Sangong and lasts till now.



Figure 66 Wu Sangong, a native of Langgyan Village, was ranked third, and so his nickname was Third Wu. Also because he invented the *Duohua* technique, Wu was honored as the god of mushroom.

(3) Technique improvement sticking to forest and mushroom co-culture

The identification and ingestion of wild edible fungi have promoted the development of human civilization. The mushroom cultivation technique in the site is constantly innovated, reflecting the historical process of advancing with the times and developing in a coordinated way. The technical inheritance and innovation of QFMCS from the utilization of wild edible fungi to the artificial mushroom cultivation through *Duohua* method, and then wood log and substitute material methods, has always adhered to the thought of "harmony between man and nature and reverence of nature".

The *Duohua* method showed the beginning of the artificial mushroom cultivation. After the invention of strain inoculation technique, the cultivation experiments of wood log and substitute material methods were carried out in the site to resolve the problems of scattered sites and low production efficiency of *Duohua* cultivation technique. In particular, the substitute material method, which comprehensively uses the forest logging residues, waste wood, thinning wood and so on, represents another technical leap of mushroom production. It leads to the green, pollution-free and recyclable production of mushroom, thus promoting the co-evolution of economy, society and ecology of traditional agricultural production system.

(4) Village rules and regulations handed down by generations

The village rules and regulations passed down by generations in the site maintain the social order, social public morality and village customs, and regulate the villagers' behaviors. In the organization and management of villages, ancestors emphasized the protection of ecology, and almost every village has its own rules and regulations. For example, you have to kill your own pig for all the villages to eat if you cut woods in mountains or you must dig bamboo shoots within the time allowed, besides, you should set small fish free when fishing and do not catch birds when they brood eggs, etc. *Gumin* live in harmony with various animals and plants, forming a simple thought of ecological protection and awareness of sustainable use of environment resources. When *Gumin* move to other places to cultivate mushrooms, there is a rule of "three no", indicating no poison, no bird gun, and no killing, which is the code of conduct and the criterion of value that *Gumin* of all dynasties abide by jointly.

These rules and regulations handed down by generations have left the living space for animals and plants, and also effectively protected the ecological environment, profoundly reflected the simple ecological protection thought of the ancestors. For thousands of years, the way of life of cultivating mushrooms under the forests and farming beside the forests has avoided large-scale deforestation, reduced or even put an end to soil erosion in mountain areas, and created a sustainable development mode of forest and mushroom co-culture.

4.4 Social Organizations Adapting to System Development

(1) *Jinshan* association and protection regulations to protect forest resources

Jinshan means "closing hillsides to facilitate afforestation". In order to ensure the growth and breeding of forest trees, regulations such as prohibiting logging and grazing in the mountains have been formulated. In the past, there has a *Jinshan* association for the purpose of protecting forests in the site. In the early 20th century, the association was renamed "Local Forest Protection Association". Some villages set up their own association respectively, and some jointly set up one. In generally, senior villagers who are of virtue, prestige and justice are elected to make up the associations, and a lot of activities are held every year, such as *Jinshan* shows, publicity of *Jinshan* agreements, posting of forest protection notices and punishing violators, aiming to promote the villagers to abide by the rules together and consciously protect the forests.

The *Jinshan* association is responsible for the maintenance of trees around ancestral temples, temples, schools, roads, bridges, and other places in the village, as well as the prohibition against logging and grazing in the forests. The *Jinshan* association has formulated a *Prohibition Agreement* and a *Notice* to restrict villagers' behavior. The management is very strict and violators will be punished according to the regulations.

Sometimes, publicity methods such as beating the gongs, killing pigs and having special meals are used for conservation. Many of the existing *Fengshui* forests, official road shelter belts, scenic forests, and ancient and famous trees in the site are the fruits of closing hillsides to facilitate afforestation by the predecessors.

Today, the forest protection has evolved from the spontaneous nongovernmental *Jinshan* association to the laws and regulations of forest protection formulated by the state. In 2019, the *Forest Law of the People's Republic of China* revised and published, which stipulates that the strictest legal system should be implemented to protect forests, trees and woodlands according to the principle of ecological priority.

(2) *Gumin's* self-governing organization to safeguard their interests

The earliest mushroom industry organization in Chinese history is “*Sanhe* hall”. This *Gumin's* self-governing organization, elected by *Gumin* in the community, is usually composed of the local respected township leaders, elites, skilled craftsmen, and other representative figures. They are responsible for safeguarding the interests of the *Gumin* and the production order of the mushroom industry, supervising and regulating the irregular deeds and norms, and performing the governance power of the mushroom industry organization. Every July of the lunar calendar, representatives of *Gumin* gather in *Maokengkou* of Jingning County to discuss and confirm matters related to the sales of mushrooms in the year. The existing Mushroom Public Office in *Maokengkou* covers an area of 3 *mu*,



Figure 67 *Sanhe* hall is the earliest *Gumin's* self-governing organization.

revealing the prosperity of the mushroom industry at that time. “*Sanhe* hall Monument” (Figure 67) and words of “Mushroom Public Office” on the outer wall of the house witnessed the supreme power of the mushroom industry organization. Afterwards, most of the mushroom industry organization’s activities were held during the period of temple fair held in *Xiyang* Temple, because this temple fair became a must-go pilgrimage place for *Gumin* gradually.

In 1896, Zhejiang Mushroom Industry Guild Hall, the earliest mushroom industry

organization in the form of modern civil society, was established in Jian'ou County, Fujian Province. In the early 20th century, with the increasing market awareness of *Gumin* and the expansion of mushroom trade, organizations such as “*Gumin*'s Townsmen Association” and “Mushroom Industry Guild Hall” were successively set up as liaison centers of *Gumin* from Qingyuan scattered all over the country. If their production, life and property are damaged, they can appeal to the “Mushroom Industry Guild Hall” and obtain legal aid.

(3) Trading places responsible for mushroom sales

Mushroom guild is a trading places responsible for mushroom sales, which has played a special role in the long history of mushroom development in Qingyuan County. The mushroom guild is a mutually beneficial organization between *Gumin* and businesses. With a wide range of sales channels in selling products, it can solve difficulties and problems for *Gumin* and has a certain reputation among *Gumin*. Mushroom guilds have an interest relationship with *Gumin*, both of them can obtain corresponding interests by each other (Figure 68).



Figure 68 Mushroom guild is a trading places responsible for mushroom sales, and also a mutually beneficial organization between *Gumin* and businesses.

In the first half of the 20th century, the mushroom guilds founded in other provinces by Qingyuan County played an important role in organizing mushroom production and communicating sales channels. According to documentary records, Qingyuan County set up more than 100 mushroom guilds all over the country from 1941 to 1949, with more than 310 reception rooms. These guilds provided convenient accommodation and

trade for mushroom framers when they travelled between mountain forests and trading places. Usually, during the mushroom harvest season in November, local mushroom guilds can advance some funds and travel expenses for the economically disadvantaged *Gumin*, as well as prepare meals and beds for them internally, so as to enhance the relationships with the farmers, stabilize the supply of mushrooms, and ensure the benefit of both the production and marketing of mushroom.

Qingyuan mushroom market built in 1991 is a historical continuation and sublimation of the mushroom guild. The market is mainly engaged in mushroom trade, with more than 30 mushroom series products such as *Lentinus edodes*, *Auricularia auricula*, *Grifola frondosa* and *Boletus Edulis*. It is the largest specialized wholesale mushroom market in China and the largest refrigeration center for agricultural and sideline products in southwest Zhejiang Province. In 2015, new market was officially put into operation and mushroom industry of Qingyuan was at a new starting point.

At present, there are two main types of social organizations in the heritage site. One is the self-governing organization of farmers, such as mushroom planting and managing cooperatives and villagers' committees, mainly responsible for regularly collecting of farmer's information and demands for the government, and transmitting government's policy support messages to solve the problems of the farmers. The other is some professional social organizations, such as edible fungi association, mushroom research association, export agricultural products enterprise association), mainly responsible for safeguarding the interests of mushroom people, managing the industry order and supervising the production specifications and other responsibilities (Figure 69).



Figure 69 Congress of Qingyuan edible fungi association

5 Landscape Features

5.1 Landscape Created by the Unique Geographical Environment and Production Methods

High mountains and dense forests are widely distributed in the site, and mushroom cultivation is the main means of livelihood for local people. The unique geographical environment and the corresponding production methods together formed a unique landscape of forests around the villages, rare croplands, dense streams, mushroom cultivation under forest or surrounding villages.

The site is located in *Donggong* Mountain Range of Fujian-Zhejiang hilly area along the southeastern coast of China, with lots of precipitous mountains, deep valleys and steep slopes. Its average altitude is approximately 1000 m and slopes of most mountains are above 30 °(Figure 70).

The site belongs to the middle subtropical zone and has a warm and humid monsoon climate, with abundant rainfall, no severe cold in winter, no extreme heat in summer, many streams in mountains, rich water and fertilizer in soil. And it is also located in one of the regions with the most abundant fungus resources in the world. Benefiting from the superior climate, soil and other geographical environment, the site is rich in subtropical evergreen broad-leaved forests and fungus resources. Moreover, due to the closed environment and unfavorable reclamation caused by high mountains, the local forests are still well preserved even under the continuous enhancement of human activities, which provides unique natural conditions for this heritage system.

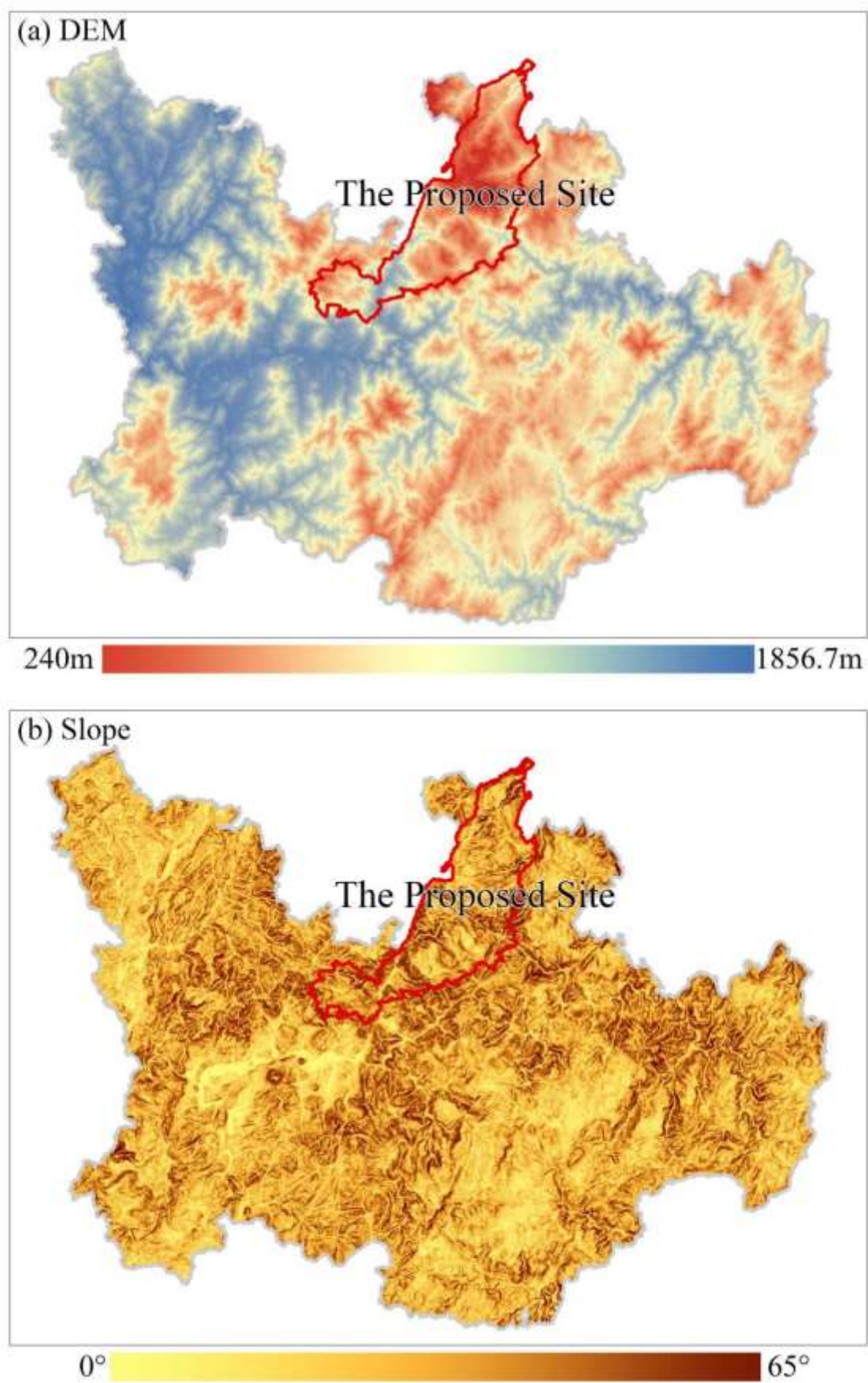


Figure 70 Topographic maps of the site (a) DEM; (b) Slope

The steep mountains lead to the lack of arable land, which restricts the development of traditional agriculture, but promote the local villagers to go to the forests for mushroom cultivation objectively. Local people build villages near the forests and rivers, cultivated mushrooms in the forests or beside the villages. Thus, the landscape patterns of fields in forests and villages in fields was gradually formed, which has the macro characteristics of "90% of the area is covered with mountains, 5% with water and 5% with field" (Figure 71). Meanwhile, local people pay attention to the protection of forest resources while cultivating mushrooms, which makes the landscape pattern of the site basically unchanged for thousands of years.

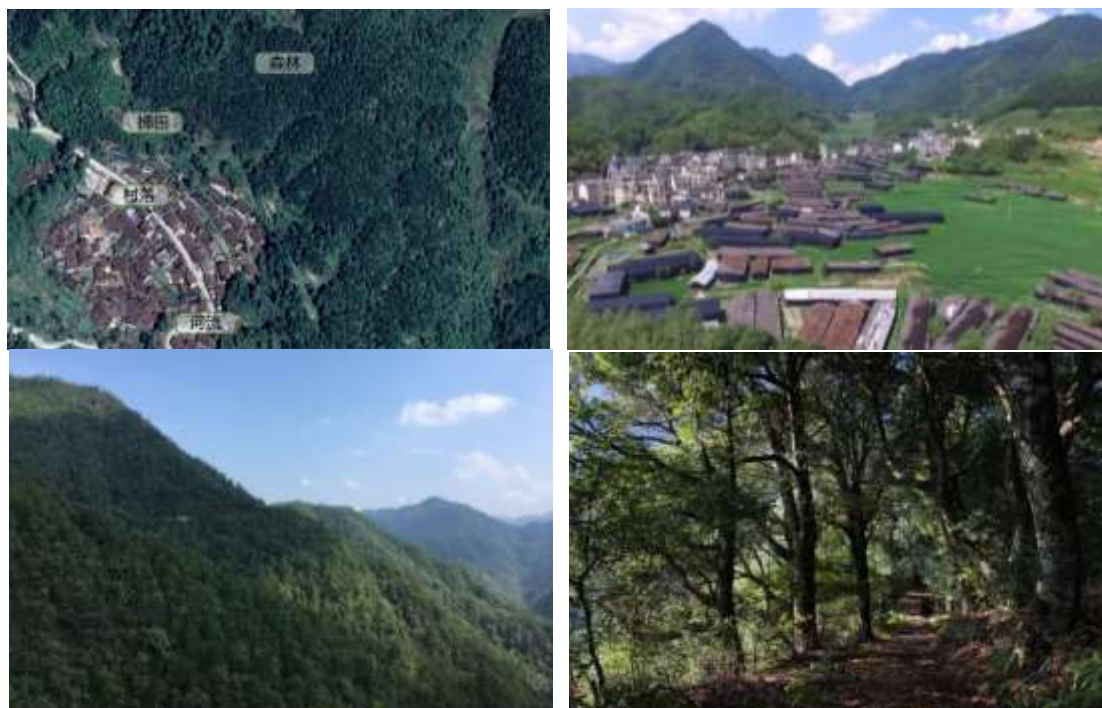


Figure 71 Typical landscape of the site - Longyan Village (Upper left: high-resolution satellite image; upper right: photo of the village; lower left: forest vision; lower right: forest ecological landscape). This village is the hometown of Wu Sangong. Therefore, it is called the first village of Chinese mushroom culture, which has a history of more than 1000 years. More than 95% of the households in the village are surnamed Wu, and they have been producing mushrooms for generations.

5.2 Landscape Type and Distribution

The total land area of the site is 14,117.43 ha. Forest is the dominant landscape type of the site, including mushroom forest such as *Liquidambar formosana*, *Quercus* and *Castanea henryi*, other broadleaf forest, coniferous forest, coniferous and broadleaf mixed forest and bamboo forest. There are other vegetation landscape types, such as shrubland, pasture, paddy field, dryland, orchard, vegetable garden and tea garden. Non-vegetated landscape types of the proposed site include residential land, barren land,

road, infrastructure and water body (Figure 72).

Qingyuan County

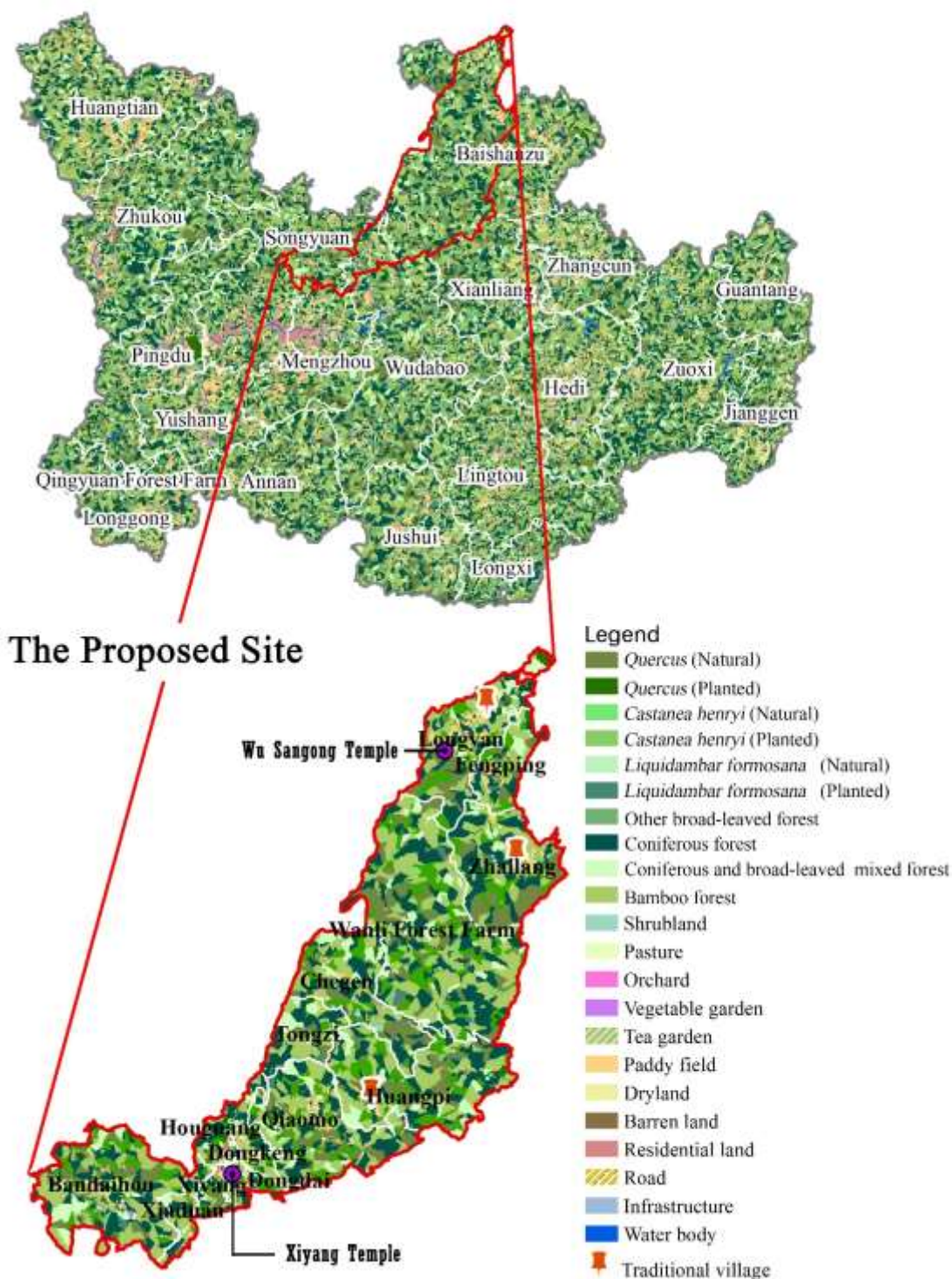


Figure 72 Land use map of the site in 2018. Forest is the dominant landscape type.

The area of forest is 13049.67 ha accounting for 92.44% of the total area of the proposed site. It includes natural broad-leaved forest suitable for *Duohua* method

cultivation such as *Quercus*, *Castanea henryi* and *Liquidambar formosana*, which account for 15.21% (1984.29 ha), 0.21% (27.35 ha) and 0.12% (15.33 ha) of the total forest area, respectively; planted *Quercus*, *Castanea henryi* and *Liquidambar formosana* account for 1.03% (134.84 ha), 1.21% (158.27 ha) and 0.70% (91.42 ha) of the forests area, respectively; other broad-leaved forest, coniferous forest, coniferous and broad-leaved mixed forest and bamboo forest account for 13.08% (1707.00 ha), 27.34% (3567.49 ha), 9.28% (1210.68 ha) and 31.82% (4153.01 ha), respectively. The area of paddy field, dryland, shrubland and pasture are 491.63 ha (3.48%), 133.31 ha (0.94%), 111.34 ha (0.79%) and 127.37 ha (0.90%), respectively, which mainly distribute in the eastern and western parts of the site. The total area of orchard, vegetable and tea garden is 73.68 ha (0.52%). The area of residential land, water body and road, barren land and infrastructure are 47.26 ha (0.33%), 64.73 ha (0.46%) and 18.43 ha (0.13%), respectively, mostly scattering in the valleys of the site (Figure 73, Table 16, Table 17).

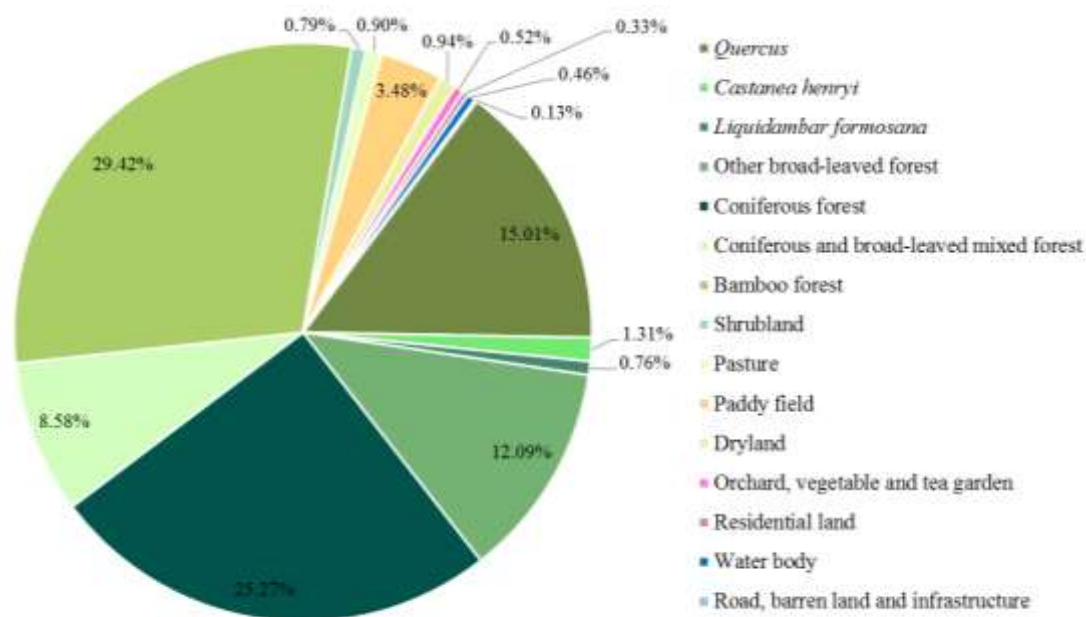


Figure 73 Land use types in percentage of the proposed site in 2018

Table 16 Land cover acreage and proportion in the site

Township	Indicator	Forest	Shrubland	Pasture	Paddy field	Dryland	Residential land	Orchard, vegetable and tea garden	Road, infrastructure and barren land	Water body	Total
Baishanzu	Area (ha)	10447.82	103.96	86.43	351.71	100.86	31.46	14.86	15.20	37.98	11190.29
	Proportion (%)	93.37	0.93	0.77	3.14	0.90	0.28	0.13	0.14	0.34	-
Songyuan	Area (ha)	1624.01	0.30	2.19	47.14	14.92	2.93	41.85	1.72	0.81	1735.88
	Proportion (%)	93.56	0.02	0.13	2.72	0.86	0.17	2.41	0.10	0.05	-
Wudabao	Area (ha)	977.84	7.08	38.76	92.78	17.53	12.87	16.97	1.51	25.94	1191.27
	Proportion (%)	82.08	0.59	3.25	7.79	1.47	1.08	1.42	0.13	2.18	-
Total	Area (ha)	13049.67	111.34	127.37	491.63	133.31	47.26	73.68	18.43	64.73	14117.43
	Proportion (%)	92.44	0.79	0.90	3.48	0.94	0.33	0.52	0.13	0.46	-

Note: The township statistics in the table is only about the administrative villages located within the site.

Table 17 Area and proportion of different forest type in the site

Township	Indicator	Forest	Forest types									
			<i>Quercus</i> (Natural)	<i>Quercus</i> (Planted)	<i>Castanea henryi</i> (Natural)	<i>Castanea henryi</i> (Planted)	<i>Liquidambar formosana</i> (Natural)	<i>Liquidambar formosana</i> (Planted)	Coniferous forest	Other broad-leaved Forest	Coniferous and broad-leaved mixed forest	Bamboo forest
Baishanzu	Area (ha)	10447.82	1659.35	104.73	25.12	124.30	14.57	79.97	2869.71	1406.91	919.84	3243.33
	Proportion (%)	-	15.88	1.00	0.24	1.19	0.14	0.77	27.47	13.47	8.80	31.04
Songyuan	Area (ha)	1624.01	245.70	2.01	1.54	27.01	0.76	11.44	397.74	184.64	181.57	571.61
	Proportion (%)	-	15.13	0.12	0.09	1.66	0.05	0.70	24.49	11.37	11.18	35.20
Wudabao	Area (ha)	977.84	79.24	28.10	0.69	6.96	0.00	0.01	300.03	115.46	109.28	338.07
	Proportion (%)	-	8.10	2.87	0.07	0.71	0.00	0.00	30.68	11.81	11.18	34.57
Total	Area (ha)	13049.67	1984.29	134.84	27.35	158.27	15.33	91.42	3567.49	1707.00	1210.68	4153.01
	Proportion (%)	-	15.21	1.03	0.21	1.21	0.12	0.70	27.34	13.08	9.28	31.82

Note: The township statistics in the table is only about the administrative villages located within the site.

(1) Forest

The zonal vegetation of the site is evergreen broad-leaved forest, and there are also evergreen coniferous forest, mixed coniferous broad-leaved forest and bamboo forest, etc. (Figure 74). Most of the forests are evergreen all the year round, with rich species and complex flora in the community. They are mainly composed of tree species such as *Fagaceae*, *Theaceae*, *Aquifoliaceae*, and *Ericaceae*. The constructive species are *Lithocarpus brevicaudatus* and *Cyclobalanopsis multinervis*.



Evergreen broad-leaved forest

Evergreen coniferous forest

Coniferous and broad-leaved mixed forest

Bamboo forest

Figure 74 Evergreen broad-leaved forest is the zonal vegetation, evergreen coniferous forest, mixed coniferous broad-leaved forest and bamboo forest are also widely distributed here.

There have been preserved 4210.15 ha natural forests in the site, accounting for 32.26% of the total forest area, which are mainly ecological forests. A large number of natural secondary forests have been preserved in *Baishanzu* Nature Reserve and other places, including rare and well-preserved mid-subtropical natural vegetation in subtropical areas of China. Artificial forests actively planted by local residents account for 67.74% of the total forest area of the site, including mushroom forests, fruit forests, timber forests, and so on. The forests in the site present significant vertical distribution differences along altitudes, especially in the *Baishanzu* Nature Reserve in the northwest of the site. Its complete vegetation vertical zonality represents the essence of the forest landscape in the site. The relative height difference between the southern and northern slope of the *Baishanzu* Mountain is more than 1300 m. Due to the obvious vertical

gradient with the combination of water and heat factors at different altitudes of the mountain, there have six vegetation zones with different community appearance characteristics successively distributed from mountain foot to mountain top, including evergreen broad-leaved forest zone, evergreen and deciduous broad-leaved mixed forest zone, coniferous and broad-leaved mixed forest zone, coniferous forest zone, mountain coppice zone and mountain shrub-grass zone (Figure 75). Among them, mushroom cultivation is mainly concentrated in the area where the evergreen broad-leaved forest and mixed forest are located, mostly below 1500 m.

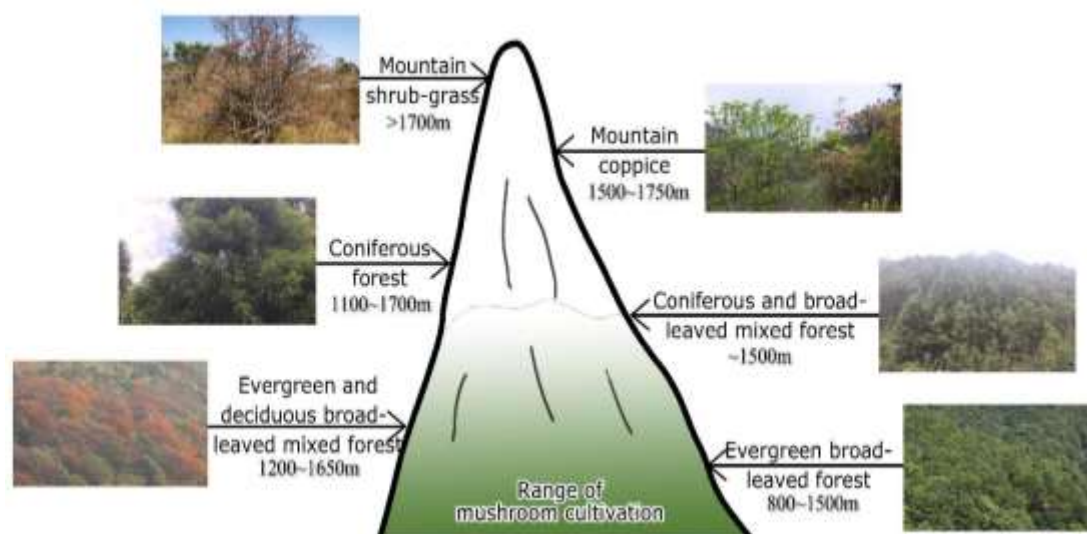


Figure 75 Forests in the site present significant vertical distribution differences along altitudes, especially in the *Baishanzu* Nature Reserve.

Evergreen broad-leaved forests are mainly distributed in the middle mountain area of the site, with an altitude between 800 m and 1500 m, including three formations of *Castanopsis eyrei* forest, *Cyclobalanopsis glauca* forest and secondary evergreen forest, with sparse shrubs and herbs in understory layer.

Evergreen and deciduous broad-leaved mixed forests, with an altitude between 1200 m and 1650 m, include three formations of *Fagus lucida* - evergreen broad-leaved mixed forest, *Cyclobalanopsis* - deciduous broad-leaved mixed forest, *Lithocarpus brevicaudatus* - deciduous broad-leaved mixed forest. With the increase of altitude, forests gradually transited to the deciduous forests.

Coniferous and broad-leaved mixed forests, with an altitude of about 1500 m, include six formations of *Pinus taiwanensis* - broad-leaved mixed forest, *Abies beshanzuensis* - broad-leaved mixed forest, *Cryptomeria fortune* - broad-leaved mixed forest, *Fokienia hodginsii* - broad-leaved mixed forest, *Cunninghamia* - broad-leaved mixed forest, *Pinus massoniana* - broad-leaved mixed forest. Both of coniferous trees and

broadleaf trees account for more than 30% of its composition.

Coniferous forests, with an altitude between 1100 m and 1700 m, include four formations of *Pinus massoniana* forest, *Pinus taiwanensis* forest, *Cryptomeria fortunei* forest and artificial coniferous forest. The appearance of the forest community remains dense green throughout the year.

Mountain coppices, with an altitude between 1500 m and 1750 m, include four formations of *Rhododendron fortunei* coppice, *Rhododendron simiarum* coppice, *Camellia brevistyla* coppice, evergreen and deciduous mixed coppice.

Mountain shrub-grass, with an altitude of above 1700 m, mainly composed of shrubs and herbs, including four formations of *Stranvaesia davidiana* shrub, *Lespedeza bicolor* shrub, *Yushania baishanzuensis* shrub and *Sasa qingyuanensis* shrub.

The mushroom forests used for mushroom cultivation are mostly evergreen broad-leaved trees, mainly including *Quercus* (including *Castanopsis fargesii*, *Castanopsis eyrei*, *Castanopsis carlesii*, *Castanopsis fabri*, *Cyclobalanopsis glauca*, *Quercus acutissima*, *Castanopsis tibetana*, *Quercus phillyraeoides*, etc.), *Castanea henryi*, *Liquidambar formosana*, etc.

(2) Gushan

Gumin usually take log of tree species such as *Quercus*, *Castanea henryi* and *Liquidambar formosana* in natural forests to cultivate mushrooms with traditional *Duohua* method. These tree species suitable for *Duohua* method are widely distributed in the broad-leaved forests, coniferous and broad-leaved mixed forests in the proposed site. According to the forest resources survey in Qingyuan County, the area of forests dominated by natural *Quercus*, *Castanea henryi* and *Liquidambar formosana* is 2,026.97 ha, accounting for 15.53% of total forest area in the proposed site. All of these forests could be used to cultivate mushrooms with *Duohua* method theoretically.

At present, there are 135 *Gushan* in the proposed site which are clearly recorded to produce mushroom with the *Duohua* method cultivation (Table 18). They are mainly concentrated in Bandaihou Village in the south of the site and Longyan Village in the north of the site.

According to the forest resources survey data of Qingyuan County, the total area of these *Gushan* is 813.56 ha, accounting for 40.14% and 6.23% of the natural mushroom forests and total forests, respectively (Figure 76).

There have broad-leaved forests and coniferous and broad-leaved mixed forests of *Castanopsis carlesii*, *Castanopsis fargesii*, *Santalum album*, *Liquidambar formosana*, *Elaeocarpus decipiens*, *Castanopsis eyrei* and *Castanea henryi* in the heritage site. Not only it is the place where *Gumin* once produced mushroom by *Duohua* cultivation in history, but also the core area for protecting and inheriting *Duohua* cultivation in the

future. *Gumin* take 5-7 years as a production cycle in one place and then move to another place so that the forest at the production site can resume growth. In the course of several years of production, *Gumin* will build temporary residence, thus leaving some abandoned *Gumin*'s shack in the heritage site.

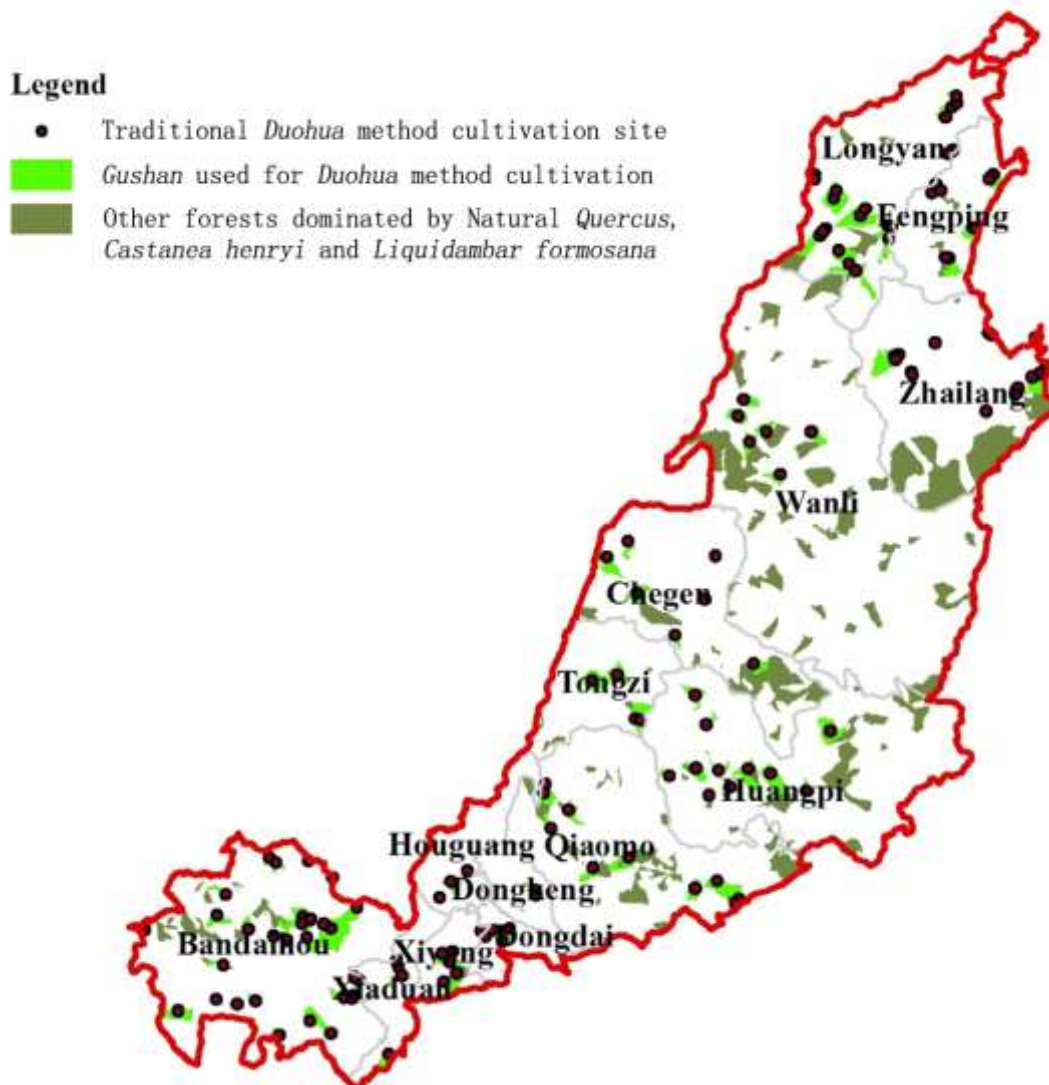


Figure 76 Distribution of traditional *Duohua* method cultivation sites in the site. *Duohua* method mushroom cultivation mostly uses natural evergreen broadleaf trees, mainly including *Quercus*, *Castanea henryi* and *Liquidambar formosana*.

Table 18 Area of *Gushan* for *Duohua* method cultivation in each village

Village	Number of <i>Gushan</i> for <i>Duohua</i> method cultivation	Area of <i>Gushan</i> for <i>Duohua</i> method cultivation (ha)
Longyan	21	130.38
Fengping	10	38.85
Zhailang	12	54.37

Village	Number of <i>Gushan</i> for <i>Duohua</i> method cultivation	Area of <i>Gushan</i> for <i>Duohua</i> method cultivation (ha)
Wanli Forest Farm	6	51.01
Chegen	7	50.76
Tongzi	4	45.74
Huangpi	11	105.09
Qiaomo	10	81.25
Dongkeng	2	6.85
Dongdai	4	9.83
Houguang	3	9.06
Xiyang	6	30.00
Xiaduan	4	15.07
Bandaihou	35	185.30
Total	135	813.56

(3) Village

Dozens of villages are scattered among the mountains in the site, mostly distributed in dots along the flat area near the river valley. Villages are hidden in high mountains and dense forests. They are not only the living places for local residents, but also the sites for the mushroom cultivation. These villages have a long history, among which Longyan, Huangpi and Zhailang villages are the most representative.

Longyan Village is known as "the First Village of Chinese Mushroom Culture". It is the hometown of Wu Sangong, which has a history of more than 1000 years. More than 90% of the farmers in the village live on mushroom cultivation for generations. Lots of relics related to Wu Sangong are preserved in the village, such as Wu Sangong Ancestral Temple, Wu Sangong's Former Residence and Wu Sangong Cemetery.

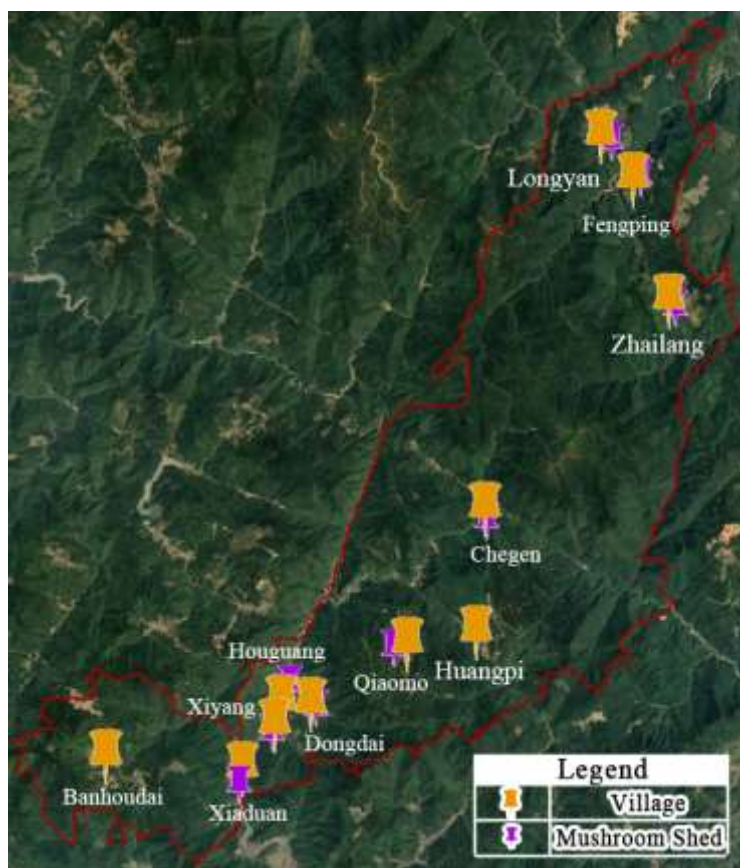
Huangpi Village is a typical historical and cultural ancient village in the site. The village has preserved rich cultural relics, such as Ancestral Temple of *Wu* Family, *Xinfenlin* inscriptions on precipices, etc. In Ancestral Temple of *Wu* Family, ancient building constructions such as shrines, windows and brackets carved by exquisite carving skills are well preserved, which have important architectural research value.

Zhailang Village was built in the *Jiayou* period of *Song* Dynasty (1056 A.D.-1063 A.D.). There have more than a dozen well-preserved ancient dwellings of southern Zhejiang style, two temples, one ancient *Langqiao*, and more than 20 ancient *Cryptomeria fortunei* trees that over 300 years old in this village (Figure 77).

(4) Terrace

More than 95% of the site are mountainous areas. In order to maximize the use of land and food production to meet the basic living needs of villagers, local residents

build terraces on gentle slopes along the hillside contours between forests and villages, which are used to grow crops such as grain and vegetables, forming a unique terrace landscape (Figure 78, Figure 79). Terraces surround the villages and are adjacent to dense forests, which not only improves the arable land area in mountainous areas, but also has the function of soil and water conservation.



Huangpi Village

Zhailang Village

Longyan Village

Figure 77 Villages mainly located at the flat area near the river valley in the proposed site, among which Huangpi Village, Zhailang Village and Longyan Village are traditional and representative. Mushroom sheds for modern mushroom cultivation are usually distributed around villages.

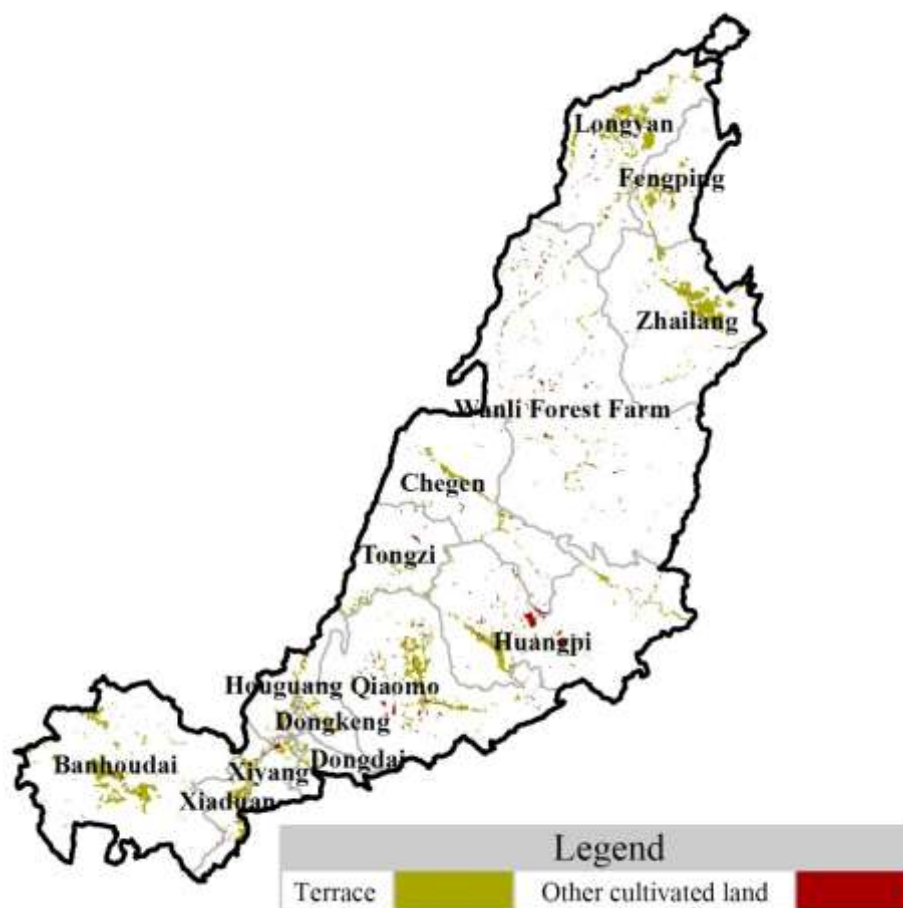


Figure 78 Most croplands are terraces in the proposed site. Terraces are mainly distributed in the eastern and western mountainous areas. They not only increase the arable area, but also conducive to the conservation of soil and water.



Paddy rice planted in terraces



Vegetable planted in terraces

Figure 79 Terrace landscape in the site. The main crops are paddy rice and vegetables.

(5) River

Hundreds of streams are densely distributed in the site with a radial pattern, which belongs to Oujiang River System, Minjiang River System and Fu'an River System. The southwestern slope of *Baishanzu* Mountain is the birthplace of Songyuan River, a

tributary of Minjiang River. The northeastern slope is the birthplace of the mainstream of the Oujiang River, and the southeastern slope is the source of Fu'an River, which is known as the "Source of Three Rivers" (Figure 80).



Figure 80 Distribution of water system in the site. The site is known as the "Source of Three Rivers". Oujiang River, Minjiang River tributary and Fu'an River tributary are originated from *Baishanzu* Mountain.

Streams flow in the high mountains and dense forests. Some of them surround the villages, and provide rich water resources for mushroom cultivation and villagers' production and life. Some of them converge into alpine wetlands, such as Huangpi Wetland with vast area, stone dragon wonder and strangely-shaped pines, adding beautiful scenery to the site. Some of them form unique waterscapes. For example, there are a large number of green pools, shoals, springs and waterfalls distributed in *Jinzifeng* forest park. The flow of *Sanjing* Creek in Longyan Village is clear, with colorful rocks scattered in the bottom of the stream (Figure 81).

Stream in *Baishanzu* Nature ReserveStream in *Jinzifeng* forest park*Sanjing* Creek

Huangpi Wetland

Figure 81 Streams and wetlands in the site

5.3 Spatial Structure of the Landscape

Local residents fully adapt and transform the natural environments by generations, forming a landscape pattern of “Forest-Terrace-Village-River” and distributing from alpine to valley successively (Figure 82). Villages are generally built along the river valleys near water sources, with an average altitude of 959.01 m and a slope of 8.93 ° (Table 19). Terraces located in the areas between the villages and mountainside with relatively gentle slope, with an average altitude of 1086.12 m and a slope of 13.75 °. Forests are distributed in the areas with steep slopes. The average altitude is 1150.04 m, with the highest being up to 1854.0 m, and the average slope is 23.19 °.

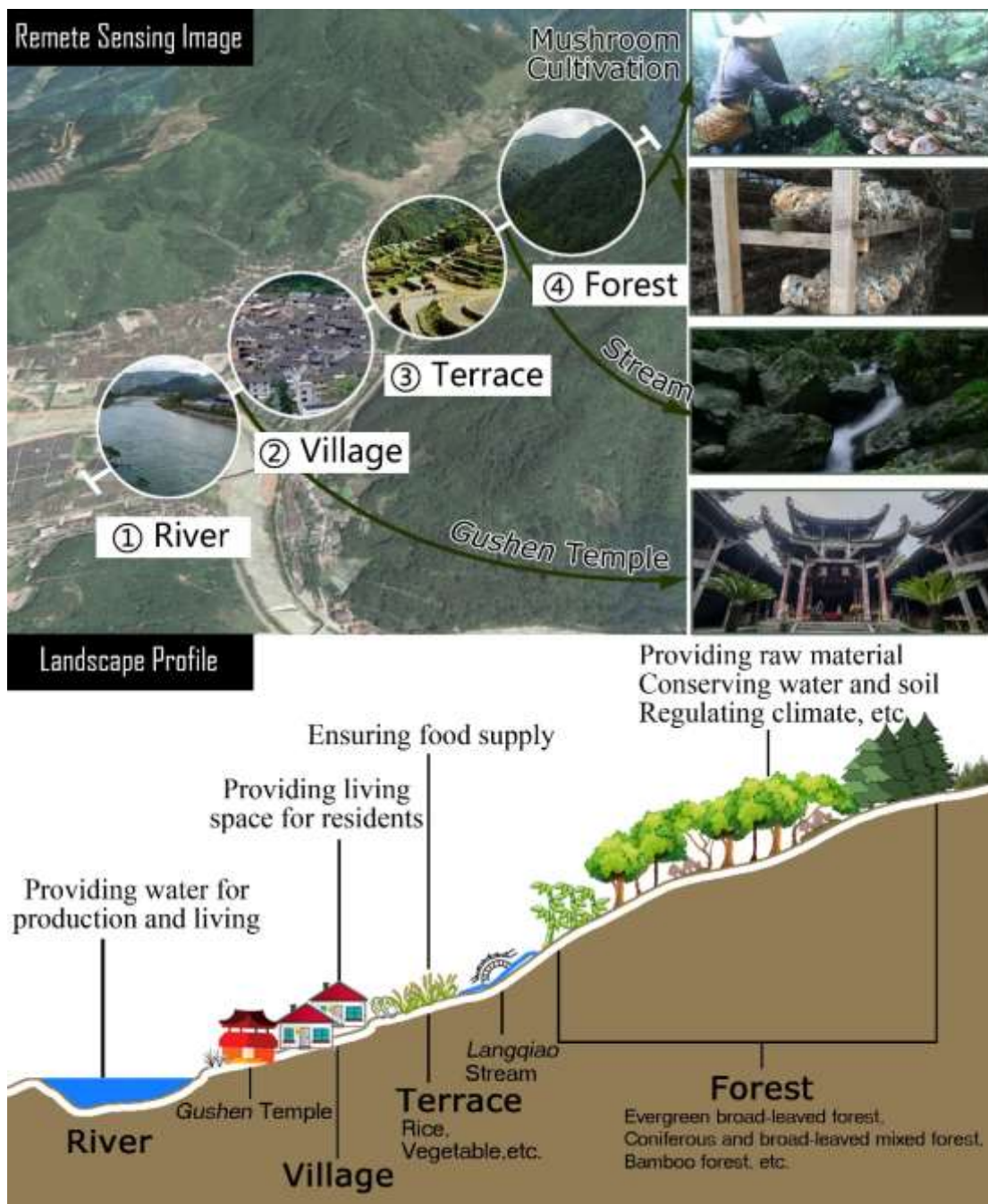


Figure 82 There has formed a unique agro-forest complex landscape. "Forest-Terrace-Village-River" was successively distributed from high mountains to river valleys. Forests provide raw material for mushroom cultivation and play an important ecosystem services. Terraces guarantee the food supply of local residents such as grains and vegetables. Villages provide living places for residents and processing places for agricultural and forestry products. The rivers meet the demand for production and living water, providing aquatic products for local residents and serving as a transportation channel in history.

Table 19 Distribution characteristics of landscape elements

	Forest		Terrace		Village		River	
	Altitude	Slope	Altitude	Slope	Altitude	Slope	Altitude	Slope
	(m)	(°)	(m)	(°)	(m)	(°)	(m)	(°)
Max.	1854	60.84	1842	48.29	1545	25.89	1320	35.62
Median	1150.04	23.19	1086.12	13.75	959.01	8.93	796.77	9.14
Min.	452	0	446	0	473	0.48	446	0.48

A distinctive feature of the site is the co-existence of three cultivation landscapes of *Duohua*, wood log and substitute material methods, which are distributed in different areas respectively. The traditional *Duohua* method is inseparable from the forests, so the cultivation sites are scattered in the forests. The invention of wood log and substitute material methods expanded the mushroom cultivations from deep mountains to the flat areas around the villages, thus forming an intensive mushroom cultivation landscape. Wood log cultivation is mostly located in the forests at the edge of the villages, which is convenient for artificial management and shading. It is more common in the north and central part of the site, especially in Longyan and Qiaomo villages. Substitute material cultivation often produces mushroom intensively in the mushroom sheds around the villages, which is distributed in all village of the site (Figure 83).



Figure 83 Landscape of mushroom cultivation in the site. *Duohua* cultivation sites scatter in mountain forests, wood log cultivation sites are located in the edges of forests near villages, and substitute material cultivation sites are located in mushroom sheds in villages.

5.4 Change of Forest Landscape

Landsat images show that the forest area of the site has increased steadily in recent decades, and the landscape structure is generally stable. From 1976 to 2018, the forest coverage rate increased from 88.33% to 92.44% (Figure 84, Figure 85).

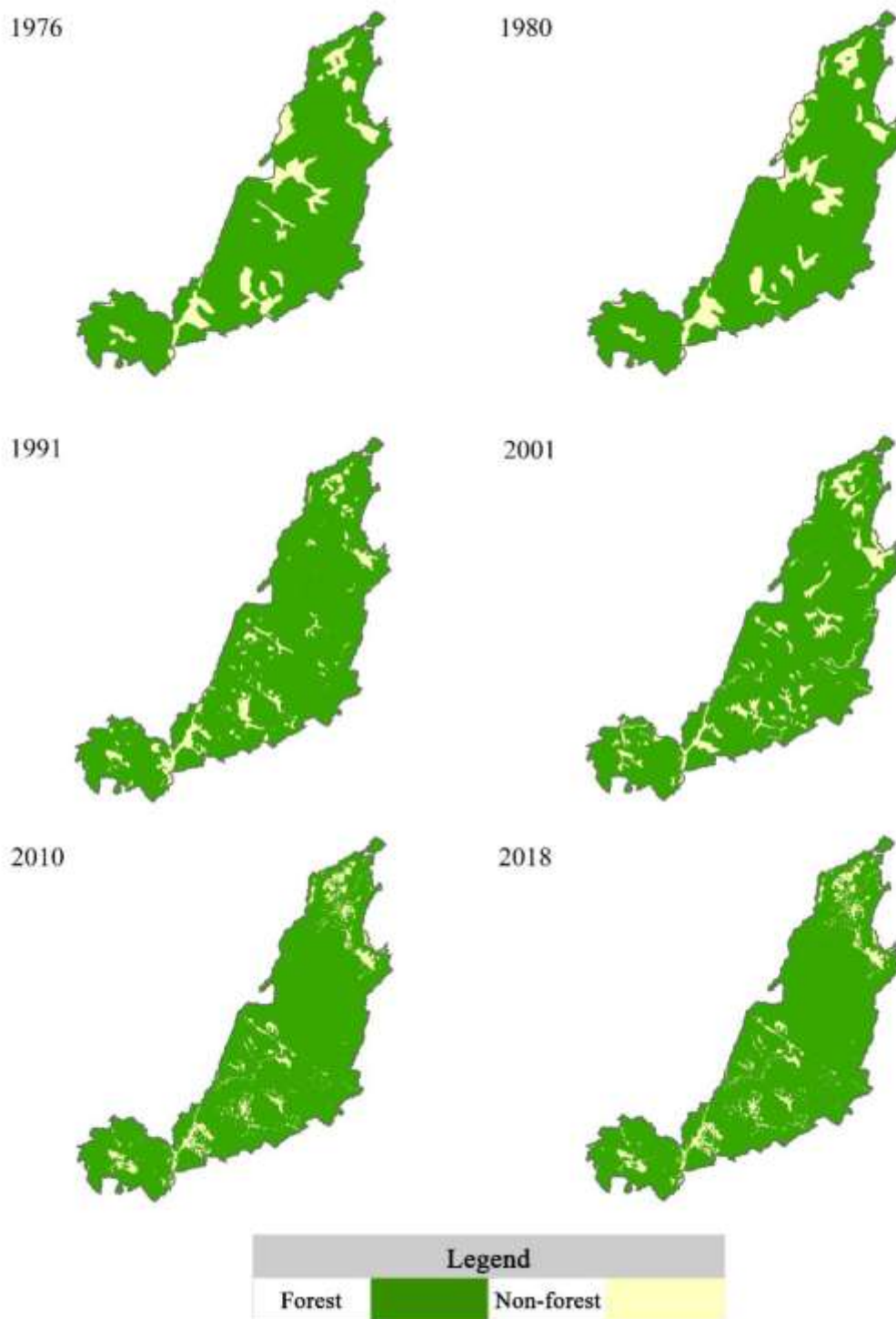


Figure 84 Forest landscape change in the site. Satellite images of Landsat indicate that the forests area of the site increased gradually from 1976 to 2018.

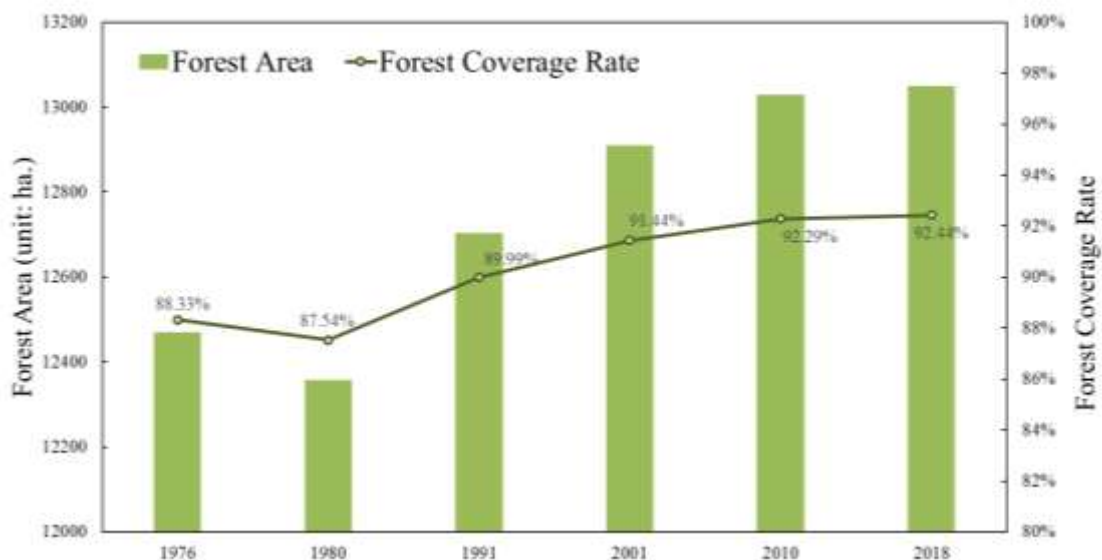


Figure 85 Forest cover rate change in the site (1976-2018). From 1976 to 2018, forest coverage rate of the site increased from 87.08% to 89.69%. Because of the rapid development of mushroom industry around 1980s, the forest cover rate has a slight decline in 1980.

Since the 1970s, the mushroom industry in Qingyuan County has developed rapidly with the popularization of strain inoculation technique, and the corresponding consumption of forest resources has also increased. After 2010, the expansion of cities and towns led to a slight reduction of forest area in the eastern and northern of the site. However, the total forest area in Qingyuan County has not decreased but shows a general stable trend. This is mainly due to the long-term adherence of local residents to the thought of forest and mushroom co-culture, the continuous progress of mushroom cultivation techniques, and the continuous improvement of use pattern of forest resources. It is also related to the local special alpine environment and low population density, which makes less human interference. In addition, vigorous implementation of forest protection policies also makes great contribution.

V. Action Plans for the Proposed GIAHS Site

1 Threats, Challenges, Potentials and Opportunities

1.1 Threats and Challenges

(1) Rapid development of society brings great impact on traditional culture

With the rapid development of urbanization and industrialization in recent years, lots of farmers leave villages for cities, which cause massive reduction of the number of farmers, especially young and middle-aged farmers. The traditional culture accordingly has lost its intergeneration inheritance carrier, and is gradually declining and falling. Traditional cultures of QFMCS, such as forest ecological cultures, folk beliefs and customs, folklore art, catering culture, traditional farm tools, cultural relics, local rules and regulations and social organizations, has been impacted by the tide of the times, undergoing unprecedented changes. Young people are fonder of fashion culture, instead of *Gumin* Opera, *Xianggu Kungku*, *Xianggu* folk song, etc., and the traditional worship ceremony of worshipping *Shanshen*, acknowledging *Shuniang*, sacrificing *Fengshui* forest, obtaining *Yinshu*, etc. is gradually weakened. Due to the continuous development of mushroom cultivation techniques, traditional customs such as *Guodan*, taking a *Guyu* bath, having farewell dinner, keeping a *Gushan* dog, etc. are endangered.

(2) Labor loss restricts the effective inheritance of traditional techniques

QFMCS achieves the coordinated development of forest resource conservation and mushroom cultivation through a variety of traditional techniques, but the traditional agricultural production requires a long time, high work intensity, and lots of labors. According to the survey and statistics, 1,059 people were engaged in the agricultural production of forestry and mushroom in the site in 2019, accounting for only 21.1% of the total registered population; among them, the number of employees aged 16-40, 41-50, 51-60 and over 60 were 166, 225, 363 and 305 respectively, accounting for 15.7%, 21.2%, 34.3% and 28.8% respectively (Table 20). It can be seen that, at present, a small number of people are still engaged in agricultural production, and it is mainly the middle-aged and elderly people over 50 years old (accounting for 63.1%).

The mushroom industry will be trapped in a severe condition for its sustainable development as those farmers are growing older. Taking *Duohua* cultivation technique as an example, in the past 20 years, only a few farmers still used the traditional method. With the continuous outflow of young and middle-aged labor force and the continuous progress of modern agricultural production techniques, it is hard for most of young people to learn and inherit such method due to few opportunities of learning and

practices. Without protection and inheritance, the traditional techniques contained in QFMCS will be lost and gradually become a historical memory.

Table 20 Age distribution of the labor force in the site in 2019

Township	Number of people /person	Number of people engaged in forest and mushroom industry /person	Age distribution of the labor force			
			16~40 years old /person	41~50 years old /person	51~60 years old /person	>60 years old /person
Baishanzu	3041	521	74	101	196	150
Wudabao	1587	493	84	109	157	143
Songyuan	394	45	8	15	10	12
Total	5022	1059	166	225	363	305

Note: The township statistics in the table is only about the administrative villages located within the site.

(3) Insufficient investment affects the protection of historical and cultural landscape

Traditional villages are an essential part of the cultural landscape in the site. Ancient villages with a history of nearly one thousand years, such as Longyan, Huangpi and Zhailang villages, are located in the site, and a large number of cultural relics and historic sites, ancient houses and ancient buildings are preserved in the villages (Figure 86). With the acceleration of urbanization, many villages are demolished, or newly built or rebuilt disorderly, or emptied out, desolated and withered. Traditional villages gradually lose their original style and features.

At present, incense offerings can still be seen in the well-preserved *Gushen* temple. The Wu Sangong Memorial Hall has been repaired and reconstructed with funds from the government. Some ancient dwellings have also been actively repaired in the site, but there are still many dwellings that have not been well protected and maintained. Qingyuan County has implemented the landscape reconstruction plan to save the old houses and ancient villages. However, due to insufficient protection funds, the focus of reconstruction is only put on the national traditional ancient villages with more rich history and cultures at present. Most of the ancient villages in the site has not drawn extensive attention, and many landscapes bearing mushroom cultures have been out of repair for a long time. The traditional ancient villages and architectural landscapes are scattered in the countryside and unmanaged. The local buildings are mostly of wooden structures, which are more prone to decay and burn.



Figure 86 There have many ancient dwelling in the site. Some ancient dwellings have been actively repaired, but there are still many dwellings that have not been well protected.

(4) Brand effect of heritage protection has not showed up

The southwest, northwest and other regions of China have taken the advantage of their rich forest resources and low-cost labor force, and implemented the “short, flat, and fast” project, to accelerate the development of mushroom industry, thus resulting in much more fierce market competition against Qingyuan mushroom industry. At the same time, as the residents’ consumption demand keeps increasing and various trade barriers are set up, the mushroom industry and market of Qingyuan County are facing unprecedented challenges for sustainable development.

Currently, some brands of Qingyuan mushroom have been awarded, such as the “Township of China's Mushroom”, “Products under National Origin Area Protection”, “China's Important Agricultural Heritage System” and “Famous Trademark of China”. Such various brands have improved influence and popularity of Qingyuan mushroom on the one hand; but on the other hand, it is difficult to effectively promote each brand due to limited marketing costs, leading to a waste of resource. Furthermore, in the site, many agricultural products and processed products with local characteristics are still produced and sold by farmers themselves, and have not yet been industrialized. Viewed from many heritage sites, certification on important agricultural heritage system has merely created a gold name plate. Lack of systematic recognition of agriculture heritage system results in insufficient promotion and utilization of its brand. This is also the case for the site herein. Overall, brand promotion is not enough, and work hasn't been carried

out to manage heritage logo and to certify ecological products in the site.

1.2 Potentials and Opportunities

(1) Improvement of agricultural quality and efficiency needs to learn from traditional agricultural wisdom

The site located in the relatively backward mountainous area of southwest Zhejiang Province, and the comparative benefit of agriculture is low. Development of characteristic and high-quality agriculture can help farmers to improve income. The site has obvious advantages in characteristic agricultural and forestry products, ecological and environmental resources, natural and human landscapes, traditional cultures, local cuisine and other resources and it is very suitable to develop characteristic and high-quality agricultural production. In addition, it is of enormous potential to develop emerging industries such as eco-tourism, creative agriculture, agricultural culture industry, agricultural education industry based on the QFMCS. Exploring the scientific connotation of QFMCS and advocating the development mode of ecological circular agriculture will help to reduce environmental pollution in the site and ensure the quality safety of agricultural products. At the same time, the protection of traditional cultivation techniques and local varieties is conducive to adhering to the objectives of superior quality, characteristic and localization of fine seed selecting and breeding, overcoming the tendency of single breeding in excessive pursuit of yield orientation, forming agricultural production and quality advantage of agricultural products with significant local characteristics, and promoting the realization of the green development goals of green agriculture, green products and green villages in the site.

Though the site is endowed with rich resources, many of them have not been developed and utilized at present. Therefore, the protectors of the heritage do not get the due benefits and the enthusiasm of protection is not high. The heritage conservation and utilization measures, such as strengthening the construction of product brands, implementing the talent training project, and improving the infrastructure of the site and others, will help to make full use of these resources, vigorously promote the quality and efficiency of agriculture and the integrated development of primary, secondary and tertiary industries, and realize the value increment of heritage resources in the site.

(2) Value realization of ecological product promotes development of related industries

As the birthplace of “Two-Mountain Theory”, Lishui City of Zhejiang Province has been committed to practice and exploration in realizing the value of ecological products, and actively promoting the transformation of “green hills and clear waters” into “prosperity and wealth”. Benefiting from the superior ecological environment of the

site, agricultural and forestry products such as mushroom, fruits and vegetables, and grains have unique ecological advantages, providing a good foundation for the exploration of the value realization mechanism of ecological products. Qingyuan County of Lishui City has successively won the titles of “The Mushroom City of China”, “Summer Resort in China” and “China’s Most Beautiful Eco-tourism Demonstration County”, which are completely consistent with the value realization mechanism of ecological products in development concept. In the future, through the pilot work of the national ecological product value realization mechanism to further explore the effective path of the transformation of the ecological value of the special agricultural products in the site, the development of related industries can be promoted and the sustainable development ability of QFMCS can also be enhanced.

(3) Awareness of farming culture protection in the site has been continuously enhanced

Owing to the recognition and respect for traditional culture, traditional ideological and value system in China, the protection and development of QFMCS has drawn wide attention and support from all sectors of society. To protect the traditional culture, under the unified deployment of Qingyuan County Government, the departments of agriculture, forestry, culture, radio, film, television and other departments carried out a comprehensive investigation of traditional techniques, and established China Qingyuan *Xianggu* Museum, an only museum combining professional and comprehensive natures to exhibit mushroom culture (Figure 87). To protect the traditional techniques, the county issued relevant policies to encourage farmers to appropriately carry out cultivation with *Duohua* method, and also built a cultivation demonstration base of *Duohua* method in *Huilongwan* with a total area of 1216 *mu* to carry out protection and inheritance. To protect the endangered and rare plants such as *Abies beshanzuensis* and maintain the regional biodiversity, *Baishanzu* National Nature Reserve was established. In the meanwhile, the eco-tourism industry was actively developed and one-day or two-day tours of mushroom culture scenic spots were opened. Therefore, mushroom culture, Jingning ethnic minority custom, Longquan sword porcelain culture complement each other, forming a unique folk culture circle in southwest Zhejiang.



Figure 87 China Qingyuan *Xianggu* museum, an only museum combining professional and comprehensive natures to exhibit mushroom culture.

2 Proposed Actions

To deal with these threats, challenges, potentials and opportunities, 36 actions have been planned, including 5 comprehensive actions, 5 ecological conservation actions, 5 cultural inheritance actions, 6 eco-agricultural product development actions, 6 sustainable tourism development actions and 7 capability building actions. Table 21 showed the budgetary indications on the funds allocated for each action including the key implementer(s) for each action.

2.1 Comprehensive Actions

(1) Establishing a multi-sectoral coordination mechanism and a multi-party participation mechanism for heritage conservation

Main Contents: 1) Establishing a multi-party participation and benefit-sharing mechanism involving the government, farmers, enterprises, experts, scholars and the media; establishing and perfecting the relevant rules and regulations for community participation suitable for the protection of agricultural heritage system; 2) Promoting the construction of information disclosure platform and accepting social supervision to make the protection and development work open, transparent, institutionalized and standardized gradually.

Implementation Period: 2022-2023

Key Implementers: Bureau of Agriculture and Rural; Edible Fungi Industry Center

(2) Formulating heritage management measures

Main Contents: 1) According to the spirit of the document, titled as the *Measures for the Management of Important Agricultural Heritage Systems* (2015) formulated by the Ministry of Agriculture and Rural Affairs, Qingyuan County will formulate *the Measures for Protecting and Developing the Important Agricultural Heritage System of QFMCS*, specifying policies and measures for protection and development; 2) Formulating *the Measures for Using the Agricultural Heritage System Logo of QFMCS* and clarifying the management agency, approval procedure, terms of use and assessment methods related to the logo of QFMCS.

Implementation Period: 2022-2023

Key Implementers: Bureau of Agriculture and Rural; Edible Fungi Industry Center

(3) Compiling teaching materials for popular science education

Main Contents: 1) Compiling guide manuals for the protection and management of QFMCS; compiling practical technical manuals for the production of mushroom, and guiding the mushroom cultivation, processing operation and matters needing the attention; 2) Making the popular science micro animation of QFMCS for popular science education for the general public.

Implementation Period: 2022-2023

Key Implementer: Edible Fungi Industry Center

(4) Publicizing agricultural heritage system through various channels

Main Contents: 1) Using all forms of media such as newspapers, radio, television and website to popularize the basic information of the heritage system; paying attention to the role of new media, such as building a public publicity platform, inviting people from all walks of life to visit the site and experience the cultural charm of QFMCS; 2) Designing exquisite products such as cartoon dolls, refrigerator stickers or other handicrafts with mushroom images.

Implementation Period: 2022-2025

Key Implementers: Convergence Media Center; Publicity Department of County Party Committee; Bureau of Culture, Broadcast and Television, Tourism and Sports

(5) Participating in and organizing agricultural heritage system activities

Main Contents: 1) Inviting well-known experts at home and abroad from time to time to conduct seminars focusing on mushroom cultivation technique, ecological protection, landscape characteristics, cultural value and tourism development; through holding academic activities related to the protection of agricultural heritage system, to deeply excavated the multi-value and multi-culture of the system itself, such as ecology, history, culture, and folklore; 2) Holding the annual Mushroom Cultural Festival and

the mushroom cultivation competition in the site; 3) Collecting photographic works, essays and poems related to the forest and mushroom co-culture culture; holding photographic exhibitions and essay competitions related to the forest culture and mushroom culture; encouraging poetry societies, photographic associations, and other relevant organizations to create and photograph essays, poems, novels, and photographic works related to the forest and mushroom co-culture culture so as to raise public attention and awareness about the heritage system; 4) Promoting the publicity of agricultural heritage system through multiple channels and pairing with relevant heritage sites to enhance the comprehensive influence.

Implementation Period: 2022-2025

Key Implementers: Edible Fungi Industry Center; Bureau of Culture, Broadcast and Television, Tourism and Sports

2.2 Ecological Conservation Actions

(1) Protecting edible fungi, local varieties and other germplasm resources

Main Contents: 1) Carrying out a general survey of germplasm resources of edible fungi; building “one area, one museum and five banks”, i.e. fungi conservation area, fungi species museum, strains resource bank, strains living tissues bank, strains active ingredients bank, strains gene bank, strains information bank; 2) Investigating the planting area and output, growing environment and other information of local variety resources; establishing the resource database for local varieties of the site.

Implementation Period: 2022-2025

Key Implementer: Edible Fungi Industry Center

(2) Protecting and monitoring rare and endangered species

Main Contents: 1) Finding out the characteristics of distribution and growth habitat of rare and endangered animals and plants in the site; regularly monitoring the changes in population quantity; 2) Implementing the listing protection for rare plants and national key protected plants represented by *Abies beshanzuensis*; establishing the fixed monitoring points and burying the obvious warning signs.

Implementation Period: 2022-2025

Key Implementers: Edible Fungi Industry Center; Baishanzu Management Office

(3) Managing the forest ecosystem

Main Contents: 1) Enhancing forest protection, including prohibiting the cutting of natural forests, strictly controlling forest logging, strengthening forest fire prevention, preventing forest diseases and insect pest; 2) Carrying out transformation of forest construction, purposefully transforming *Cunninghamia lanceolata* plantation through planting indigenous and precious tree species, tree species of mushroom forest, and

further improving the quality of forest landscape in the site; 3) Strengthening the supervision of mushroom forest and maintain the stability and sustainability of mushroom forest.

Implementation Period: 2022-2025

Key Implementer: Bureau of Natural Resources and Planning

(4) Managing the rural ecological environment

Main Contents: 1) Optimizing the planting and breeding industry structure of the site; actively developing the water-saving agriculture; strengthening the biological control of agriculture; vigorously promoting the reduction and efficiency improvement of fertilizers and pesticides; promoting whole quantity comprehensive utilization of straws; giving priority to carrying out returning-to-field in place, resource utilization and harmless treatment of agricultural film; strengthening the resource utilization of fecal residue and waste water; popularizing whole quantity collection and returning-to-field utilization of fecal residue and other technical models according to local conditions; 2) Building a sound diversified domestic garbage collection, transportation and disposal system which conforms to the rural actual condition; carrying out rural domestic garbage classification and reduction action where conditions allow; implementing the garbage in-place classification and resource utilization; through rural domestic sewage, domestic garbage and other environmental treatment and beautiful village construction, gradually improving the ecological environment of villages in the site.

Implementation Period: 2022-2025

Key Implementer: Bureau of Agriculture and Rural

(5) Carrying out the monitoring and evaluation of ecological environment

Main Contents: 1) Combining with the distribution of mushroom forests and typical agroforestry ecosystem in the site to set up the ecological monitoring points; setting up the monitoring network of agricultural non-point source pollution and domestic pollution and forming the periodic monitoring mechanism biennially to conduct the monitoring on changes of water resources, soil and atmospheric environment so as to provide the basis for treatment of ecological environment; 2) Establishing the forest resources dynamic assessment and early warning system.

Implementation Period: 2022-2025

Key Implementers: Qingyuan Branch of Lishui Ecological Environment Bureau; Bureau of Natural Resources and Planning

2.3 Cultural Inheritance Actions

(1) Carrying out survey on farming cultures and making a catalog for them

Main Contents: 1) Carrying out the comprehensive survey and entry of traditional

culture, folk literature and art, folk artists, folk crafts, folk customs, sayings, songs, poetry, all kinds of ancient buildings and structures; establishing the systematic farming culture multimedia database; 2) Further collecting cultural relics and specimens concerning mushroom cultivation history and technology, perfecting and updating the collections of Qingyuan *Xianggu* Museum and enriching display contents.

Implementation Period: 2022-2025

Key Implementer: Bureau of Culture, Broadcast and Television, Tourism and Sports

(2) Protecting and repairing traditional villages, ancient buildings and relics

Main Contents: 1) Repairing the buildings with unique cultural meaning, including memorial archway, ancestral temple, *Langqiao*, historic building, ancient road, ancient wells and ancient temples in the site. For the valuable cultural relics, organizing the declaration of municipal level and provincial level cultural relics protection units; 2) Strengthening the protection of traditional villages, incorporating the protection and restoration of traditional villages (including Longyan, Huangpi, and Zhailang villages) into the system of cultural village protection and new rural construction, and hiring a professional team to repair and improve these villages.

Implementation Period: 2022-2023

Key Implementer: Bureau of Housing and Urban-Rural Development

(3) Protecting folk culture

Main Contents: 1) Excavating and recording the lost or near-lost crop planting technique, agricultural production tools, agricultural proverbs, local rules and regulations, folk customs and so on; publishing Qingyuan farming culture album; 2) Encouraging appropriate restoration of part of the traditional technique, agricultural tools and folk activities, and lively inheriting the farming cultures of the site; combining with the solar term protection to protect the traditional foods such as *Lixia* soup, *Xiaomei*, and *Sunzong*; 3) Holding the sacrificial ceremony of Wu Sangong regularly and taking it as one of the important conventional cultural activity to promote a good atmosphere of QFMCS protection.

Implementation Period: 2022-2025

Key Implementers: Organizing Committee Office of Qingyuan Mushroom Culture Festival; Bureau of Culture, Broadcast and Television, Tourism and Sports

(4) Protecting and carrying forward traditional techniques

Main Contents: 1) For valuable traditional techniques, organizing the declaration of municipal level, provincial level and even national level intangible heritage; 2) Identifying or appraising and electing inheritors who master traditional techniques such as *Duohua* method or traditional culture such as *Gumin* Opera or *Xianggu Kungku*, etc.; 3) Promoting mushroom culture into the campus, including carrying out traditional

cultural experience in kindergartens, popularizing *Gumin* Opera and *Xianggu Kungku* in primary and secondary schools, and incorporating it into the reading materials of nine-year compulsory education.

Implementation Period: 2022-2025

Key Implementers: Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Education

(5) Publicizing and displaying farming cultures

Main Contents: 1) Making leaflets, calendars, postcards and cartoons to promote the farming cultures of the site; establishing special website and WeChat public account communication platform; 2) Making video of QFMCS to popularize and publicize the farming cultures; publicizing performance activities of inheritors and the protection measures of government to expand their influence among people.

Implementation Period: 2022-2025

Key Implementer: Bureau of Culture, Broadcast and Television, Tourism and Sports

2.4 Eco-agricultural Product Development Actions

(1) Constructing organic mushroom production bases

Main Contents: 1) Improving the construction level of *Huilongwan Duohua* cultivation base and making it a *Duohua* cultivation demonstration base according to the traditional *Xianggu* cultivation technique standards; 2) Improving the subsidy policy for *Duohua* cultivation to ensure that the distribution of traditional *Duohua* method cultivation sites is not reduced; 3) Selecting typical farmer households to construct 2 wood log cultivation demonstration bases; 4) Constructing 3 standardized production bases of *Xianggu*, *Auricularia auricula* and *Grifola frondosa* in the site in line with the standards of environmental protection, according to the *mushroom industry development plan of Qingyuan County*.

Implementation Period: 2022-2025

Key Implementer: Edible Fungi Industry Center

(2) Excavating ecological agricultural products in the site

Main Contents: 1) Introducing and developing the production of mushroom varieties with medicinal and edible such as *Grifola frondosa* and *Ganoderma lucidum*; protecting and cultivating the rare wild edible fungi, such as *Morchella esculenta* and *Boletus appendiculatus*, and taking the road of fine and special; 2) Improving the production and management mode of characteristic forest and fruit products such as *Castanea henryi*, *Camellia oleifera*, bamboo, raspberry, etc. and developing its processing industries; 3) Encouraging and rehabilitating terraced agriculture to develop comprehensive breeding of special species such as red rice, *Chenopodium quinoa*,

alpine water bamboo, *Magnolia officinalis*, *Eleusine coracana*, field snail and carp.

Implementation Period: 2022-2025

Key Implementer: Bureau of Agriculture and Rural

(3) Developing agricultural product processing and cultivating leading enterprises

Main Contents: Encouraging enterprises to increase research and development of new products to make fast food and fast consuming products such as fungus meal powder, beverage, ready-to-eat food and seasoning; encouraging enterprises to develop high-end products such as mushroom polysaccharides, mushroom drugs and pharmaceutical intermediates; encouraging enterprises to adopt the development models of "enterprise + base" or "enterprise + cooperative + farmer" and strengthening technical support and supervision to ensure product quality.

Implementation Period: 2022-2025

Key Implementer: Bureau of Economy and Commerce

(4) Carrying out product certification and brand building

Main Contents: 1) Establishing a certification system for products in the site and encouraging farmers to use traditional ecological agriculture techniques for production; encouraging enterprises, cooperatives and other legal entities as the main body to carry out green and organic certification of ecological agricultural products; encouraging high-quality and reputable mushroom processing enterprises to apply for provincial and national famous brand products, and creating a brand with distinct core values and characteristics; 2) Designing the logo of QFMCS on the basis of the geographical indication trademark of "Qingyuan Mushroom", establishing the brand of *Duohua*, wood log and substitute material mushrooms respectively so as to further improve the series brand building of mushrooms of the heritage site.

Implementation Period: 2022-2025

Key Implementer: Bureau of Agriculture and Rural

(5) Improving the research capability and increasing the technical support

Main Contents: 1) Strengthening the cooperation with famous scientific research institutions of mushroom at home and abroad, focus on scientific research on the production of summer mushroom and the introduction of rare edible fungi; strengthening the introduction and selection of new varieties and the innovation, introduction and popularization of high-efficiency production mode; 2) Formulating the technical standards of the wood log cultivation and revising the technical standards of the substitute material cultivation.

Implementation Period: 2022-2025

Key Implementer: Edible Fungi Industry Center

(6) Constructing the market circulation service system

Main Contents: 1) Relying on Qingyuan Mushroom Market to build the wholesale market of agricultural products based on the characteristic and advantageous agricultural industry; developing e-commerce channels and establishing a variety of online marketing models, as well as supporting and cultivating operators of mushroom online stores; 2) Cooperating with large enterprises to promote the brand of characteristic agricultural products in the site.

Implementation Period: 2022-2023

Key Implementer: Bureau of Market Regulation

2.5 Sustainable Tourism Development Actions

(1) Integrating tourism resources and designing tourism products

Main Contents: 1) Strengthening the integration of scenic spots that have a certain influence in the site, and constructing the overall layout of heritage tourism with forest and mushroom co-culture culture as the core; 2) Building a number of tourist sites with distinct regional characteristics through protection and restoration to enrich the leisure agriculture of the site; taking Longyan, Huangpi, and Zhailang villages as the core to build the tourism brand of QFMCS; 3) Designing and making a batch of tourism souvenirs reflecting the connotation of forest and mushroom co-culture culture.

Implementation Period: 2022-2025

Key Implementer: Bureau of Culture, Broadcast and Television, Tourism and Sports

(2) Protecting the agroforestry landscape

Main Contents: 1) Maintaining distinctive landscape structure of “River-Village-Terrace-Forest” in the site; retaining the original natural form of fields and the distinction between paddy and dry fields; protecting and restoring terraces in the site and promoting diversified planting; 2) Carrying out afforestation, beautifying and clean of mushroom sheds by means of planting trees on both sides of mushroom sheds; cleaning up rubbish in and around sheds regularly.

Implementation Period: 2022-2025

Key Implementer: Bureau of Agriculture and Rural

(3) Protecting village landscape

Main Contents: 1) Remaining original layout and style of villages and maintaining the landscapes around villages, including *Fengshui* forest, cropland and orchard; restoring traditional rural residential architectural style in the site properly, and standardizing the newly facilities and equipment needed for production and living according to unified style; 2) Repairing and beautifying non-vehicular roads in villages with local stone materials.

Implementation Period: 2022-2025

Key Implementers: Bureau of Agriculture and Rural; Bureau of Housing and Urban-Rural Development

(4) Constructing leisure farm with special characteristics

Main Contents: 1) Developing agritainments with the main contents of eating farmers' rice, living in farmers' houses, and picking farmers' fruits to build a group of demonstration agritainments with the cultural characteristics of QFMCS; 2) Taking leisure vacation and participation experience as the core to develop leisure farms with complete functions, friendly environment, and rich culture.

Implementation Period: 2022-2023

Key Implementer: Bureau of Agriculture and Rural

(5) Constructing the leisure agriculture management service system

Main Contents: 1) Training the personnel of heritage management and leisure agriculture service in a classified and stratified manner to improve the quality of the employees; strengthening the management and support of all kinds of leisure agricultural cooperative organization and trade associations, and enhancing the self-discipline of the trade; 2) Conforming to the development trend of the internet, internet of things and mobile phones to expand information terminals and accelerate the construction of information service system.

Implementation Period: 2022-2025

Key Implementers: Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Agriculture and Rural

(6) Improving the infrastructures in the site

Main Contents: 1) Speeding up the construction of infrastructures such as roads, water and electricity, and telecommunications in the leisure agricultural areas of the core protection zones of the site; 2) Improving the service facilities in Longyan, Huangpi and Zhailang villages, such as accommodation, sightseeing, catering, and harmless treatment of garbage and sewage, and constructing interpretation sign in important landscape node.

Implementation Period: 2022-2025

Key Implementer: Bureau of Housing and Urban-Rural Development

2.6 Capability Building Actions

(1) Popularizing the heritage protection thought

Main Contents: 1) Strengthening the publicity and education of local residents so as to realize the important role in improving the living environment, protecting the ecological environment, and increasing agricultural income through the protection of

QFMCS; 2) Establishing villagers' awareness of environmental protection and cultural protection through regular publicity, training, printing of environmental protection knowledge brochures, holding competitions about agricultural heritage system, and making exquisite postcards. 3) Combining with the traditional cultural education activities of schools and the comprehensive practical activities of handicraft courses, regularly organizing young people to go to the site for agricultural experience, so that the children can really get in touch with the heritage system of their hometowns.

Implementation Period: 2022-2025

Key Implementer: Bureau of Education

(2) Strengthening study and guidance of administrative cadres, enterprises, craftsmen and representatives of farmer households

Main Contents: 1) Organizing heritage administrators to systematically study the *Measures for the Administration of Important Agricultural Heritage Systems* and the *Opinions of the CPC Central Committee and the State Council on the Implementation of the Strategy of Revitalizing Rural Areas*, to raise awareness of the protection and utilization of the heritage; 2) Organizing administrative cadres, enterprises, craftsmen and representatives of farmers to visit other agricultural heritage sites occasionally to exchange work experience and learn from each other's strengths and complement each other's weaknesses; 3) Holding regular training courses on operation and management ability, traditional techniques, cultural protection, and industrial development, and inviting professionals from all walks of life to train managers and farmers respectively to build up a team of compound talents who understand the technology, market and decision-making ability of mushroom industry.

Implementation Period: 2022-2025

Key Implementers: Bureau of Human Resources and Social Security; Bureau of Agriculture and Rural

(3) Enhancing the cooperation with scientific research institutions in colleges and universities

Main Contents: 1) Promoting scientific research institutions to establish research bases, and attracting scientific research talents to carry out relevant research according to the actual situation of the site; 2) Guiding and encouraging enterprise to carry out scientific and technical cooperation with neighboring universities and scientific research institutions, establishing production and scientific research bases, and carrying out research on breeding, genetic breeding, deep processing and comprehensive utilization, etc.; 3) Popularizing and applying the existing scientific research achievements and new cultivation techniques; absorbing, drawing lessons from and applying the advanced techniques of other industries to improve the innovation ability

of enterprises; 4) Establishing a standardized technical consultation and training mechanism, unblocking the direct communication channels among farmers, enterprises, artisans, and technicians, and improving the efficiency of technology transfer.

Implementation Period: 2022-2025

Key Implementers: Bureau of Science and Technology; Edible Fungi Industry Center

(4) Promoting intellectual support and services

Main Contents: 1) Carrying out special training for management personnel of mushroom industry enterprises, and strengthening on-the-job education for practical talents of mushroom industry; bringing the cadre training of the agricultural and forestry section in the site into the cadre training plan; 2) Attracting talents through market-oriented and industrial projects flexibly and accurately, and absorbing talents from all walks of life through various channels, to provide talents support for heritage protection and development; 3) Strengthening the contact with outstanding returned intellectuals, cadres and entrepreneurs in rural areas, giving full play to the role of them in promoting the cultural inheritance and industrial development, encouraging them to actively participate in heritage protection and construction, and enhancing their sense of cultural identity and cultural mission.

Implementation Period: 2022-2025

Key Implementers: Bureau of Agriculture and Rural; Bureau of Human Resources and Social Security

(5) Cultivating new agricultural managers

Main Contents: 1) Fostering and developing family farms, farmer cooperatives, leading agricultural enterprises, agricultural industrialization consortiums, agricultural socialized service and management organizations with a certain scale, a high degree of intensification and strong demonstration and driving force to participate in heritage protection and development; 2) Cultivating agricultural industrialization consortiums, promoting the industrial, factor and benefits association between mushroom processing enterprises and farmers in the site, advancing the benefits association mechanism of agricultural enterprises from loose type to closed type, and constructing the community of shared interests; 3) Supporting various management organizations to inherit traditional cultivation techniques and local dietary production skills, and carrying out rural related activities relying on traditional techniques and technology; 4) Encouraging farmers, enterprises and social capital to revitalize idle farmhouses and develop new industries such as rural leisure tourism, forest health care, and farming experience.

Implementation Period: 2022-2025

Key Implementer: Bureau of Agriculture and Rural

(6) Selecting demonstration households of heritage protection and development

Main Contents: For the enterprises and farmers who have been engaged in the cultivation, protection and utilization of mushrooms for many years, the government designate them as demonstration households of heritage protection and development, and give priority to selecting and funding them to participate in forums and exchange meetings on protection of agricultural heritage systems held in Lishui City and other areas. The relevant products will be given priority to use the logo of agricultural heritage system freely after passing relevant safety certification. The typical heritage protection stories will be publicized and displayed from time to time.

Implementation Period: 2022-2025

Key Implementers: Publicity Department of County Party Committee; Edible Fungi Industry Center

Table 21 Budget of action plans (2022-2025)

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
2.1 Comprehensive Actions			
(1) Establishing a multi-sectoral coordination mechanism and a multi-party participation mechanism for heritage conservation			
-Operating cost of the heritage management department	20	Bureau of Agriculture and Rural; Edible Fungi Industry Center	2022-2023
(2) Formulating heritage management measures			
-Formulating the Measures for Protecting and Developing the Important Agricultural Heritage System of QFMCS	5	Bureau of Agriculture and Rural; Edible Fungi Industry Center	2022-2023
-Formulating the Measures for Using the Agricultural Heritage System Logo of QFMCS	5	Bureau of Agriculture and Rural; Edible Fungi Industry Center	2022-2023
(3) Compiling teaching materials for popular science education			
-Compiling guide manuals and practical technical manuals	5	Edible Fungi Industry Center	2022-2023
-Making series of popular science micro animation of QFMCS	10	Edible Fungi Industry Center	2022-2025
(4) Publicizing agricultural heritage system through various channels			
-Holding short video competitions of QFMCS; Creating popular science micro articles; Organizing media to push the special news of QFMCS	15	Convergence Media Center; Publicity Department of County Party Committee	2022-2025
-Designing exquisite products such as cartoon dolls, refrigerator stickers or other handicrafts with mushroom images	20	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
(5) Participating in and organizing agricultural heritage system activities			
-Holding the annual competition of mushroom cultivation skills	15	Edible Fungi Industry Center	2022-2025

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
-Holding exhibitions or competitions of essays, poems, fictions and photographic works	10	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Multi-channel publicity and exhibition of farming culture	30	Bureau of Agriculture and Rural; Edible Fungi Industry Center	2022-2025
2.2 Ecological Conservation Actions			
(1) Protecting edible fungi, local varieties and other germplasm resources			
-Construction of “one area, one museum and five banks” of edible-medicinal fungi germplasm resources in Baishanzu National Park	300	Edible Fungi Industry Center	2022-2025
-Edible Fungi Germplasm Resources Bank in Zhejiang Province	100	Edible Fungi Industry Center	2022-2025
(2) Protecting and monitoring rare and endangered species			
-Establishing a monitoring station of rare fungus conservation and macro fungus diversity	20	Edible Fungi Industry Center	2022-2023
-Building 20 <i>mu</i> wild population recovery base of <i>Abies beshanzuensis</i>	150	Baishanzu Management Office	2022-2025
(3) Managing the forest ecosystem			
-Establishing early warning and monitoring system of forest fires	50	Bureau of Natural Resources and Planning	2022-2025
-Preventing and controlling forest diseases and insect pests	50	Bureau of Natural Resources and Planning	2022-2025
-Transformation of forest form	100	Bureau of Natural Resources and Planning	2022-2025
-Tending of mushroom forests	30	Bureau of Natural Resources and Planning	2022-2025
(4) Managing the rural ecological environment			
-Promoting ecological agricultural techniques	100	Bureau of Agriculture and Rural	2022-2025

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
-Implementing the garbage in-place classification and resource utilization	100	Bureau of Agriculture and Rural	2022-2025
(5) Carrying out the monitoring and evaluation of ecological environment			
-Building water quality automatic station, air automatic station, noise station and radiation station	100	Qingyuan Branch of Lishui Ecological Environment Bureau	2022-2023
-Establishing the monitoring system for forest resources	100	Qingyuan Branch of Lishui Ecological Environment Bureau	2022-2023
2.3 Cultural Inheritance Actions			
(1) Carrying out survey on farming cultures and making a catalog for them			
-Establishing the farming culture multimedia database	20	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Perfecting and updating the collections of Qingyuan <i>Xianggu</i> Museum	50	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
(2) Protecting and repairing traditional villages, ancient buildings and relics			
- Repairing ancient buildings and relics	150	Bureau of Housing and Urban-Rural Development	2022-2023
- Protecting traditional villages	200	Bureau of Housing and Urban-Rural Development	2022-2023
(3) Protecting folk culture			
-Publishing Qingyuan farming culture album	5	Bureau of Culture, Broadcast and Television, Tourism and Sports	2024-2025
-Carrying out inheritance activities of farming culture	20	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Holding the Qingyuan mushroom culture festival (Pilgrimage activities of Wu Sangong)	600	Qingyuan mushroom culture festival organizing committee office	2022-2025

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
(4) Protecting and carrying forward traditional techniques			
-Declaration for municipal level, provincial level intangible culture heritage	10	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Selecting inheritor of agricultural heritage system	20	Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Education	2022-2025
-Carrying out the teaching of <i>Xianggu Kungku</i> and <i>Gumin</i> opera	30	Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Education	2022-2025
(5) Publicizing and displaying farming cultures			
-Making promotional materials and special website	20	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Making promotional video of farming culture	25	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
2.4 Eco-agricultural Product Development Actions			
(1) Constructing organic mushroom production bases			
-Constructing Huilongwan <i>Duohua</i> cultivation base	50	Edible Fungi Industry Center	2022-2025
-Constructing wood log cultivation demonstration bases	50	Edible Fungi Industry Center	2022-2025
-Constructing standardized production bases of mushroom	50	Edible Fungi Industry Center	2022-2025
(2) Excavating ecological agricultural products in the site			
-Cultivating new varieties of edible fungi	20	Bureau of Agriculture and Rural	2022-2025
-Cultivating characteristic forest and fruit industry	50	Bureau of Agriculture and Rural	2022-2025
-Subsidies for the development of specialty agriculture	50	Bureau of Agriculture and Rural	2022-2025

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
(3) Developing agricultural product processing and cultivating leading enterprises			
-Rewarding leading enterprises in agricultural production	200	Bureau of Economy and Commerce	2022-2025
(4) Carrying out product certification and brand building			
-Rewarding brand certification of <i>Duohua</i> , wood log and substitute material cultivation of mushroom	30	Bureau of Agriculture and Rural	2022-2025
(5) Improving the research capability and increasing the technical support			
-Scientific research on the production of summer mushroom and the introduction of rare edible fungi	10	Edible Fungi Industry Center	2022-2025
-Formulating the technical standards of <i>Duohua</i> cultivation and wood log cultivation	10	Edible Fungi Industry Center	2022-2025
(6) Constructing the market circulation service system			
-Building the professional market of agricultural products based on Qingyuan Mushroom Market	50	Administration for Market Regulation	2022-2023
-Building the management and control ability of mushroom market	50	Administration for Market Regulation	2022-2023
2.5 Sustainable Tourism Development Actions			
(1) Integrating tourism resources and designing tourism products			
-Construction of tourist destinations such as Longyan "looking for the origin of mushroom", Huangpi "cycling and walking base", Zhailang "military tourist town"	700	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
-Designing and making a batch of tourism souvenirs reflecting the connotation of forest and mushroom co-culture system.	50	Bureau of Culture, Broadcast and Television, Tourism and Sports	2022-2025
(2) Protecting the agroforestry landscape			

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
-Carrying out afforestation, beautify and clean of mushroom sheds	50	Bureau of Agriculture and Rural	2022-2025
(3) Protecting village landscape			
-Improving the village landscape	200	Bureau of Agriculture and Rural	2022-2025
-Restoring and transforming the ancient road in the village	100	Bureau of Housing and Urban-Rural Development	2022-2023
(4) Constructing leisure farm with special characteristics			
-Creating a agritainment gathering village	10	Bureau of Agriculture and Rural	2022-2023
-Creating a provincial level leisure village	10	Bureau of Agriculture and Rural	2022-2023
(5) Constructing the leisure agriculture management service system			
-Training service personnels	20	Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Agriculture and Rural	2022-2025
-Building the information service system	20	Bureau of Culture, Broadcast and Television, Tourism and Sports; Bureau of Agriculture and Rural	2022-2025
(6) Improving the infrastructures in the site			
-Construction of infrastructures such as roads, water and electricity, and telecommunications in the site	150	Bureau of Housing and Urban-Rural Development	2022-2025
-Constructing interpretation sign in important landscape node	50	Bureau of Housing and Urban-Rural Development	2022-2025
2.6 Capability Building Actions			
(1) Popularizing the heritage protection thought			

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
-Compiling the textbook about QFMCS for primary and secondary school students	35	Bureau of Education	2022-2023
-Promoting the QFMCS regularly	10	Bureau of Education	2022-2025
-Carrying out the theme activity of QFMCS for primary and secondary school students	8	Bureau of Education	2022-2025
(2) Strengthening study and guidance of administrative cadres, enterprises, craftsmen and representatives of farmer households			
-Visiting other GIAHS sites	10	Bureau of Human Resources and Social Security; Bureau of Agriculture and Rural	2022-2025
-Carrying out the annual mushroom technology training class of "Mushroom Township Master"	20	Bureau of Human Resources and Social Security; Bureau of Agriculture and Rural	2022-2025
(3) Enhancing the cooperation with scientific research institutions in colleges and universities			
-Research on the mechanization and industrialization cultivation technique of <i>Grifola frondosa</i>	50	Bureau of Science and Technology; Edible Fungi Industry Center	2022-2023
-Setting up the subsidies for mushroom industry in the county-level science and technology plan project (100,000 RMB Yuan per year)	50	Bureau of Science and Technology	2022-2025
-Setting up a mushroom industry project in the biennial provincial science and technology commissioner project (300,000 RMB Yuan each)	60	Bureau of Science and Technology	2022-2025
(4) Promoting intellectual support and services			
-Cultivating more than 5 high-quality talents of edible fungi every year	25	Bureau of Agriculture and Rural	2022-2025
-Building a postdoctoral workstation	40	Bureau of Human Resources and Social Security	2022-2025
-Building 5 county-level master studios and 1 municipal level master studios	12	Bureau of Human Resources and Social Security	2022-2025

Action Plans	Budget (10 ⁴ yuan)	Key Implementer(s)	Implementation Period
(5) Cultivating new agricultural managers			
-Cultivating two new agricultural managers engaged in the production of mushroom every year	25	Bureau of Agriculture and Rural	2022-2025
-Encouraging the inheritance activities of agricultural managers	10	Bureau of Agriculture and Rural	2022-2025
-Supporting new industries and new forms of business	20	Bureau of Agriculture and Rural	2022-2025
(6) Selecting demonstration households of heritage protection and development			
-Supporting and publicizing the activities of demonstration farmers	5	Publicity Department of County Committee; Edible Fungi Industry Center	2022-2025
Total	4845		

3 Guarantee Measures

3.1 Multi-party Participation Mechanism

The protection of QFMCS requires joint participation of the government, enterprises, farmers, scientific research institutions and media. A multi-party participation mechanism from local places to the nation and even the international community should be established to actively exert the characteristics and advantages of all parties to guarantee effective implementation of the heritage protection plan (Table 22).

Table 22 Multi-party participation mechanism of heritage protection

Group	Cooperative organizations	Role
National level	Ministry of Agriculture and Rural Affairs	Formulating policies and regulations related to agricultural heritage system
		Providing support to GIAHS application
		Guiding the protection work of QFMCS
Local level	Zhejiang Province	Guidance, administration, service and supervision of agricultural heritage system protection
		Publicity and promotion of agricultural heritage system
	Qingyuan County	Formulating protection and development plans of QFMCS
		Establishing specialized service teams of agricultural heritage system protection
		Encouraging farmers to set up cooperatives
	Enterprises	Improving the competitiveness of agricultural products through large-scale cultivation
		Broadening the sales channels of agricultural products
		Driving the surrounding villages to actively develop mushroom and expanding the planting scale
	Farmers	Managing forests and cultivating mushrooms
		Promoting the inheritance of forest and mushroom co-culture culture from generation to generation
	Scientific research institution	Conducting systematic researches around QFMCS
		Providing technical support for heritage protection
	Media	Publicizing the works related to heritage protection

National level: Ministry of Agriculture and Rural Affairs is responsible for formulating the policies and regulations, strengthening the supervision of protection and development, and establishing the public trust of important agricultural heritage system. In the meanwhile, it takes charge of strengthening cooperation with FAO and other international organizations to guide local GIAHS declaration.

Local level: firstly, it is the guidance, management, service and supervision of agricultural heritage system within the jurisdiction of Zhejiang Province, including publicity, promotion and actively striving for supporting policies; secondly, it is the specific management of QFMCS within the jurisdiction of Qingyuan County, including

the establishment of leading group for protection of agricultural heritage system, the establishment of a multi-sector cooperation mechanism for heritage protection and development, the establishment of a primary-level committee for heritage protection independently governed by villagers with joint participation of village committee and enterprises in the village, and supporting the construction of industry associations, societies, leading enterprises and other community organizations in the site; thirdly, it is the driving force of enterprises to the development of mushroom industry, farmers' active participation in mushroom cultivation, protection and inheritance of farming cultures, scientific research about QFMCS carried out by scientific research institutions, and media reports on work related to heritage protection.

3.2 Fund Leverage and Resources Mobilization

The heritage protection requires the policy guidance and financial support from the governments. Government financial supports for heritage protection mainly include: firstly, government special funds allocated for heritage protection; secondly, funds which can be attained according to some national and local policies supporting development of the mushroom industry or some major agricultural strategies such as the *Rural Revitalization Strategy*; thirdly, formulating supporting policies to improve and adjust current financial budget so as to list the project fund into the government financial budget, and meanwhile issue the corresponding policies focusing on tax breaks and land transfer to eliminate restrictions on enterprises and farmers; fourthly, carrying out the eco-compensation system to encourage enterprises and farmers to resume the traditional cultivation and to develop leisure agriculture.

Financial support from society is also very important. Local government should establish and improve regular social donation activities that are conducive to heritage protection, clarify donation policies and responsibilities, formulate management and operation specification, and incorporate regular social donation activities into the scope of heritage management.

3.3 Monitoring and Evaluation Mechanism

In order to guarantee the effective protection of QFMCS, according to the selection criteria of GIAHS by FAO, the heritage monitoring and evaluation indicators shall be designed from four aspects, namely economic and livelihood function, biodiversity and landscape value, traditional knowledge and techniques, cultural protection and inheritance. Based on the monitoring results, the sustainable development capacity of the site will be analyzed and evaluated regularly, forming an annual evaluation report and monitoring report. Results will be reported to the Ministry of Agriculture and Rural

Affairs through the dynamic monitoring system of GIAHS in China.

The monitoring and evaluation will be carried out from three aspects according to the actual situation of QFMCS. Firstly, it is the annual work, including the annual self-evaluation of the site and the filling of dynamic monitoring system related to heritage. During the implementation of the protection action plan (2022-2025), under the leadership of leading group for the protection of QFMCS, the implementation effect of the year shall be evaluated and summarized, and improvement scheme shall be put forward to solve existing problems. Meanwhile, according to the requirements of Ministry of Agriculture and Rural Affairs, the filling of dynamic monitoring system of agricultural heritage system should be completed promptly. Secondly, it is the mid-term evaluation. For the part with deviation between the action plans and the expected goals, experts shall be organized to consult in time. The action plan shall be modified and improved according to the experts' opinions and suggestions, and shall be submitted to the superior management department. Thirdly, it is experts' field assessment at the end of the planning period. It is needed to actively cooperate with the inspection of Ministry of Agriculture and Rural Affairs, actively listen to the opinions and suggestions of the professional committee, optimize the protection action plans, and further promote the actual implementation of the protection action plans.

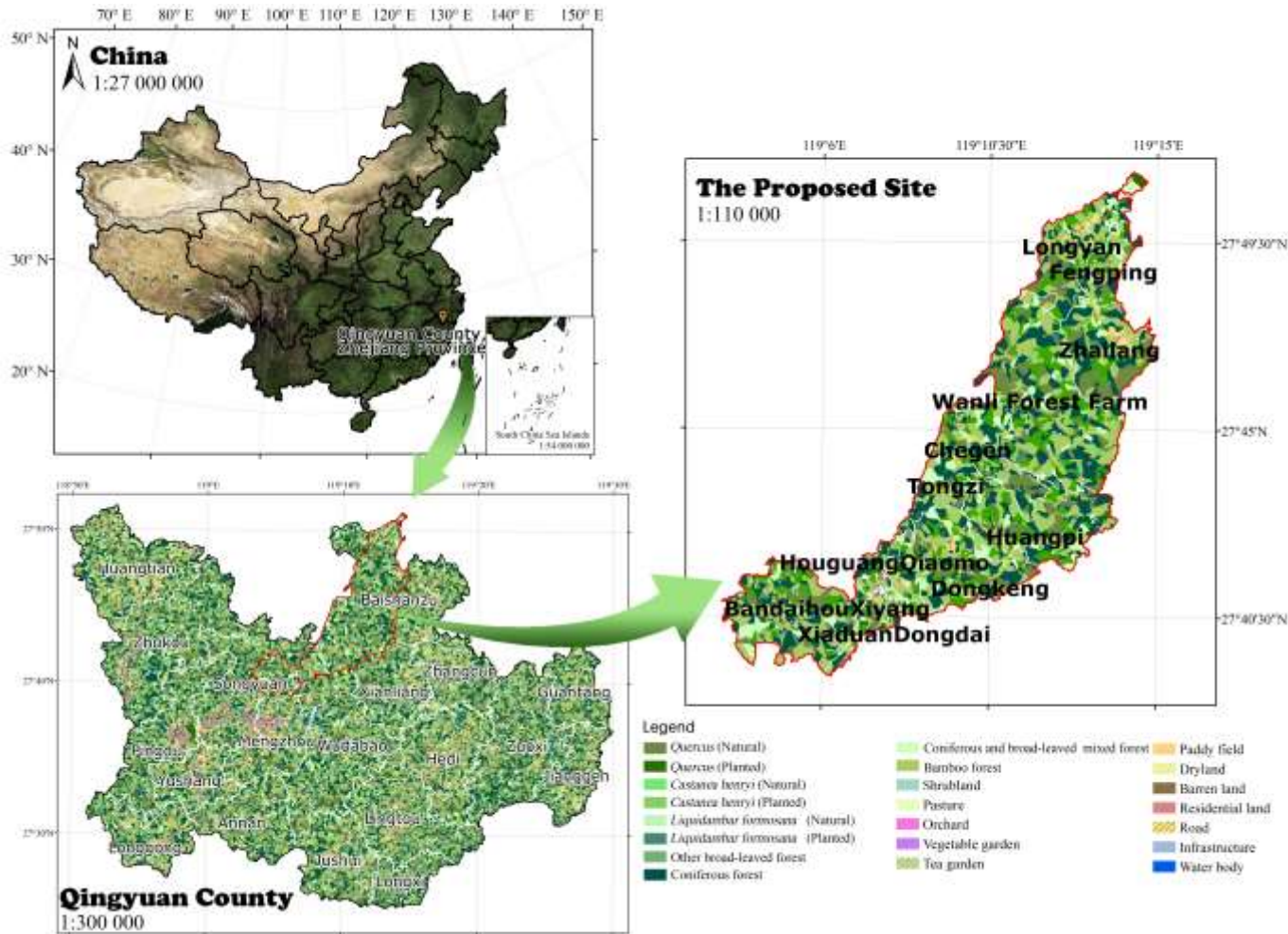
VI. Additional Information to be Included as an Annex

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2 Location of the Proposed Site



3 List of Biodiversity

3.1 Flora

GYMNOSPERMAE

Cycadaceae

Cycas revoluta (Cultivation)

C. rumphii (Cultivation)

Ginkgoaceae

Ginkgo biloba

Pinaceae

Abies beshanzuensis

A. firma (Cultivation)

Cedrus deodera (Cultivation)

Keteleeria cycloIcpis

Pinus armandi (Cultivation)

P. elliotii (Cultivation)

P. massoniana

P. palustris (Cultivation)

P. parviflora (Cultivation)

P. taeda (Cultivation)

P. taiwanensis

P. thunbergii (Cultivation)

P. rigida (Cultivation)

Pseudolarix amabilis

Pseudotsuga gaussenii

Tsuga tchekiensis

T. oblongisquamata

Taxodiaceae

Cryptomeria fortunei

C. japonica (Cultivation)

Cunninghamia lanceolata

Metasequoia glyptostroboides
(Cultivation)

Sequoia sempervirens (Cultivation)

Taiwania cryptomerioides (Cultivation)

Taxodium ascendens (Cultivation)

T. distichum (Cultivation)

Cupressaceae

Chamaecyparis obtusa (Cultivation)

Ch. pisifera (Cultivation)

Ch. pisifera var. *plumosa* (Cultivation)

Cupressus funebris (Cultivation)

Fokienia hodginsii

Juniperus formosana

Platycladus orientalis (Cultivation)

P. orientalis cv. *Sieboldii* (Cultivation)

Sabina chinensis (Cultivation)

S. chinensis cv. *Kaizuca* (Cultivation)

S. procumbens (Cultivation)

Thuja occidentalis (Cultivation)

T. standishii (Cultivation)

Thujopsis dolabrata

Podocarpaceae

Podocarpus macrophyllus (Cultivation)

P. macrophyllus var. *chingii*

P. macrophyllus var. *maki*

P. nagi (Cultivation)

P. neriifolius

Cephalotaxaceae

Cephalotaxus fortunei

C. fortunei var. *concolor*

C. sinensis

Taxaceae

Amentotaxus argotaenia

Pseudotaxus chienii

Taxus chinensis

T. chinensis var. *mairei*

Torreya grandis

T. jackii

ANGIOSPERMAE

Dicotyledoneae

Archichlamydeae (Cultivation)

Casuarinaceae

Casuarina equisetifolia (Cultivation)

Saururaceae

Houttuynia cordata

Saururus chinensis

Piperaceae

*Piper hancei**P. kadsura***Chloranthaceae***Chloranthus fortunei**Ch. henryi**Ch. multistachys**Ch. serratus**Ch. spicatus**Ch. sp.**Sarcandra glabra***Salicaceae***Populus adenopoda**P. canadensis* (Cultivation)*P. nigra* (Cultivation)*P. nigra* var. *italica* (Cultivation)*Salix babylonica* (Cultivation)*S. chaenomeloides* Var. *glandulifolia**S. chienii**S. chaenomeloides**S. dunnii**S. glandulosa**S. matsudana* (Cultivation)*S. rosthornii**S. wilsonii***Myricaceae***Myrica rubra***Juglandaceae***Carya cathayensis* (Cultivation)*C. illinoensis* (Cultivation)*Cyclocarya paliurus**Engelhar dtiafenzelii**Juglans cathayensis* var. *formosana**J. regia* (Cultivation)*Platycarya strobilacea**Pterocarya insignis**P. stenoptera***Betulaceae***Alnus cremastogyne**A. trabeculosa**Betula luminifera**Carpinus falcatisbracteata**C. londoniana**C. londoniana* var. *latifolia**C. viminea* wall*Osterya multinervis***Fagaceae***Castanea henryi**C. mollissima**C. seguinii**Castanopsis carlesii**C. eyrei**C. fabri**C. fargesii**C. fordii**C. jucunda**C. sclerophylla**C. tibetana**Cyclobalanopsis chekiangensis**C. ciliaris**C. gilva.**C. glauca**C. gracilis**C. jenseniana**C. multinervis**C. myrsinaefolia**C. nubium**C. stewardiana**Fagus engleriana**F. longipetiolata**F. lucida**F. pashanica**Lithocarpus cleistocarpus**L. glaber**L. hancei**L. harlendii**L. iteaphyllum**L. naiadarum**L. polystachyus**L. spicatus**Quereus acutissima**Q. aliena* var. *acuteserrata**Q. chenii**Q. engleriana**Q. fabri**Q. glandulifera**Q. glandulifera**Q. oxyphylla**Q. phillyraeoides*

Q. variabilis

Ulmaceae

Aphananthe aspera

A. aspera var. *pubescens*

Celtis biondii

C. bungeana

C. julianae

C. tetrandra subsp. *sinensis*

C. vandervoetiana

Hemiptelea davidii

Trema cannabina var. *dielsiana*

Ulmus bergmanniaua

U. changii

U. davidiana planch. var. *japonica*

U. elongata

U. szechuanica.

U. multinervis

U. parvifolia

U. pumila (Cultivation)

Zelkova schneideriana

Z. serrata

Moraceae

Broussonetia kaempferi

B. kazinoki

B. papyrifera

Cudrania cochinchinensis

C. tricuspidata

Fatoua villosa

Ficus beecheyana

F. carica

F. erecta var. *bee-cheyana*

F. formosana

F. gasparriniana var. *virid-escens*

F. heteromorpha

F. microcarpa

F. pandurata

F. pandurata var. *angustifolia*

F. pandurata var. *holo-phylla*

F. pandurata var. *linearis*

F. pumila

F. sarmentosa var. *henryi*

F. sarmentosa var. *impressa*

F. stenophylla

F. variolosa

Morus alba

M. australis

M. cathayana

Cannabinaceae

Humulus scandens

Urticaceae

Boehmeria clidemioides var. *diffusa*

B. formosana

B. gracilis

B. grandifolia

B. japonica

B. longispica

B. nivea

B. nivea var. *tenacissima*

B. platanifolia

B. silvestrii

B. spicata

Elatostema involucreatum

E. lineolatum var. *majus*

E. obtusum

E. stewardii

Gonostegia hirta

Laportea bulbifera var. *sinensis*

L. dielsii

Nanocnide pilosa

Oreocnide frutescens

Pellionia minima

P. radicans

P. scabra

Pilea cavaleriei

P. fasciata

P. mongolica

P. notata

P. peploides

P. swinglei

Pouzolzia zeylanica

Porteaceae

Helicia Cochinchinensis

Oliaceae

Schoepfia jasminodora

Santalaceae

Thesium chinense

Loranthaceae

Loranthus caloreas var. *fargesii*
L. caloreus var. *oblongifolius*
L. delavayi
L. yadoriki
Taxillum kaempferi
T. Ievinei
Viscum album
V. articulatum
V. coloratum
V. diospyrosicolum

Aristolochiaceae

Aristolochia conorta
A. debilis
A. heterophylla
A. kaempferi
A. moupinensis.
A. tubiflora
Asarum caudigerum
A. fukienense
A. ichangense
A. insigne
A. macranthum
A. sieboldii

Balanophoraceae

Balanophora japonica

Polygonaceae

Antenoron filifopme
A. neofiliforme
Fagopyrum cymosum
F. esculentum
Polygonum alatum
P. aviculare var. *vegetum*
P. barbatum var. *gra-cile*
P. caespitosum
P. caespitosum var. *Laxiflorum*
P. chinense
P. criopolitanum
P. cuspidatum
P. dichotomum
P. dissitiflorum
P. hydropiper
P. hydropiper var. *hispidum*
P. japonicum
P. jucundum.

P. Iapathifolium
P. longisetum
P. macranthum
P. microcephalum
P. minutissimum sp.
P. multiflorum
P. muricatum
P. nepalense var. *microphyllum*
P. noposumpers
P. opacum
P. orientale
P. perfoliatum
P. persicarium
P. persicaria
P. pubescens
P. senticosum
P. sieboldii
P. sinicum
P. suffultum
P. thunbergii
P. trigonocarpum
P. viscoferum var. *robustum*
P. viscosum
Rumex acetosa
R. japonicus
R. madaio

Chenopodiaceae

Chenopodium album
Spinacia olcracea

Amaranthaceae

Achyranthes asperabidentata
A. longifolia
Alternanthera sessilis
Amaranthus caudatus
A. Lividus
A. mangostanus
A. tricolor
A. viridis
Celosia argentea
C. cristata
Gomphrena globosa

Nyctaginaceae

Mirabilis jalapa

Phytolaccaceae

Phytolacca acinosa
P. americana

Aizoaceae

Mollugo pentaphylla

Portulacaceae

Portulaca granoliflora (Cultivation)
P. oleracea
Talinum paniculatum

Basellaceae

Basella rubra

Caryophyllaceae

Arenaria serpyllifolia
Cerastium caespitosum
C. caespitosum var. *glandulosum*
C. glomeratum
Lychnis coronata
L. senno
Malachium aquaticum
Melandrium apricum
Pseudostellaria heterophylla
Sagina japonica
S. maxima
Silene fortunei
Stellaria alsine var. *undnlala*
S. chinensis
S. media

Trochodendraceae

Euptelea pleiospermum

Cercidiphyllaceae

Cercidiphyllum japonicum var. *sinense*

Ranunculaceae

Aconitum carmichaeli
A. finetianum
Anemone flaccida
A. hupehensis var. *japonica*
Cimicifuga acerina
Clematis apiifolia
C. apiifolia var. *obtuside-ntata*
C. argenticulida

C. armandi
C. chekiangensis
C. chinensis
C. dilatata
C. finetiana
C. ganpiniana
C. henryi
C. lasiandra
C. meyeniana
C. montana
C. pseudootophora
C. uncinata
Coptis chinensis
C. chinensis var. *brevisepela*
Dichocarpum sutchuenense
Paeonia lactiflora (Cultivation)
P. suffruticosa (Cultivation)
Ranunculus chinensis
R. japonicus
R. sieboldii
Semiaquilegia adoxoides
Thalictrum acutifolium
Th. faberi
Th. fortunei
Th. Javanicum

Lardizabalaceae

Akebia quinata
A. trifoliata
A. trifoliata var. *australis*
Decaisnea fargesii
Holboellia coriacea
H. fargesii
Stauntonia brachyanthera
S. leucantha
S. maculata
S. obovata

Sargentodoxaceae

Sargentodoxa cuneata

Berberidaceae

Berberis lempergiana
B. virgetorum
Bjuliae Scheid
Dysosma pleiantha
D. versipellis

*Epimedium grandiflorum**E. sagittatum**Mahonia bealei**M. confusa* (Cultivation)*M. fortunei**M. japonica**Nandina domestica****Menispermaceae****Cocculus orbiculatus**Diploclisia chinensis**Menispermum dauricum**Pericampylus glaucus**Sinomenium acutum**S. acutum* var. *cinereum**Stephania cepharantha**S. japonica**S. tetrandra****Magnoliaceae****Liriodendron chinense**L. tulipifera* linu (Cultivation)*Magnolia amoena**M. biloba**M. cylindrica**M. denudata**M. grandiflora* (Cultivation)*M. liliflora**M. siebolii**Marglietia insignis* (Cultivation)*M. yuyunensis**Michelia alba* (Cultivation)*M. fallax**M. figo* (Cultivation)*M. foveoalta* var. *cinerascens**M. macclurei* var. *sublanaea* (Cultivation)*M. maudiae**M. skinneriana**Parakmeria lotungensis**Tsoongiodendron odorum* (Cultivation)***Schisandraceae****Kadsura japonica**K. longipedunculata**Schisandra henryi**S. sphenanthera**S. viridis****Illiciaceae****Illicium lanceolatum**I. jiadifengpi* var. *baisanense****Calycanthaceae****Chimonanthus nitens**Ch. praecox**Ch. salicifolius**Ch. Zhejiangensis****Lauraceae****Cinnamomum austro-sinense**C. camphora**C. chekiangense**C. micranthum**C. porrectum**C. rigidissimum**C. subavenium**Lindera angustifolia**L. communis**L. communis* var. *tomentosa**L. erythrocarpa**L. floribunda**L. fruticosa**L. glauca**L. megaphylla**L. obtusiloba**L. reflexa**L. reflexa* var. *barbata* var. *nov.ined.**L. rubronervia**L. strychnifolia**L. strychnifolia* F. Villarform*Litsea Coreana* var. *lanuginosa**L. coreana* Ievl var. *sinensis**L. cubeba**L. cubeba* var. *formosana**L. elongata**L. pungens**Machilus brachybotrys**M. grijsii**M. ichangensis**M. leptophylla**M. leveneii**M. litseifolia**M. oreophila**M. pauhoi* kanehira

<i>M. phoenicis</i>	<i>Orostachys erubescens</i>
<i>M. salicina</i>	<i>O. fimbriatus</i>
<i>M. thunbergii</i>	<i>Sedum aizoom</i>
<i>M. velutina</i>	<i>S. alfredii</i>
<i>Neolitsea aurata</i>	<i>S. bulbiferum</i>
<i>N. aurata</i> var. <i>chekiangensis</i>	<i>S. ellacombianum</i>
<i>N. aurata</i> var. <i>paracicu-lata</i>	<i>S. emarginatum</i>
<i>N. aurata</i> var. <i>undulatula</i>	<i>S. erythrostictum</i>
<i>Phoebe bournei</i>	<i>S. drymarioides</i>
<i>Ph. chekiangensis</i>	<i>S. formosanum</i>
<i>Ph. sheareri</i>	<i>S. japonicum</i>
<i>Sassafras tsumu</i>	<i>S. kamtschaticum</i>
<i>Papaveraceae</i>	<i>S. leptophyllum</i>
<i>Corydalis decumbens</i>	<i>S. lineare</i>
<i>C. incisa</i>	<i>S. makinoi</i>
<i>C. Pallida</i>	<i>S. mingjinianum</i>
<i>C. racemosa</i>	<i>S. polytrichoides</i>
<i>C. tashiroi</i>	<i>S. sarmentosum</i>
<i>Eomecon chionantha</i>	<i>S. subtile</i>
<i>Macleaya cordata</i>	<i>S. verticillafum</i>
<i>Cruciferae</i>	<i>Saxifragaceae</i>
<i>Arabis flagellosa</i>	<i>Astilbe austro-sinensis</i>
<i>Brassica campestris</i> (Cultivation)	<i>A. chinensis</i>
<i>B. juncea</i> (Cultivation)	<i>A. grandis</i>
<i>Capsella bursa-pastoris</i>	<i>Cardiandra moellendorffii</i>
<i>Cardamine flexuosa</i>	<i>Ckryosplenium macrophyllum</i>
<i>C. hirsuta</i>	<i>C. pilosum</i> var. <i>valdepilosum</i>
<i>C. lyrata</i>	<i>Deutzia glauca</i>
<i>Matthiola incna</i>	<i>D. ningpoensis</i>
<i>Orychophragmus Violaceus</i>	<i>D. scabr</i>
<i>Raphanus sativus</i>	<i>Hydrangea anomala</i>
<i>Rorippa atrovirena</i>	<i>H. jiangxiensis</i>
<i>R. indica</i>	<i>H. macrophylla</i> ssp. <i>serrata</i>
<i>R. montana</i>	<i>H. macrophylla</i> var. <i>normalis</i>
<i>Bretschneideraceae</i>	<i>H. strigosa</i>
<i>Bretschneidera sinensis</i>	<i>H. paniculata</i>
<i>Droseraceae</i>	<i>H. umbellata</i>
<i>Drosera peltata</i> var. <i>glabrata</i>	<i>Itea chinensis</i> var. <i>oblonga</i>
<i>D. Peltata</i>	<i>Philadelphus brachybotrys</i> var. <i>Koehne</i>
<i>D. rotundifolia</i>	<i>P. incanus</i>
<i>Crassulaceae</i>	<i>P. sericanthue</i>
<i>Echeveria glauca</i>	<i>Pileostegia viburnoldes</i>
	<i>Platycrater arguta</i>
	<i>Ribes fasciculatum</i> var. <i>chinense</i>
	<i>Saxifraga fortunei</i>
	<i>S. stolonifera</i>

<i>S. zhejiangensis</i> sp.	<i>C. sinensis</i>
<i>Schizophragma glaucescens</i>	<i>Crataegus cuneata</i>
<i>S. integrifolium</i>	<i>C. hupehensis</i>
<i>S. integrifolium</i> f. <i>denticulatu</i>	<i>Duchesnea indica</i>
<i>S. molle</i>	<i>Eriobotrya japonica</i>
<i>Tiarella polyphylla</i>	<i>Geum japonicum</i> var. <i>chinense</i>
Platanaceae	<i>Kerria japonica</i>
<i>Platanus acerifolia</i> (Cultivation)	<i>Maddenia hypoleuce</i>
Pittosporaceae	<i>M. doumeri</i>
<i>Pittosporum illicioides</i>	<i>Malus halliana</i>
<i>P. illicioides</i> var. <i>stenopyllum</i>	<i>M. hupehensis</i>
<i>P. tobira</i>	<i>M. melliana</i>
Hamamelidaceae	<i>M. pumila</i>
<i>Altingia chinensis</i> .	<i>M. sp.</i>
<i>A. gracilipes</i>	<i>Photinia beauverdiana</i>
<i>A. gracilipes</i> var. <i>serrulata</i>	<i>Ph. beauverdiana</i> var. <i>brevifolia</i>
<i>A. yunnanensis</i>	<i>Ph. beauverdiana</i> var. <i>notabilis</i>
<i>Corylopsis glandulifera</i>	<i>Ph. davidsoniae</i>
<i>C. glandulifera</i> var. <i>hypoglauca</i>	<i>Ph. glabra</i>
<i>C. sinensis</i>	<i>Ph. hirsuta</i>
<i>C. sinensis</i> var. <i>calvescens</i>	<i>Ph. lasiogyna</i>
<i>Disanthus cercidifolus</i> var. <i>longipes</i>	<i>Ph. parvifolia</i>
<i>Distylium buxifolium</i>	<i>Ph. Prunifolia</i>
<i>D. myricoides</i>	<i>Ph. schneideriana</i>
<i>D. racemosum</i>	<i>Ph. serrulata</i>
<i>Hamamelis mollis</i>	<i>Ph. subumbellata</i>
<i>Liquidambar acalycina</i>	<i>Ph. villesa</i>
<i>L. formosana</i>	<i>Ph. villesa</i> var. <i>sinica</i>
<i>Loropetalum chinensis</i>	<i>Ph. zhejiangensis</i>
<i>Semiliquidambar Cathayensis</i>	<i>Potentilla discolor</i>
<i>S. caudata</i>	<i>P. freyniana</i>
<i>S. caudata</i> var. <i>cuspidata</i>	<i>P. kleiniana</i>
<i>S. chingii</i>	<i>Prunus armeniaca</i>
<i>Sycopsis sinensis</i>	<i>P. brachypoda</i> var. <i>eglandulosa</i>
Eucommiaceae	<i>P. brachypoda</i> var. <i>nudiuscula</i>
<i>Eucommia ulmoides</i> (Cultivation)	<i>P. buergeriana</i>
Rosaceae	<i>P. campanulat</i>
<i>Agrimonia pilosa</i>	<i>P. davidiana</i>
<i>Amelanchier asiatica</i>	<i>P. dielsiana</i>
<i>A. sinica</i>	<i>P. discoidea</i>
<i>Aruncus sylvester</i>	<i>P. glabra</i>
<i>Chaenomeles cathayensis</i>	<i>P. glandulosa</i>
	<i>P. japonica</i>
	<i>P. mume.</i>
	<i>P. pendula</i>
	<i>P. persica</i>

- P. persica* form *duplex* (Cultivation)
P. persica form *pendula* (Cultivation)
P. persica var. *compressa* (Cultivation)
P. persica var. *densa* (Cultivation)
P. phaeosticta
P. pseudocerasus (Cultivation)
P. sallcina
P. serrulata
P. serrulata var. *pubesens*
P. serrulata var. *spontanea*
P. spinulosa
P. vaniotii
P. venosa *koehne*.
P. wilsonii
P. zippeliana
Pyrus bretschneideri (Cultivation)
P. calleryana
P. calleryana f. *tomentella*
P. calleryana var. *integrifolia*
P. pyrifolia
P. serrulata
Raphiolepis major
R. indica
Rhodotypos scandens
Rosa bracteata
R. chinensis
R. cymosa
R. henryi
R. laevigata
R. multiflora
R. multiflora var. *cathayensis*
R. rugosa (Cultivation)
Rubus adenophorus
R. alceaefolius
R. amphidasys
R. buergeri
R. chiliadenus
R. chingii
R. carchorifolius
R. coreanus
R. fokiensis sp.
R. glabricarpus
R. grayanus
R. hirsutus
R. illecebrosus
R. impressinervius
R. innominatus
R. innominatus var. *kuntzeanus*
R. irenaeus
R. lambertianus
R. lishuiensis
R. malifolius
R. pacifuse
R. parvifolius
R. peltatus
R. pungens var. *indefensus*
R. refleyus
R. reflexus var. *hui*
R. rosaefolius
R. sumatranus
R. swinhoei
R. tephrodes
R. tephrodes var. *ampliflorus*
R. trianthus
R. tsangorum
Sangnisorba officinalis
Sorbus amabilis
S. dunnii
S. folgneri
S. hemsleyi
Spiraea blumei
S. blumei var. *latipetala*
S. cantoniensis
S. chinensis
S. hirsuta
S. japonica f. var. *acuminata* (planch.)
S. japonica f. var. *fortunei* (planch.)
S. japonica f. var. *ovalifolia*
S. prnnifolia var. *simpliciflora*
S. tnnbergii
Sthepandra chinensis
Stranvaesia davidiana var. *undulata*
Leguminosae
Acacia catechu
A. dealbata
Aeschynomene indiea
Albizia julibrissin
A. kalkora (poxb.) *ocarpd*
Amorpha fruticosa (Cultivation)
Amphicarpaea edgeworthii var.
trisperma
Apios fortunei

<i>Arachis hypogaea</i>	<i>I. ichangensis</i>
<i>Astragalus sinicus</i>	<i>I. neoglabra</i>
<i>Bauhinia championii</i>	<i>I. nigreseens</i>
<i>Caesalpinia decapetala</i>	<i>I. parkesii</i>
<i>C. vernalis</i>	<i>I. pseudotinctoria.</i>
<i>Campylotropis macrocarpa</i>	<i>Kummerowia stipulacea</i>
<i>Canavalia gladiata</i>	<i>K. striata</i>
<i>Caragana sinica</i>	<i>Lespedeza bicolor</i>
<i>Cassia leschenaultiana</i>	<i>L. buergeri</i>
<i>C. mimosoides</i>	<i>L. chinensis</i>
<i>C. nomame</i>	<i>L. cuneata</i>
<i>C. occidentalis</i>	<i>L. davidii</i>
<i>Cercis chinensis</i>	<i>L. dunnii</i>
<i>C. chuniana</i>	<i>L. floribunda</i>
<i>C. gigantea</i> f. sp. (Cultivation)	<i>L. fordii</i>
<i>Cladrastis platycarpa</i>	<i>L. formosa</i>
<i>C. wilsonii</i>	<i>L. pilosa</i>
<i>Crotalaria ferruginea</i>	<i>L. pubescens</i>
<i>C. Sessiliflora</i>	<i>L. tomentosa</i>
<i>Dalbergia balansae</i>	<i>L. virgata</i>
<i>D. hancei</i>	<i>Maackia hupehensis</i>
<i>D. hupeana</i>	<i>M. tenuifolia</i>
<i>D. millettii.</i>	<i>Millettia dielsiana</i>
<i>D. mimosoides</i>	<i>M. pachycarpa</i>
<i>Derris fordii</i>	<i>M. reticulata</i>
<i>D. scabricaulis</i>	<i>Mimosa pudica</i> (Cultivation)
<i>Desmodium caudatum</i>	<i>Mucuna sempervirens</i>
<i>D. fallax</i>	<i>Ormosia henrhi prain</i>
<i>D. gardneri</i>	<i>O. hosiei</i>
<i>D. gyroides</i>	<i>Phaseolus angularis</i> (Cultivation)
<i>D. heterocarpon</i>	<i>P. mininus</i>
<i>D. heterocarpon</i> var. <i>patulepilosum</i>	<i>P. radiatus</i> (Cultivation)
<i>D. microphyllum</i>	<i>P. vulgaris</i> (Cultivation)
<i>D. multiflorum</i>	<i>Pisum sativum</i> (Cultivation)
<i>D. oldhamii</i>	<i>Pueraria eduli</i>
<i>D. racemosum</i>	<i>P. elegans</i>
<i>D. repandum</i>	<i>P. lobata</i>
<i>Gleditsia japonica</i>	<i>P. phaseoloides</i>
<i>G. sinensis</i>	<i>Rhynchosia acuminatifolia</i>
<i>Glycine max</i>	<i>R. Volubilis</i>
<i>G. soja</i>	<i>Robinia pseudoacacia</i> (Cultivation)
<i>Gymnocladus chinensis</i>	<i>Sophora flavesens</i>
<i>Indigofera amblyantha</i>	<i>S. japonica</i> (Cultivation)
<i>I. decora</i>	<i>S. japonica</i> var. <i>pendula</i> (Cultivation)
<i>I. cooperi</i>	<i>Stizolobium cochinchinensi</i>
<i>I. fortunei</i>	<i>Vicia cracca</i>

V. faba (Cultivation)
V. hirsuta
V. kulingiana
V. terasperma
Vigna sinensis (Cultivation)
V. vexillata
Wisteria sinensis

Oxalidaceae

Oxalis corniculata
O. corniculata var. *repens*
O. corymbosa
O. griffithii

Geraniaceae

Geranium carolinanum
G. nepalense
G. wilfordii

Erythroxylo-aceae

Erythroxylum kunthianum

Rutaceae

Boenninghausenia albiflora
Citrus aurantium (Cultivation)
C. aurantium var. *amara* (Cultivation)
C. grandis (Cultivation)
C. medica (Cultivation)
C. medica var. *sarcocactylis*
C. reticulata (Cultivation)
C. reticulata var. *suavissima*
 (Cultivation)
C. reticulata var. *subcmproessa*
 (Cultivation)
C. reticulata var. *unshiu* (Cultivation)
C. sinensis (Cultivation)
C. wiolsoni
Euodia fargesii
E. rutaecarpa
E. rutaecarpa f. *meionocarpa*
E. rutaecarpa var. *officinalis*
Fortunella crassifolia (Cultivation)
F. hindsii
F. japonica
Orixa japonica
Phellodendron chinense
Poncirus trifoliata

Skimmia japonica
S. reevesiana
Toddalia asiatica
Zanthoxylum ailanthoides
Z. armatum var. *subtrifoliatum*
Z. molle
Z. nitidum
Z. rhetsoldes
Z. scandens
Z. schinifolium
Z. simulans

Simaroubaceae

Ailanthus altissima
Picrasma quassioides

Meliaceae

Aglaia odorata
Melia azedarach
M. toosendan (Cultivation)
Toona Ciliata var. *Pubescens*
T. rubriflora
T. sinensis

Polygalaceae

Polygala arillata
P. aureocauda
P. hongkongensis var. *stenophylla*
P. jaonica
P. latochei

Euphorbiaceae

Acalypha australis.
A. blachystachya
Alchornea davidii
Aleurites fordii
A. montana
Antidesma japonicum
Bischofia polycarpa
Euphorbia adenochloa
E. hirta
E. humifusa
E. lathyris
E. pekinensis
E. sieboldiana
E. supina
Glochidion puberum

<i>G. wilsonii</i>	<i>I. buergeri</i>
<i>Mallotus apelta</i>	<i>I. centrochinensis.</i>
<i>M. japonicus</i>	<i>I. chingyuanensis</i>
<i>M. lianus</i>	<i>I. ciliospinosa</i>
<i>M. philippinensis</i>	<i>I. corallina</i>
<i>M. repandus</i>	<i>I. cornuta</i>
<i>M. tenuifolius</i>	<i>I. Crenata</i>
<i>Mercurialis leiocarpa</i>	<i>I. editicostata</i>
<i>Phyllanthus chekiangensis</i>	<i>I. elmerrilliaua</i>
<i>Ph. flexuosus</i>	<i>I. ficifolia</i>
<i>Ph. glaucus</i>	<i>I. ficoidea</i>
<i>Ph. matsumurae</i>	<i>I. formosana</i>
<i>Ph. urinaria</i>	<i>I. hainanensis</i>
<i>Ricinus communis</i>	<i>I. kengii</i>
<i>Sapium discolor</i>	<i>I. kwangtungensis</i>
<i>S. japonicum</i>	<i>I. latifolia</i>
<i>S. sebiferum</i> (Cultivation)	<i>I. limii</i>
Daphniphyllaceae	<i>I. litseaefolia</i>
<i>Daphniphyllum macropodum</i>	<i>I. lohfauiensis</i>
<i>D. oldhamii</i>	<i>I. macrocarpa</i>
Callitrichaceae	<i>I. macropoda</i>
<i>Callitriche verna</i>	<i>I. micrococca.</i>
Buxaceae	<i>I. pedunculosa</i>
<i>Buxus bodinieri</i> (Cultivation)	<i>I. pubesens</i>
<i>B. henryi</i>	<i>I. purpurea</i>
<i>B. sinica</i>	<i>I. rotunda</i>
<i>B. sinica</i> ssp. <i>aemulans</i>	<i>I. rotunda</i> var. <i>microcarpa</i>
<i>B. sinica</i> var. <i>parvifolia</i>	<i>I. serrata</i> var. <i>sieboldi</i>
<i>Sarcococca orientalis</i>	<i>I. suaveolens.</i>
Anacardiaceae	<i>I. subficoidea</i>
<i>Choerospondias axillaris</i>	<i>I. triflora</i>
<i>Cotinus coggygria</i> var. <i>pubescens</i>	<i>I. triflora</i> var. <i>kane-hirai</i>
<i>Pistacia chinensis</i>	<i>I. tsoii</i>
<i>Rhus chinensis</i>	<i>I. viridis</i>
<i>R. hypoleuca</i>	<i>I. wenchowensis</i>
<i>Toxicodendron radicans</i> ssp. <i>hispididum</i>	<i>I. wilsonii</i>
<i>T. succedaneum</i>	<i>I. zhejiangensis</i>
<i>T. sylvestre</i>	Celastraceae
<i>T. trichocarpum</i>	<i>Celastrus aculeatus</i>
<i>T. verniciflum</i>	<i>C. angulatus</i>
Aquifoliaceae	<i>C. gemmatus.</i>
<i>Ilex asprella</i>	<i>C. hookeri</i> prain
	<i>C. oblanceifolius</i>
	<i>C. orbiculatus.</i>
	<i>C. porphyrocarpus</i> sp.
	<i>C. rosthornianus</i>

- C. stylosus*.
C. stylosus ssp. *glaber*
C. tientaiensis sp. nov.
Euonymus acanthocarpus
E. alatus
E. bungeanus.
E. carnosus
E. centidens
E. chinensis
E. eusaphis
E. fortunei
E. fortunei var. *radicans*
E. hamiltonianus
E. hederaceus
E. japonicus
E. japonicas var. *albo-marginata*
E. japonicus var. *aureovaregata*
E. kiautschovicus
E. Lanceifloia
E. laxiflorus
F. myrianthus
E. oblongifolius
E. oxyphyllus
E. streptopterus
E. subsessilis
Microtropis fokiensis
Tripterygium hypoglaucum
T. wilfordii f.
- Staphyleaceae**
- Euscaphis japonica*
Staphylea bumalda
Tapiscia sinensis
Turpinia arguta
- Icacinaceae**
- Hosiea japonica*
H. sinensis
- Aceraceae**
- Acer amplum*
A. buergerianum
A. buergerianum var. *horizontale*
A. cordatum var. *marginata*
A. cordatum var. *micrcordatum*
A. davidi
A. elegantulum
- A. ginnala* ssp. *theiferum*
A. grosseripax var. *hersii*
A. henryipax
A. linganense
A. mono
A. olivaceum
A. oliveranum
A. palmatum (Cultivation)
A. palmatum f. *fropurpureum*
 (Cultivation)
A. palmatum var. *dissectum* (Cultivation)
A. palmatum var. *thunbergii*
 (Cultivation)
A. pauciflorum
A. pubinerva
A. pubipalmatum var. *pulche-rrimum*
A. sinopurpurascens
A. wilsonii
- Hippocastanaceae**
- Aesculus chinensis* (Cultivation)
- Sapincaceae**
- Koelreuteria bipinnata* var. *integrifoliola*
Sapindus mukorossi
- Sabiaceae**
- Meliosma beaniana*
M. flexuosa pamp
M. myriantha
M. myrianth var. *discolo*
M. myrianth var. *Pilosa*
M. oldhamii
M. pannosa
M. rhoifolia var. *barbulata*
M. rigida
M. squamulata
M. veitchiorum
Sabia discolor
S. japonica
S. ritchieae
S. swinhoei
- Balsaminaceae**
- Impatiens balsamina*
I. davidii
I. noli-tangere

I. siculifer

Rhamnaceae

Berchemia floribunda

B. floribunda var. *oblongifolia*

B. giraldiana

B. huana

B. kulingensis

Hovenia acerba

H. trichocarpa

H. trichocarpa var. *robusta*

Paliurus ramosissimus

Rhamnella franguloides

Rhamnus branchypode

R. crenata

R. crenata var. *discolor*

R. globosa

R. leptohylla

R. nepalensis

R. rugulose

R. utilis

R. wilsnii

Sageretia hamosa

S. henryi

S. melliana

S. rugosa

S. thea

Zizyphus jujub

Vitaceae

Ampelopsis brevipedunculata

A. brevipedunculata var. *kulingensis*

A. brevipedunculata var. *kulingensi*

A. cantoniensis

A. chaffanjonii

A. humulifolia var. *heterophylla*

A. japonica

A. megalophylla var. *puberula*

A. sinica var. *hancei*

Cayratia corniculata

C. japonica

C. oligocarpa

Parthenocissus heterophylla

P. laetevirens

P. thomsonii

P. tricuspidata

Tetrastigma hemsleyanum

Vitis amurensis.

V. chunganensis

V. chungii

V. davidii

V. davidii var. *cyanocarpa*

V. ficifolia

V. flexuosa

V. flexuosa var. *parvifolia*

V. hancockii

V. lanata

V. pseudoreticulata

V. quinqueangularis

V. vinifera (Cultivation)

V. wilsonae

Elaeocarpaceae

Elaeocarpus chinensis

E. decipiens

E. glabripetalus

E. japonicus

E. sylvestris

Sloanea sinensis

Tiliaceae

Corchoropsis tomentosa

Corchorus acutangulus

C. capsularis (Cultivation)

Grewia biloba

Tilia endochrysea

T. japonica

T. leptocarya

T. miqueliana

Toblongifolia

T. oliveri

Triumfetta annua

Malvaceae

Abelmoschus manihot (Cultivation)

Althaea rosea (Cultivation)

Hibiscus mutabilis (Cultivation)

H. rosa-sinensis (Cultivation)

H. syriacus

Urena lodata

U. procumbens

Sterculiaceae

Firmiana simplex

Melochia corchorifolia
Pentapetes phoenicea (Cultivation)
Reeresia Pycnantha

Actinidiaceae

Actinidia alnifolia
A. arguta
A. callosa Lindl var. *henryi*
A. callosa var. *discolor*
A. chinensis planch
A. chekiangensis
A. erlantha
A. fulvicoma
A. hemsleyana
A. hemsleyana var. *Kengiana*
A. kolomikta
A. lanceolata
A. latifolia
A. melanandra
A. melanandra var. *Subcohcolor*
A. melliana
A. styracifolia

Theaceae

Adinandra glischroloma
A. macrosepala
A. millettii
Camellia brevistyla
C. chekiang-oleosa
C. chekiang-oleosa var. *suichngensis*
C. crapnelliana (Cultivation)
C. cuspidata
C. cuspidata var. *Chekiangensis*
C. fraterna
C. japonica (Cultivation)
C. obtusifolia
C. ottopetala
C. oleifera
C. punieiflora
C. sasanqua (Cultivation)
C. sinensis
C. taishuensis
C. trichoelada
C. yuh sienensis (Cultivation)
Cleyera japonica
C. pachyphylla
C. pachyphlla var. *epunctata*

C. robusta
Eurya acutisepala
E. ala
E. chinensis
E. hebeclados
E. hebeclados var. *aureo-punctata*.
E. japonica
Eloquaiana
E. metcalfia
E. muricata.
E. nitida
E. rubiginosa var. *attenuata*
E. saixcola
E. trichocarpa
Schima superba
Stewartia sinensis
Ternstroemia gymnathera
T. microphylla
T. nitide
Tutcheria microcarpa

Hypericaceae

Hypericum ascyron
H. attenuatum
H. erectunb thunb
H. faberi
H. japonicum
H. monogynum
H. patulum
H. samponii
H. seniawini
Triadenum breviflorum

Vliaceae

Viola acaminata
V. befonicifolia
V. chaeropnylloides
V. chekiangensis
V. chekiangensis var. *albinervis*
V. confusa
V. cordifolia
V. davidii
V. diffusa
V. diffusa var. *glabella*
V. diffusa ssp. *tenuis*
V. grypoceras
V. inconspicua

V. principis
V. stewardiana
V. selkirkii
V. triangulifolia
V. triflora (Cultivation)
V. variegata
V. verecunda
V. verecunda var. *semilunaria*
V. yedoensis

Flacourtiaceae

Idesia polycarpa
I. polycarpa var. *vestita*
Poliothyrsis sinensis
Xylosma japonicum

Stachuaraceae

Stachyurus chinensis

Begoniaceae

Begonia sinensis

Cactaceae

Echinopsis multiplex
Opuntia dillenii

Thymelaeaceae

Daphne odra (Cultivation)
D. odora var. *atrocaulis*
D. retusa (Cultivation)
Edgeworthia chrysantha
Wikstroemia indicia
W. monnula
W. pilosa

Elaeagnaceae

Elaeagnus cuprea
E. difficilis
E. glabra
E. henryi
E. lanceolata
E. multiflora
E. pungens
E. umbellata

Lythraceae

Lagerstroemia indica

L. subcostata
R. otalaindica
R. rotundifolia

Punicaceae

Punica granatum (Cultivation)
P. granatum var. *multiplex* (Cultivation)

Nyssaceae

Camptotheca acuminata
Nyssa sinensis

Alangiaceae

Alangium chinense
A. chinense subsp. *strigosum*
A. kurzii
A. kurzii var. *handelii*
A. kurzii var. *umbellatum*
A. platanifolium

Myrtaceae

Eucalyptus camaldulensis (Cultivation)
E. globulus
E. robusta (Cultivation)
Syzygium buxifolium
S. grijsii
S. haudelii

Melastomataceae

Blastns cochinchinsis
Bredia amoena
B. sinensis
Fordiophyton fordii
F. albo-maculatum sp.
Melastoma dodecadrum
Osbeckia chinensis
O. crinita
Phyllagathis caralerieii
Sarcopyramis nepalensis

Onagraceae

Circaea alpina
C. cordata
C. erubescens
C. mollis
Epilobium cephalostigma
E. hirsutum

E. pyrricholophum
Ludwigia epilobioides
Oenothera odorata (Cultivation)

Halorargidaceae

Haloragis micrantha

Arauliaceae

Acanthopanax evodiaefolius
A. gracilstylus
A. henryi
A. leucorrhizus
A. scandens
A. trifoliatus.
Aralia chinensis
A. chinensis var. *dasyphyloiaes*
A. chinensis var. *nuda*
A. cordata
A. echinocaulis
A. spinifolia
Dendropanax dentiger
Hedera nepalensis var. *sinensis*
Panax japonicus
P. japonicus var. *bipinna-lifidus*
Pentapanax henryi var. *wangshanensis*
Tetrapanax papyrifera (Cultivation)

Umbelliferae

Angelica cartilagino marginata
A. citriodora
A. grosseserrata.
A. migueliana
A. pubescens
A. sylvestris
Bupleurum longirad iatum f. *austrle*
Centella asiatica
Coriandrum sativum
Cryptotaenia japonica
Daucus carota
Foeniculum vulgare (Cultivation)
Hydrocotyle nepalensis
H. sibthorpioides
H. wilfordii
Ligusticum sinense
L. tachiroei
Nothosmyrnjum japonicum
Oenanthe benghalensis

O. decumbens
Osmorhiza ristata
Ostericum grosseserratum
Peucedanum decursivum
P. praeruptorum
Pimpinella diversifolia
Pternopetalum tanabae
Sanicula chinensis
S. lamelligera
S. orthacantha
Torilis japonica
T. soabra

Cornace

Aucuba chinensis
A. Chinensis var. *angusta*
A. chinensis f. *obcordata*
Cornus controversa
C. macrophylla
C. walteri
Dendroberthamia angustata
D. hongkongensis
D. japonica var. *cihnensis*
D. wuyishanensis
Helwingia japonica
Macrocarpium officinalis

Clethra cead

Clethra barbinervis
C. cavaleriei
G. cavaleriei var. *subintegrifolia*

Pyrolaceae

Montropastrum globosum
M. longchuanense
M. pubescens
Pyrola decorata
P. rotundifolia

Ericaceae

Enkianthus chinensis
E. serrulatus
Hugeria vaccinioides
Lyonia ovalifolia var. *elliptica*
L. ovalifolia var. *hebecarpa*
Pieris polita
Rhododendron anhweiense

*R. championae**R. farrerae**R. fortunei**R. henryi**R. kiangsiense**R. latoucheae**R. mariesii**R. molle**R. ovatum**R. simjarum**R. simsii**Vaccinium braacteatum**V. carlesii**V. chingii**V. henryi**V. iteophyllum**V. sinicum**V. sprengelii**V. trichocladum***Myrsinaceae***Ardisia brevicaulis**A. crenata**A. crenata* var. *bicolor**A. crenata* Sims var. *lanceolata**A. crispa**A. crispa* var. *amplifolia**A. crispa* var. *dielsiihanceana**A. janonica**A. punctata**A. pusilla**Embelia laeta**E. oblogifolia**E. rudis**Maesa japonica**Myrsine africana**M. stolonifera**Rapanea neriifolia***Primulaceae***Lysimachja chakiangensis**L. christinae**L. clethroides**L. congestiflora**L. fortunei**L. fukienensis**L. hemsleyana**L. heterogene.**L. longipes**L. patnungensis**Stimpsonia chamaedryoides**S. coelestina* sp. nov. *ined***Ebenaceae***Diospyros cathayensis**D. glaucifolia**D. Kaki* f. (Cultivation)*D. kaki* f. var. *sylvestris**D. letus**D. morrisiana**D. rhombifolia**D. tsiangii***Symplocaceae***Symplocos aenea**S. anomala**S. botryantha**S. caudata**S. chekiangensis* sp.*S. chinensis**S. confusa**S. congesta**S. ernestii**S. glauca**S. heishanensis**S. lancifolia**S. laurina**S. morrisonicola**S. paniculata**S. setchuensis**S. sinuata**S. stellairs.**S. subconnata**S. yizhanensis***Styracaceae***Alniphyllum foruni**Halesia macgregorii**Pterostyrax corymbosa**Styrax calvescens**S. confusa**S. dasyantha* perk.*S. formesanus* var. *hirtus**S. hemsleyana*

S. hypoglauca perk. (Cultivation)

S. japonica

S. obassia

S. odoratissima.

S. suberfolia

Oleaceae

Chionantus reutsus

Forsythia viridissima

Fraxinus chinensis

F. chinensis var. *acuminata*

F. retusa champ

F. sieboldiana

Jasminum floridum

J. lanceolarium var. *Puberulum*

J. mesnyi (Cultivation)

J. nudiflorum (Cultivation)

J. sambac (Cultivation)

J. sinense

Ligustrum acutissimum

L. henryj

L. japonicum

L. lianum

L. lucidum

L. obtusifolium

L. quihoui

L. retusum

L. sinense

L. sinense var. *nitidum*

Olea europaea (Cultivation)

Osmanthus acanthoides sp.

O. asiaticus (Cultivation)

O. cooperi

O. fragrans

O. fragrans var. *aurantiacus*

(Cultivation)

O. longissimus sp. *nov. ined.*

O. matsumuranus

Loganjaceae

Buddleja lindleyana

Gardneria multiflora

G. nutans

Gelsemium elegans

Gentianaceae

Gentaurium pulchellum var. *altaicum*

Gentiana davidi

G. heterostemon var. *chingii*

G. scabra

G. squarrosa

G. zollingeri

Latouchea fokiensis

Swertia bimaculata

S. diluta

S. hickinii

Tripterospermum affine

Apocynaceae

Alyxia sinensis

Anodendron affine

Catharanthus roseus (Cultivation)

Nerium indicum

N. indicum (Cultivation)

Sindechites henryi

Trachelospermum axillare

T. brevisylum

T. cathayanum

T. jasminoides

T. jasminoides var. *heterophyllum*

Asclepiadaceae

Biondia henryi

Cynanchum auriculatum

G. paniculatum

G. stauntonii

Marsdenia officinalis

M. sinensis

Metaplexis japonica

Stephanotis mucronata

Tylophora floribunda.

Gonvolvulaceae

Calystegia hederacea

C. sepium

Cuscuta australis

G. japonica

Dichondra repens

Evolvulus alsinoides

Ipomoea aquatica

I. batats (Cultivation)

Merremia sibirica

Pharbitis nil (Cultivation)

Porana racemosa

Quamoclit pennata

Boraginaceae

Bothriospermum tenellum

Gynoglossum zeylanicum

Ehretia thyrsoiflora

Lithospermum erythrorhizon

Throcarpus glochidiatus.

T.sampsonii

Trigonotis peduncularis

Verbenaceae

Callicarpa bodinieri

C. cathayana chang

C. dichotoma

G. formosana

G. giraldii

G. giraldii var. *lyi*

C. integerrima

G. iaponica.

G. iaponica var. *angustata*

C. kochiana

G. lingii

C. rubella

C. rubella f. *crenata*

C. rubella var. *subglabra*

Caryopteris incana

C. nepetaefolia

Clerodendron bungei

C. cyrtophyllum

C. kaichianum

C. lindleyi

C. mandarinorum

C. philippinum

C. trichicotomum

Premna microphylla

Verbena officinalis

Vitex negundo

V. negundo var. *cannabifolia*

Labiatae

Agastache rugosa

Ajuga decumbens

A. nipponensis

Bostrychanthera deflexa

Clinopodium chinense

C. confine

C. gracile

C. polycephalum

Elsholtzia argyi

E. ciliata

E. stachyodes

Epimeredi indica

Glechoma longituda

Hanceola exerta

Keiskea elsholtzioides

K. sinensis

Lamium album var. *barbatum*

Leonurus artemisia

L. Artemisia var. *albiflorus*

L. sibiricus

Lycopus lucidus var. *hirtus*

Meehania fargesii var. *randicans*

Mentha haplocalyx

Mesona chinensis

Mosla chinensis

M. dianthera

M. longibracteata

M. Scabra

M. soochowensis

Ocimum basilicum

Origanum vulgare

Orthodon grosseseerrutus

O. longibracteatus

Paraphlomis intermedia

P. lancidentata

Perilla frutescens

P. frutescens var. *crispa*

P. frutescens var. *acuta*

Plectranthus amethystoides.

P. asiatica

P. nervosu

P. vulgaris

P. vulgaris var. *lilacina*

Rabdosia amethystoides

R. inflexa

R. longituba

R. lophanthoides

R. macrocalyx

R. nervosas

Salvia chinensis

S. japonica

S. japonica var. *parvifolia*

- S. japonica* f. *lanuginosa*
S. japonica f. *al atopinnata*
S. liguliloba
S. multiorrhiza
S. plebeia
S. prionitis
S. splendens
S. substolonifera
Scutellaria angulosa var. *franchetiana*
S. barbata
S. franchetiana
S. indica
S. indica var. *subacaulis*
S. pekinensis var. *purpureicaulis*
S. tuberifera
Stachys geobombycis
S. japonica
S. sieboldii
Teucrium pernyi
T. viscidum
- Solanaceae**
- Capsicum annuum*
C. frutescens
Datura stramonium
Lycianthes glandulosa sp.
Lycium chinense
Lycopersicon esculentum (Cultivation)
Nicotiana tabacum (Cultivation)
Physalium heterophyllum
Physalis alkekengi var. *franchetii*
Ph. angulata
Solanum japonense
S. lyratum
S. melongena (Cultivation)
S. nigrum
S. pitosporifolium
S. pseud-capsicum var. *diflorum*
S. Surattense
S. tuberculatum
Tubocapsicum anomalum
- Scrophulariaceae**
- Antirrhinum majus*
Hemiphragma heterophyllum
Lindernia angustifolia
L. antipoda
- L. crustacea*
L. procumbens
L. setulosa
Mazus fukienensis
M. japonicus
M. miquelii
M. stachydifolius
Melampyrum laxum
M. roseum
M. roseum var. *setaceum*
Monochasma savatieri
Paulownia australis
P. fortunei
P. kawakamii
Pedicularia kiangsiensis
Phtheirospermum japonicum
Rehmannia chingii
Scrophularia ningpoensis (Cultivation)
Siphonostegia chinensis
S. laeta
Torenia violacea
Veronica arvensis
V. didyma
V. linariifolia
V. peregrina
V. persica
Veronicastrum axillare
V. lungtsuanense
V. stenostachyum
V. villosulum
- Bignoniaceae**
- Campsis grandiflora*
Catalpa bungei (Cultivation)
C. ovata
C. speciosa (Cultivation)
- Pedaliaceae**
- Sesamum indicum*
- Orobanchaceae**
- Aeginetia indica*
A. sinensis
Lathraea japonica
- Gesneriaceae**
- Boea clarkeana*

- B. hygrometrica*
Briggsia chienii
Chirita pinnatifida
Conadron ramondiodes
Didymocarpus cortus-ifolius
Hemiboea henryi
Lysionotus pauciflorus
Oreocharis auriculata
O. maximowiczii
- Lentibulariaceae**
- Utricularia affinis*
U. bifida
U. racemosa
- Acantaceae**
- Calophanoides chinensis.*
Hygrophila solicifolia
Peristrophe japonica
Rostellularia procumbens
Strobilanthes eusia
S. oliganthus
- Phrymataceae**
- Phryma leptostachya* var. *asiatica*
- Plantaginaceae**
- Plantago asiatica.*
P. depressa
P. major
- Rubiaceae**
- Adina pilulifera*
A. polycephala var. *glabra*
A. racemosa
A. rubella
Anotis ingrata
Cephalanthus occidentalis
Damncanthts indicus
D. indicus var. *major*
D. macrophyllus
D. major
Emmenopterys henryi
Galium aparine var. *tenerum*
G. asperuloides var. *hoffmeisteri*
G. bungei
G. trifidum
- Gardenia jasminoides*
G. jasminoides var. *foruniana*
G. jasminoides
G. jasminoides var. *radicans*
Hedyotis auricularia
H. chrysotricha
H. corymbosa
H. diffusa
H. lancea
H. lindleyana var. *glabra*
H. molli
H. tenelliflora
Lasianthus hartii
L. hartii var. *glabrus*
L. lancilimbus
Mitchella undulata
Morinda umbellata
Mussaenda esquirolii
M. pubescens
Neanotis hirsuta
Ophiorrhiza japonica
Paederia cavaleriei
P. laxiflora
P. scandens
P. scandens var. *tomentosa*
Randia cochinchinensis
Rubia cordifolia
R. podantha
Serissa japonica
S. serissoides
Tarenna mollissima
Thysanospermum diffusum
Tricalysia dubia
Uncaria rhynchophylla
- Caprifoliaceae**
- Abelia chinensis*
A. dielsii
Heptacodium jasminoides
Lonicera acuminata
L. acuminata var. *depilata*
L. chrysantha ssp. *koehneana*
L. hemsleyana
L. hypoglauca
L. japonica
L. japonica var. *chinensis*
L. macrantha

L. macranthoides
L. modesta
L. modesta var. *lushanensis*
L. pampaninii
L. rhytidophylla
L. similis
L. tragophylla
L. trichosepala
Sambucus chinensis
S. williamsii
Viburnum chunii
V. corymbiflorum
V. dilatatum
V. erosum
V. fordiae
V. formosanum ssp. *leiogynum*
V. henryi
V. lancifolium
V. luzonicum
V. macrocephalum
V. plicatum
V. propinquum
V. sargentii var. *calvescens*
V. schensianum ssp. *chekiangense*
V. sempervirens
V. sempervirens var. *trichophorum*
V. setigerum
V. sympodiale
V. taiwanianum
Weigela japonica var. *sinica*
Valerianaceae
Patrinia angustifolia
P. scabiosaefolia
P. villosa
Valeriana officinalis var. *latifolia*
Cucurbitaceae
Actinostemma lobatum
Benincasa hispida (Cultivation)
Citrullus vulgaris (Cultivation)
Cucumis melo (Cultivation)
C. sativus (Cultivation)
Cucurbita moschata (Cultivation)
Gynostemma pentaphyllum
Lagenaria siceraria (Cultivation)
L. siceraria var. *hispida* (Cultivation)

Luffa cylindrica (Cultivation)
Melothria indica
M. japonica
Momordica charantia
Thladiantha caloarata
T. dentata
T. dictyocarpa
T. longifolia
Trichosanthes cucumeroides
T. kirilowii

Campanulaceae

Adenophora axilliflora
A. hunanensis
A. tetraphylla
A. trachelioides
Campanumoea lancifolia
C. maximowiczii
Codonopsis lanceolata
Lobelia chinensis
L. davidi
Peracarpa carnosa
Platycodon grandiflorus
Pratia begonifolia
Wahlenbergia marginata

Compositae

Adenostemma lavenia
Ageratum conyzoides
Ainsliaea fragrans
A. macroclinidioides
Anaphalis sinica
A. sinica
Arctium lappa
Artemisia annua
A. anomala
A. argyi (Cultivation)
A. capillaris
A. dubia
A. eriopoda
A. feddei
A. indica wall
A. japonica
A. lactiflora
A. lavandulaefolia
A. scoparis
Aster ageratoides

<i>A. panduratus</i>	<i>Gnaphalium adnatum</i>
<i>A. tataricus</i>	<i>G. affine</i>
<i>A. turbinatus</i>	<i>G. hypoleucum</i>
<i>A. zhejiangensis</i>	<i>G. hypoleucum</i> var. <i>amoyense</i>
<i>Atractylodes macrocephala</i> (Cultivation)	<i>G. japonicum</i>
<i>Bidens bipinnata</i>	<i>G. pensylvanicum</i>
<i>B. biternatacoparis</i>	<i>G. polycaulon</i>
<i>B. frondosa</i>	<i>Gymnaster angustifolius</i>
<i>B. pilosa</i>	<i>Gynura bicolor</i> (Cultivation)
<i>B. tripartita</i>	<i>G. crepidioides</i>
<i>Blumea hieraciifolia</i>	<i>G. divaricata</i> (Cultivation)
<i>B. oblongifolia</i>	<i>G. segetum</i> (Cultivation)
<i>Cacalia rubescens</i>	<i>Helianthus annuus</i> . (Cultivation)
<i>Carpesium abrotanoides</i>	<i>H. tuberosus</i> (Cultivation)
<i>C. cernuum</i>	<i>Hemistepta lyrata</i>
<i>C. divaricatum</i>	<i>Heteropappus hispidus</i>
<i>Centipeda minima</i>	<i>Inula cappa</i>
<i>Cephalanoplos segetum</i>	<i>I. japonica</i>
<i>Chrysanthemum coroarium</i> var. <i>sratisum</i>	<i>Ixeris chinensis</i>
<i>Cirsium japonicum</i>	<i>I. debilis</i>
<i>C. lineare</i>	<i>I. dentata</i>
<i>Congza banariensis</i>	<i>I. denticulata</i>
<i>C. canadensis</i>	<i>I. gracilis</i>
<i>C. japonica</i>	<i>I. pinnatifida</i> sp. nov. <i>ined.</i>
<i>C. sumatrensis</i>	<i>I. polycephala</i>
<i>Cosmos bipinnatus</i> (Cultivation)	<i>Kalimeris indica</i>
<i>Cynura crepidioides</i>	<i>K. shimadae</i>
<i>Dahlia pinnata</i> (Cultivation)	<i>Lactuca formosana</i>
<i>Dendranthema indicum</i>	<i>L. graciliflora</i>
<i>D. morifolium</i> (Cultivation)	<i>L. indica</i>
<i>D. morii</i>	<i>L. indica</i> var. <i>laciniata</i>
<i>Dichrocephala auriculata</i>	<i>L. raddeana</i> var. <i>elata</i>
<i>Doellingeria scaber</i>	<i>L. sativa</i> (Cultivation)
<i>Eelipta prostrata</i>	<i>L. sororia</i>
<i>Elephantopus</i>	<i>Laggera alata</i>
<i>Emilia sonchifolia</i>	<i>Lapsana apogonides</i>
<i>Erigeron annuus</i> .	<i>Leibnitzia anandria</i>
<i>Eupatorium caespitosum</i>	<i>Ligularia fischeri</i>
<i>E. chinense</i>	<i>L. japonica</i>
<i>E. fortunei</i>	<i>L. stenocephala</i>
<i>F. japonicum</i>	<i>Pertya cordifolia</i>
<i>E. japonicum</i> var. <i>tripartitum</i>	<i>P. cordifolia</i> var. <i>uniflora</i> var. <i>nov.ined.</i>
<i>E. lindleyanum</i>	<i>Petasates japonicus</i>
<i>E. lindleyanum</i> var. <i>tripartitum</i>	<i>Saussurea hwangshanensis</i>
<i>Galinsoga ciliata</i>	<i>S. cordifolia</i>
<i>Gerbera piloselloides</i>	<i>S. deltoidea</i>

<i>S. hwangshanensi</i>	<i>B. multiplex</i> var. <i>nana</i>
<i>S. japonica</i>	<i>B. oldhami</i>
<i>Senecio Kirilowii</i>	<i>B. pachinensis</i>
<i>S. oldhamianus</i>	<i>B. pachinesis</i> var. <i>hisutisslma</i>
<i>S. scandens</i>	<i>B. textilis</i>
<i>Serratula chinensis</i>	<i>B. ventricosa</i> cv. <i>nana</i>
<i>Siegesbeckia glabrescens</i>	<i>Brachystachyum densiflorum</i>
<i>S. orientalis</i>	<i>B. densiflorum</i> var. <i>villosum</i>
<i>S. pubescens</i>	<i>Chimonobambusa armata</i>
<i>S. pubescens</i>	<i>Ch. quadrangularis</i>
<i>Solidago decurrens</i>	<i>Glavinodum oedogonatum</i>
<i>Sonchus oleraceus</i>	<i>Indocalamus latifolius</i>
<i>Syueilesis aconitifolia</i>	<i>I. longiauritus.</i>
<i>Synurs pungens</i>	<i>I. migoï</i>
<i>Tagetes erecta</i> (Cultivation)	<i>I. tessellatus</i>
<i>Taraxacum mongolicum</i>	<i>I. victoralis</i>
<i>Vernonia cinerea</i>	<i>Indosasa glabrata</i>
<i>Xanthium mongolicum</i>	<i>I. longoligula</i>
<i>X. sibircum</i>	<i>Oligostachyum lanceolata</i>
<i>Youngia erythrocarpa</i>	<i>O. sulcatum</i>
<i>Y. japonica</i>	<i>Phyllostachys angusta</i>
<i>Zinnia elegans</i>	<i>Ph. aurea</i>
Monocotyledoneae	<i>Ph. bambusoides</i>
Typhaceae	<i>Ph. concava</i>
<i>Typha angustifolia</i>	<i>Ph. decora</i>
Potamogetonaceae	<i>Ph. elegans</i>
<i>Potamogeton cristatus</i>	<i>Ph. glauce</i>
<i>P. distinctus</i>	<i>Ph. halva</i>
Alismataceae	<i>Ph. heteroclada</i>
<i>Alisma canaliculatum</i>	<i>Ph. heterocycla</i> var. <i>pubescens</i>
<i>A. orientale</i>	<i>Ph. heterocycla</i>
<i>Sagittaria aginashi</i>	<i>Ph. incavata</i>
<i>S. pygmaea</i>	<i>Ph. iridenscens</i>
<i>S. sagittifolia</i>	<i>Ph. lithophila</i>
<i>S. sagittifolia</i> var. <i>iongiloba</i>	<i>Ph. makinoi</i>
<i>Rgnalisma rosfracum</i>	<i>Ph. meyeri</i>
<i>S. trifolja</i> var. <i>edulis</i>	<i>Ph. nidularia</i>
Hydrocharitaceae	<i>Ph. nigra</i>
<i>Hydrilla verticillata</i>	<i>Ph. nigra</i> var. <i>henonis</i>
Gramineae	<i>Ph. nuda</i>
<i>Bambusa multiplex</i>	<i>Ph. pingyanensis</i>
<i>B. multiplex</i>	<i>Ph. praecox</i>
	<i>Ph. primotina</i>
	<i>Ph. purpurata</i>
	<i>Ph. rubicunda</i>
	<i>Ph. rubromarginata</i>

<i>Ph. stimulosa</i>	<i>Arundo donax</i>
<i>Ph. villosa</i>	<i>Avena fatua</i> var. <i>glabrata</i>
<i>Ph. viridi-glaucens</i>	<i>Beckmannia syzigachne</i>
<i>Ph. viridis</i>	<i>Brachiaria villosa</i>
<i>Ph. virolla</i>	<i>Bromus japonicus</i>
<i>Ph. vivalis</i>	<i>B. remotiflorus</i>
<i>Ph. yunhoensis</i>	<i>Calamagrostis epigejos</i>
<i>Pleioblastus altiligulatus</i>	<i>Capillipedium parviflorum</i>
<i>P. amarus</i>	<i>Cleistogenes hackeli</i>
<i>P. hsienchuensis</i>	<i>Coix lacryma-jobi</i>
<i>P. intermedius</i>	<i>C. lacryma-jobi</i> var. <i>mayuen</i>
<i>P. juxianensis</i>	<i>Cymbopogon goeringii</i>
<i>P. kwangsiensis</i>	<i>Cynodon dactylon</i>
<i>P. maculosoides</i>	<i>Deyeuxia hakonensis</i>
<i>P. oleosus</i>	<i>D. sylvatica</i> var. <i>Ciliata</i>
<i>P. solidus</i>	<i>D. sylvatica</i> var. <i>laxiflora</i>
<i>Pseudosasa acutivagina</i>	<i>D. sylvatica</i> var. <i>ligulata</i>
<i>P. amabilis</i>	<i>Digitaria ciliaris</i>
<i>P. maculifera</i> var. <i>hirsuta</i>	<i>D. ischaemum</i>
<i>P. orthotropa</i>	<i>D. sanguinalis</i>
<i>Sasa qingyuanensis</i>	<i>D. timorensis</i>
<i>S. sinica</i>	<i>D. violasens</i>
<i>Semiarundinaria lubrica</i>	<i>Dimeria ornithopoda</i>
<i>Sh. strigosa</i>	<i>Echinochloa colonum</i>
<i>Sinobambusa glabrescens</i>	<i>E. crusgalli</i>
<i>S. intermedia</i>	<i>E. crusgalli</i> var. <i>hispidula</i>
<i>Sinocaeamus latiflorus</i>	<i>E. crusgalli</i> var. <i>mitis</i>
<i>S. gigantea</i>	<i>Ecooilopus cotulifer</i>
<i>Shibataea chiangshanensis</i>	<i>Eleusine indica</i>
<i>S. chinensis</i>	<i>Eragrostis autumnalis</i>
<i>S. loncofolia</i>	<i>E. bulbifera</i>
<i>S. strigosa</i>	<i>E. ferruginea.</i>
<i>Yushania baishanzuensis</i>	<i>E. japonica</i>
<i>Y. confusa</i>	<i>E. pilosa</i>
<i>Y. nitakayamaensis</i>	<i>Eremochloa ophiuroides</i>
Subfam	<i>Eriochloa villosa</i>
<i>Agrostis alba</i>	<i>Eulalia quqbrinervis</i>
<i>A. matsumurae</i>	<i>E. speciosa</i>
<i>A. sozanensis</i>	<i>Festuca parvigluma</i>
<i>Alopecurus aequalis</i>	<i>Glyceria acutiflora</i> ssp. <i>japonica</i>
<i>A. japonicus</i>	<i>Hemarthria altissima</i>
<i>Arthraxon hispidus</i>	<i>Hordeum Vulgare</i>
<i>A. hispidus</i> var. <i>cryptatherus</i>	<i>Imperata cylindrica</i> var. <i>major</i>
<i>Arundinella barbinodis</i>	<i>Isachne globosa</i>
<i>A. hirta</i>	<i>I. hoi</i>
<i>A. setosa</i>	<i>I. truncata</i>

Ischaemum aristatum
I. indicum
Leersia japonica
L. sayanuka
Leptochloa chinensis
Lophatherum gracile
Microstegium ciliatum
M. nudum
M. vimineum
Miscanthus floridulus
M. sinensis
M. sinensis var. *purpurascens*
Moliniopsis hui
Muhlenbergia hugelii
M. frondosa ssp. *ramosa*
Neyraudia montana
N. reynaudiana
Oplismenus undulatifolius
Oryza sativa
O. sativa var. *glutinosa*
Panicum bisulcatum
P. brevifolium
Paspalum orbiculare
P. thunbergii
Pennisetum alopecuroides
Phaenosperma globosa
Poa acroleuca
P. annua
P. faberi
Pogonatherum crinitum
Roegneria ciliaris
R. japonensis var. *hackeliana*
R. japonensis
R. kamoji
R. mayebarana
Saccharum aruudinaceum
S. sinense
Sacciolepis indica
Schizachyrium brevifolium
Setaria chondrachne
S. faberi
S. glauca
S. italica (Cultivation)
S. palide-fusca
S. palmifolia
S. plicata

S. viridis
Sorghum vulgare
Sporobolus diandra
S. indicus var. *purpureasuffusus*
Thomeda triandra var. *japonica*
Trisetum bifidum
Triticum aestivum
Zea mays
Zizania caduciflora

Cyperaceae

Bulbostylis barbata
B. densa
Carex agglomerata
C. brevicuspis
C. brunnea
C. capillacea
C. chinensis
C. cruciata
C. cryptostachys
C. dispalata
C. doniana
C. filicina
C. gibba
C. glossostigma
C. harlandii
C. ischnostachys
C. laticeps
C. leucochlora
C. ligulata
C. maculata
C. maubertiana
C. maximowiczii
C. morii
C. nemostachys
C. phacota
C. planiculmis
C. pruinosa
C. pumila
C. scaposa
C. sclerocarpa
C. siderosticta
C. stipitinux
C. taliensis
C. teinogyna
C. tibetica
C. tristachya

- Cyperus amuricu*
C. difformis
C. haspan
C. michelianus
C. microiria
C. rotundus
Eleocharis attenuata
E. dulcis
E. pellucida
E. pellucida var. *japonica*
E. tetraqueter
E. yokoscensis
Fimbristylis aestivalis
F. bisumbellata.
F. complanata
F. complanata var. *kraussiana*
F. dichotoma
F. diphyloides
F. ferruginea var. *sieboldii*
F. miliacea
F. rigidula
F. subbispicata
Juncellus serotinus
Kyllinga brevifolia
K. brevifolia var. *leiolepis*
Lipocarpa microcephala
Mariscus umbellatus
Pycreus globosus
P. globosus var. *strictus.*
P. sanguinolentus
Rhynchospora chinensis
Rh. faber
Scirpus juncooides
S. karuiza
S. lushanensis
S. rosthornii
S. subcapitatus
Scleria hookeriana
S. levis
S. parvula
S. terresris
- Plamae**
- Rhapis humilis* (Cultivation)
Trachycapus fortunei
- Araceae**
- Acorus calamus*
A. calamus var. *angustus*
A. gramineus
A. tatarinowii
Aglaonema modestum (Cultivation)
Amorphophallus rivieri
A. sinensi
Arisaema erubescens
A. heterophyllum
A. lobatum
A. sikokianum
A. sikokianum var. *serratum*
Colocasia antiquorum
C. esculenta (Cultivation)
Pinellia cordata
P. pedatisecta
P. peltata
P. ternata
Pistia stratiote
Typhonium divaricatum
Zantedeschia aethiopica (Cultivation)
- Lemnaceae**
- Lemna minor*
Spirodela polyrhiza
- Eriocaulaceae**
- Eriocaulon buergerianum*
E. decemflorum
E. nipponicum.
E. parvum.
E. sieboldianum
- Commelinaceae**
- Commelina bengalensis*
C. communis
Murdannia keisak
M. nudiflora
M. triquetra
Pollia japonica
- Pontederiaceae**
- Monochoria vaginalis*
M. vaginalis var. *plantnginea*
- Juncaceae**
- Juncus alatus*

- J. diastrophanthus*
J. effusus
J. lampocarpu
J. Ieschenaultii
J. setchuensis
Luzula multiflora
L. Plumosa
Stemonaceae
Stemona japonica
S. tuberosa
Liliaceae
Aletris glabra
A. spicata
Allium chinense
A. cepa (Cultivation)
A. fistulosa (Cultivation)
A. hookeri (Cultivation)
A. macrostemon
A. sacculiferun
A. sativum (Cultivation)
A. tuberosum (Cultivation)
Asparagus cochinchinensis
A. setaceus
Aspidistra elatior
Cardiocrinum cathayanum
Chlorophytum comosum (Cultivation)
Disperum sessile
Fritillaria thunbergii (Cultivation)
Hemerocallis citrina (Cultivation)
H. fulva
H. lilioasphodelus (Cultivation)
Heterosmilax japonica
Hosta plantaginea
H. ventricosa
Lilium brownii
L. brownii var. *viridulum*
L. lancifolium
L. spciosun var. *glorosoides*
Liriope graminifolia
L. minor
L. platyphylla
L. spicata
Ophiopogon japonicus
O. intermedius
Paris polyphylla var. *chinensis*
P. polyphylla var. *stenophylla*
Petrosavia jiulongshanensis sp. *nor.*
P. sakurai
Polygoatum cyrtonema
P. filipes
P. odoratum
Reineckia carnea (Cultivation)
Rohdea japonica (Cultivation)
Smilacina japonica
smilax arisanensis
S. china
S. davidiana
S. discotis
S. glabra
S. glauco-China
S. hypoglauca
S. lanceifolia var. *elongata*
S. lanceifolia var. *opaca*
S. nervo-marginata
S. nipponica
S. riparia
S. scobinicaulis
S. sieboldii
S. stans
S. trinervula
Tricyrtis bakeri
T. macropoda
Tupistra chinensis
Veratrum atroviolaceum
V. maximowiczii
V. schindleri
Agavaceae
Agave americana (Cultivation)
A. sisalana (Cultivation)
Yucca gloriosa
Amaryllidaceae
Clivia miniata (Cultivation)
Crinum asisticum var. *sinicum*
(Cultivation)
Curculi orchioides
Hippeastrum rutilum (Cultivation)
Lycoris radiata
Narcissus tazetta var. *chinensis*
Dioscoreaceae

<i>Dioscorea alata</i>	<i>Bulbophyllum hastaun</i>
<i>D. belophylloides</i>	<i>B. kwangtungense</i>
<i>D. bulbifera</i>	<i>B. psychoon</i>
<i>D. cirrhosa</i>	<i>Calanthe discolor</i>
<i>D. gracillima</i>	<i>C. hamata</i>
<i>D. hypoglauca</i>	<i>Cephalanthera falcata</i>
<i>D. japonica</i>	<i>Cymbidium ensifolium</i>
<i>D. kamoonsensis</i>	<i>C. faberi</i>
<i>D. nipponica</i>	<i>C. floribundum</i>
<i>D. officinalis</i>	<i>C. floribundum</i> var. <i>pumilum</i>
<i>D. opposita</i>	<i>C. goeringii</i>
<i>D. tenuipes</i>	<i>C. kanran</i>
<i>D. tokoro</i>	<i>C. msifolium</i> var. <i>yinglan</i>
Iridaceae	<i>Dendrobium candidum</i>
<i>Belamcanda chinensis</i>	<i>D. moniliforme</i>
<i>Iris ensata</i>	<i>D. nobile</i>
<i>I. grijsii</i>	<i>Epigeneium fargesii</i>
<i>I. japonica</i>	<i>Epipactis helleborine</i>
<i>I. speculatrix</i>	<i>Gastrodia elata</i>
<i>I. tectoum</i>	<i>Goodyera biflora</i>
Musaceae	<i>G. repens</i>
<i>Musa basjoo</i> (Cultivation)	<i>G. schlechterdaliana</i>
Zingiberaceae	<i>G. velutina</i>
<i>Alpinia chinensis</i>	<i>Habenaria dentata</i>
<i>A. japonica</i>	<i>H. linearifolia</i>
<i>Zingiber mioga</i>	<i>H. sagittifera</i>
<i>Z. officinale</i> (Cultivation)	<i>Hygrochilus subparishii</i>
Cannaceae	<i>Liparis dunnii</i>
<i>Canna edulis</i>	<i>Neottianthe cucullata</i>
<i>C. generalis</i>	<i>Pholidota cantoniensis</i>
Burmaniaceae	<i>Platanthera hologlottis</i>
<i>Burmannia cryptopetalala</i> var. <i>daxikangensis</i>	<i>P. japonica</i>
<i>B. championii</i> var. <i>zhejiangensis</i>	<i>P. mandarinnorum</i>
Orchidaceae	<i>P. minor</i>
<i>Amitostigma</i>	<i>Pleione bulbocodioides</i>
<i>A. pinguiculum</i>	<i>P. hui</i>
<i>A. zhejiangensis</i> sp.	<i>Pogonia japonica</i>
<i>Arundina chinensis</i>	<i>P. minor</i>
<i>Bletilla striata</i>	<i>Sarcochilus japonicus</i>
	<i>Sedirea subparishii</i> sp. nov. <i>ined.</i>
	<i>Spiranthes lancea</i>
	<i>Tainia dunnii</i>
	<i>Tulotis ussuriensis</i>
	<i>Vexillabium microdon-tum</i> sp.
	<i>V. yakushimen</i>

3.2 Fauna

Anguilliformes

Anguillidae

Anguilla japonica

Anguilla marmorata

CYPRINIFORMES

Cyprinidae

Opsariichthys uncirostris bidens

Zacco platypus

Hemiculter leucisculus

Atrilinea roulei

Pseudohemiculter hainamensis

Pseudohemiculter dispea

Pseudohemiculter kinghwaensis

Sonibrama macrops

Xenocypris tumirostris

Spinibarbus hollandis

Pseudoperilampus light

Acrossocheilus wenchouwensis

wenchouwensis wang

Hemibarbus maculatus

Hemibarbus laleo

Belligobio nummifer

Pseudorasbora parva

Abbottina rivularis

Sarcocheilichthys parvus

Sarcocheilichthys sinensis

Microphysogobio kiatingensis

Pseudogobio vaillanti

Gnathopogon taeniellus

Squalidus wolterstorffri

Gobioboita paucirostenlla

Gobiobotia tungi

Mylopharyngodon piceus

Ctenopharyngodon idellus

Aristichthys nobilis

Hypophthalmichthys molitrix

Acrossocheilus wenchouwensis

Acrossocheilus labiatus

Wenchouwensis kreyenbergii

Wenchouwensis fasciatus

Onychostoma barbatula

Varicorhinus barbatulus

Carassius auratus

Cyprinus carpio

Abbottina fukiensis

Cobitidae

Misgurnus anguillicaudatus

Leptobotia compressicauda

Leptobotia pellegrini

Leptobotia tientaiensis compressicauda

Cobitis sinensis

Cobitis laterimaculata

Homalopteridae

Vanmanenia stenosoma

Crossotoma tinkhami

Pseudogastromyzon fasciatus

SILURIFORMES

Siluridae

Silurus asotus

Bagridae

Pseudobagrus

Leiocassis taeniatus

Leiocassis adiposalis

Bagridae

Leiocassis albomargin

Pseudaobagrus adiposalis

Pseudaobagrus taeniatus

Libagrus anguillicauda

Sisoridae

Glyptothorax

Amblycipitidae

Liobagrus marginatus

Libagrus anguillicauda

PERCIFORMES

Serranidae

Siniperca obscura

Siniperca scherzeri

Gobiidae

Ctenogobius giurinus
Ctenogobius shennongensis
Ctenogobius lentiginis
Ctenogobius brunneus

Osmeriformes**Plecglossidae**

Pleccoglossus altivelis

SYNBRANCHIFORMES**Synbranchidae**

Monoptrus albus

SALAMANDRIFORMES**Cryptobranchidae**

Megalobatrachus davidianus

Salmandridae

Trituroides chinensis
Pachytriton blevipis brevipes
Cynops orientalis

RANIFORMES**Pelobatidae**

Megophrys boettgeri
Leptolalax liui
Vibrissaphora liui Pope
Corpophrys pelodytoides
Megophrys kuatunensis

Bufo

Bufo gargarizans
Bufo melanostictus

Hylidae

Hyla chinensis
Hyla simplex
Hyla sanchiangensis

Ranidae

Rana adenopleura
Hylarana denopleura
Hylarana latouchii
Pelophylax nigromaculata
Pelophylax plancyi

Rana japonica japonica

Rana zhenhaiensis
Rana jiulongensis
Rana tientaiensis
Rugosa tientaiensis
Rana limnocharis
Fejervarya limnocharis
Hoplobatrachus rugulosus
Odorrana versabilis
Hylarana guentheri
Odorrana livida
Odorrana schmackeri
Rana livida
Rana nigromaculata
Rana plancyi plancyi
Rana spinosa
Amolops ricketti
Amolops chunganensis
Amolops wuyiensis

Rhacophoridae

Rhacophorus leucomystax
Rhacophorus dennysi

Microhylidae

Microhyla heymonsi
Microhyla ornata
Microhyla butleri

TESTUDOFORMES**Testudinidae**

Chinemys reevesii
Platysternon megacephalum

Trionychidae

Pelodiscus sinensis
Pelochelys cantorii

LACERTIFORMES**Gekkonidae**

Gekko subpalmaris
Gekko hokouensis
Gekko subpalmatus

Scincidae

Eumeces chinensis

*Eumeces elegans**Lygosoma indicum**Scincella madesta***Lacertidae***Takydromus septentrionalis**Takydromus sexlineatus ocellatus***Anguidae***Ophisaurus septentrionalis***SERPENTIFORMES****Colubridae***Achalinus spinalis**Pareas chinensis**Calamaria septentrionalis**Dinodon flavozonatum**Dinodon rufozonatum**Elaphe bimaculata**Elaphe carinata**Elaphe mandarina**Elaphe porphyracea nigrofasciata**Elaphe frenata**Elaphe rufodorsata**Elaphe taeniura**Lycodon ruhstrati**Macropisthodon rudis rudis**Sinonatrix annularis**Amphiesma craspedogaster**Natrix aquifasciata**Natrix annularis**Sinonatrix percarinata**Amphiesma stolata**Rhabdophis tigrina**Natrix percarinata percarinata**Natrix piscator**Natrix stolata**Oligodon chinensis**Oligodon formosanus**Opheodrys major**Opisthotropis latouchii**Opisthotropis**Pseudoxenodon bambusicola**Pseudoxenodon stejnegeri**striaticaudatus**Ptyas korros**Ptyas mucosus**Sibynophis chinensis**Zaocys dhumnades**Boiga kraepelili**Enhydris plumbea***Elapidae***Bungarus multicinctus multicinctus**Naja naja atra**C.alliophis macclellandi***Viperidae***Agkistrodon acutus**Trimeresurus mucrosquamatus**Protobothrops mucrosquamatus
orientalis**Trimeresurus stejnegeri stejnegeri***PODICIPEDIFORMES****Podicipedidae***Podiceps ruficollis poggei**Podiceps critatus critatus***PELECANIFORMES****Phalacrocoracidae***Phalacrocorax critatus critatus***Lariformes****Laridae***Larus ridibundus**Rissa tridactyla**Chlidonias hybridus**Chlidonias leucoptera**Gelchelidon nilotica**Sterna caspia**Sterna hirundo**Sterna albifrons***CICONIIFORMES****Ciconiidae***Ciconia boyciana***Ardeidae***Ardea cinerea rectirostris**Ardea purpurea manilensis**Butorides striatus actophilus*

Ardeola bacchus
Bubulcus ibis coromandus
Egretta alba modestus
Egretta garzetta garzetta
Egretta intermedia
Egretta eulophotes
Nycticorax nycticorax nycticorax
Ixobrychus flavicollis
Ixobrychus sinensis sinensis
Ixobrychus eurhythmus
Ixobrychus cinnamomeus
Botaurus stellaris stellaris

Threskiornithidae

Platalea leucorodia

ANSERIFORMES

Anatidae

Anas crecca
Anas platyrhynchos
Anas poecilorrhyncha zonorrhyncha
Mergus merganser
Mergus squamatus
Mergus serrator
Anas penelope
Anas strepera
Anas falcata
Anas clypeata
Anas acuta
Anas querquedula
Tadorna ferruginea
Aix galericulata
Aythya fuligula
Melanitta fusca
Anser anser
Anser fabalis
Anser albifrons
Cygnus columbianus

FALCONIFORMES

Accipitridae

Milvus migrans
Milvus korschun lineatus
Accipiter gentiles schvedowi
Accipiter soloensis
Accipiter trivirgatus

Accipiter nisus nisosimilis
Accipiter virgatus
Accipiter gularis
Butastur indicus
Pernis ptilorhynchus
Buteo buteo
B.lagopus menzbieri
Circus spilonotus
Aquila fasciatus
Spilornis cheela
Spizaetus nipalensis
Aquila clanga
Ictinaetus malayensis
Aquila chrysaetos daphanea
Aegyptius monachus

Pandionidae

Pandion haliaetus

Falconidae

Falco columbarius insignis
Falco subbuteo
Falco tinnunculus
Falco peregrinus
Falco amurensis
Microhierax melanoleucus
Aviceda leuphotes
Aviceda leuphotes syama

GALLIFORMES

Phasianidae

Coturnix coturnix
Lophura nycthemera
Pucrasia macrolopha
Phasianus colchicus
Bambusicola thoracica
Tragopan caboti
Syrnaticus ellioti
Arborophila gingica
Arborophila gingica

GRUIFORMES

Rallidae

Porzana pusilla
Porzana fusca
Rallus striatus

Rallus aquaticus indius
Amaurornis phoenicurus chinensis
Amaurornis akool
Gallicrex cinerea cinerea
Gallinula chloropus indica
Fulica atra atra

CHARADRIIFORMES

Charadriidae

Charadrius veredus
Charadrius alexandrinus
Charadrius dubius
Pluvialis squatarola
Pluvialis dominica
Charadrius placidus
Charadrius mongolus
Vanelus vanellus
Microsarcops cinreus

Glareolidae

Glareola maldivarum

Scolopacidae

Tringa erythropus
Tringa stagnatilis
Tringa glareola
Tringa hypoleucos
Scolopax rusticola
Xenus cinereus
Limicola falcinellus
Tringa nebularia
Tringa totanus
Arenaria interpres
Limnodromus scolopaceus
Numenius minutus
Numenius phaeopus
Numenius madagascariensis
Numenius arquata orientalis
Tringa ochropus
Calidris tenuirostris
Calidris ruficollis
Calidris ferruginea
Calidris alpina
Calidris temminckii
Calidris subminuta
Calidris acuminata

Limosa limosa
Capella megala
Capella gallinago gallinago
Heteroscelus brevipes

Recurvirostridae

Himantopus himantopus
Recurvirostra avosetta

Jacanidae

Hydrophasianus chirurgus

Rostratulidae

Rostratula benghalensis

COLUMBIFORMES

Columbidae

Streptopelia chinensis
Streptopelia orientalis
Oenopopelia tranquebarcia

CUCULIFORMES

Cuculidae

Eudynamys scolopacea chinensis
Cuculus sparverioides sparverioides
Cuculus canorus
Cuculus saturatus
Centropus bengalensis
Cuculus micropterus
Clamator coromandus

Trogoniformes

Trogonidae

Harpactes erythrocephalus

STRIGIFORMES

Tytonidae

Tyto capensis

Strigidae

Ninox scutulata burmanica
Bubo bubo kiautschensis
Strix leptogrammica
Otus scops
Otus bakkamoena
Asio flammeus flammeus

*Glacuidium brodiei brodiei**Glacuidium cuculoides***CAPRIMULGIFORMES****Caprimulgidae***Caprimulgus indicus***APODIFORMES****Apodidae***Apus pacificus**Apus nilalensis**Hirundapus caudacutus***CORACIIFORMES****Alcedinidae***Ceryle lugubris guttulata**Ceryle rudis**Halcyon pileata**Alcedo atthis**Halcyon smyrnensis***Meropidae***Merops viridis viridis***Coraciidae***Eurystomus orientalis***UPUPIIFORMES****Upupidae***Upupa epops saturate***PICIFORMES****Capitonidae***Megalaima virens***Picidae***Jynx torquilla chinensis**Picumnus innominatus**Dendrocopos canicapillus**Dendrocopos major mandarinus**Picus canus**Picus canus**Blythipicus pyrrhotis***PASSERIFORMES****Pittidae***Pitta brachyura nympha***Alaudidae***Alauda arvensis intermedia**Alauda gulgul coelivox**Calandrella brachydactyla**Calandrella cheleensis***Hirundinidae***Riparia riparia fokienensis**Hirundo rustica**Hirundo daurica japonica**Delichon dasypus***Motacillidae***Dendronanthus indicus**Motacilla alba leucopsis**Motacilla cinerea robusta**Motacilla flava mavromyx**Anthus hodgsoni yunanensis**Anthus sylvanus**Anthus gustavi**Anthus spinoletta**Anthus richardi**Anthus rubescens**A.cervinus***Campephagidae***Coracina melaschistos intermedia**Pericrocotus roseus cantonensis**Pericrocotus solaris griseigularis**Pericrocotus cantonensis**Pericrocotus divaricatus**Pericrocotus flammeus***Pycnonotidae***Spizixos semitorques**Pycnonotus xanthorrhous**Pycnonotus sinensis sinensis**Hypsipetes mccllellandii**Hypsipetes flavala canipennis**Hypsipetes leucocephalus**Hypsipetes madagascariensis***Chloropseidae***Chloropsis hardwickei melliana*

Bombycillidae

Bombycilla garrulous
Bombycilla japonica

Laniidae

Lanius bucephalus bucephalus
Lanius cristatus lucionensis
Lanius schach
Lanius tigrinus
Lanius sphenocercus

Oriolidae

Oriolus chinensis

Dicruridae

Dicrurus Macrocerus cathoecus
Dicrurus leucophaeus
Dicrurus hottentottus

Sturnidae

Sturnus sinensis
Sturnus philippensis
Sturnus nigricollis
Sturnussericeus
Sturnuscineraceus
Acridogheres cristatellus

Corvidae

Garrulus glandarius
Cissa erythrorhyncha
Pica pica
Crypsirina formosae
Corvus macrorhynchus
Corvus corone
Corvus frugilegus
Corvus torquatus

Cinclidae

Cinclus pallasii

Muscicapidae

Muscicapa sibirica
Muscicapa dauurica
Muscicapa griseisticta
Niltava macgrigoriae
Mugimaki Flycatcher
Ficedula zanthopygia

Ficedula narcissina
Ficedula cyanmelana
Ficedula parva
Rhinomyias brunneata

Turdidae

Copsychus saularis prosthopellus
Luscinia cyane
Luscinia calliope
Luscinia sibilans
Phoenicurus aureus
Rhyacornis fuliginosus
Chaimarrornis leucocephalus
Tarsiger cyanurus
Enicurus scouleri
Enicurus schistaceus
Enicurus leschenaultia
Enicurus leschenaulti
Enicurus maculatus
Saxicola ferrea haringtoni
Saxicola torquata
Turdus poliocephalus
Turdus naumanni
Monticola solitaria
Myiophoneus merula
Turdus hortulorum
Turdus cardis
Turdus obscurus
Turdus pallidus pallidus
Turdus maumanni
Zoothera dauma
Zoothera sibirica
Monticola cinclorhynchus gularis
Monticola rufiventris

Timaliidae

Garrulax canorus
Stachyris ruficollis
Pteruthius xanthochlorus obscurus
Pteruthius flaviscapis
Alcippe morrisonia
Alcippe morrisonia hueti
Alcippe bruunea
Yuhina castaniceps
Yuhina nigrimenta
Garrulax poecilorhynchus
Garulax perspicillatus

Garulax pectoralis
Garrulax sannia sannio
Garulax monileger
Pomatorhinus ruficollis
Pomatorhinus erythrocnemis
Leiothrix lutea

Paradoxornithidae

Paradoxornis webbianus
Paradoxornis gularis

Sylviidae

Cettia fortipes
Cettia fortipes davidiana
Cettia canturians
Locustella lanceolata
Acrocephalus bistrigiceps
Acrocephalus orientalis
Bradyperus mandelli
Bradypterus luteoventris
Phylloscopus guscatus
Phylloscopus coronatus
Phylloscopus inornatus
Phylloscopus ricketti
Phylloscopus proregulus
Phylloscopus cantator
Phylloscopus subaffinis
Phylloscopus maculipennis
Phylloscopus borealis
Phylloscopus reguloidae
Phylloscopus tenellipes
Phylloscopus plumbeitarsus
Seicercus castaniceps
Seicercus affinis
Seicercus burkii
Seicercus albogularis

Cisticolidae

Prinia criniger
Prinia subflava
Prinia polychroa
Prinia inornata
Cisticola juncidis

Regulidae

Rugulus regulus japonensis

Paridae

Parus major
Parus ater kuatunensis
Parus xanthogenys
Parus venustulus
Parus kuatunensis

Aegithalidae

Aegithalos concinnus
Aegithalos caudatus

Sittidae

Sitta europaea sinensis

Dicaeidae

Dicaeum ignipectus

Nectariniidae

Aethopyga christinae latouchii

Zosteropidae

Zosterops japonica

Passeridae

Passer montanus
Passer rutilans

Estrildidae

Lonchura punctulata
Lonchura striata

Fringillidae

Carduelis spinus
Fringilla montifringilla
Pyrrhula nipalensis
Carduelis sinnica
Eophona migratoria
Eophona personata magnirostris

Emberizidae

Emberiza rutila
Emberiza rustica
Emberiza pusilla
Emberiza tristrami
Emberiza elegans ticehursti
Emberiza fucata fucata
Emberiza spodocephala
Emberiza chrysophrys
Emberiza aureola

*Melophus lathamii**Emberiza cioides***INSECTIVORA*****Erinaceidae****Erinaceus europaeus****Soricidae****Crocidura suaveolens**Crocidura attenuate milne-**Chimmarogale platycephalar**Suncus murinus****Talpidae****Mogera latouchei**Talpa latouchei***CHIROPTERA*****Rhinolophidae****Rhinolophus affinis**Rhinolophus blythi**Rhinolophus macrotis****Hipposideridae****Hipposidideros armiger****Vespertilionidae****Myotis capaccinii**Myotis chinensis**Rickettia pilosa**Nyctalus lasiopterus**Nyctalus noctula**Pipistrellus abramus**Minioperus schreibersi**Pipistrellus pipistrellus tramatus**Rhinolophus cornutus**Rhinolophus pearsoni***PRIMATES*****Cercopithecidae****Macaca mulatta**Rattus nitidus nitidus**Leopoldamys edwardsi edwardsi**Rattus losea****Hystriidae****Macaca thibetana milne***PHOLIDOTA*****Manidae****Manis pentadactyla***LAGOMORPHA*****Leporidae****Lepus sinensis***RODENTIA*****Sciuridae****Callosciurus erythraeus**Dremomys pernyi**Tamiops swinhoei maritimus**Tamiops swinhoei****Petauristidae****Petaurista petaurista rufipes**Hylopetes alboniger alboniger****Cricetidae****Eothenomys melanogaster**Microtus melanogaster****Rhizomuyidae****Rhizomys sinensis****Muridae****Micromys minutus erythrotis**Apodemus agrarius**Apodemus draco**Mus musculus**Rattus flavipectus**Rattus losea**Rattus norvegicus**Rattus niviventer confucianus**Rattus fulvescens**Rattus edwardsi**Rattus bowersi**Hystrix hodgsoni***CARNIVORA*****Canidae****Canis lupus chanco*

*Vulpes vulpes**Nyctereutes procyonoides**Cuon alpinus***Ursidae***Selenarctos thibetanus***Mustelidae***Martes flavigula**Mustela sibirica**Mustela kathiah kathiah**Melogale moschata**Meles meles**Arctonyx collaris**Lutra lutra***Viverridae***Viveera zibetha**Viverricula indica**Neofelis nebulosa**Herpestes urva***Felidae***Felis bengalensis**Felis temmincki**Felis temmincki dominicanorum**Neofelis nebulosa**Panthera pardus**Panthera tigris***ARTIODACTYLA****Sui***Sus scrofa***Ceridae***Muntiacus reevesi**Hydropotes inermis**Muntiacus reevesi**Muntiacus crinifrons**Elaphodus cephalophus***Bovidae***Capricornis sumatraensis**Naemorhedus goral arnouxianus**Ctenolepisma villosa**Lepisma saccharina***Ephemeroptera****Baetidae***Centroptilum album***Heptageniidae***Epeorus ngi***Ephemerellidae***Ephemerella nigromaculataan***Amphipterygidae***Devadatta argyoides argyoides**Devadatta ducatrix**Philoganga vestusta***Calopterygida***Caliphaea confuse**Caliphaea consimilis**Mnais auripennis**Vestalis virens**Chlorocyphidae***Euphaeidae***Anisophaea decorate**Bayadera melania**Bayadera melanopteryx**Euphaea opaca***Lestidae***Indolestes extraneus**Indolestes peregrinus***Megapodagrionida***Mesopodagrion tibetanum***Pseudolestidae***Rhipidolestes nectans**Rhipidolestes bidens***Coenagrionidae***Agriocnemis femina**Cercion plagiosum**Ischnura needhami**Ceriagrion erubescens**Ceriagrion melanurum**Ceriagrion rubiae***Platycnemidida**

Coeliccia didyma
Calicnemia sinensis
Copera annulata
Platycnemis phyllopora

Protoneuridae

Caconeura longjingensis
Prodasineura autumnalis
Prodasineura sita

Aeschnidae

Aeschna athalia
Aeschnophlebia anisoptera
Planaeschna milnei
Planaeschna suichangensis

Gomphidae

Asiagomphus cuneatus
Asiagomphus pacificus
Burmagomphus collaris
Merogomphus paviei
Trigomphus carus
Davidius fruhstorferi
Ophionurus sinicus
Ictinogomphus rapax
Gomphidia confluens

Chlorogomphidae

Sinorogomphus nasutas
Sinorogomphus suzukii

Cordulegastridae

Anotogaster kuchenbeiseri
Anotogaster sieboldii

Corduliidae

Epithea marginata
Idionyx lieftincki
Macromidia hangzhouensis

Macromiidae

Macromia yunnanensis
Macromia macula
Macromia malleifera
Macromia urania

Libellulidae

Brachydiplax chalybea

Leucorrhinia inteimedia
Brachythemis contaminata
Crocothemis servilia servilia
Diplacodes trivialis
Neurothemis tulliatullia
Sympetrum baccha baccha
Sympetrum kunkeli
Sympetrum ruptum
Pseudothemis zonata
Trithemis aurora
Pantala flavescens
Tramea chinensis

Isoptera

Termitidae

Odontotermes formosanus
Macrotermes barneyi
Nasutitermes curtinasus

Rhinotermitidae

Coptotermes formosanus
Reticulitermes chinensis

Blattaria

Blattellidae

Blattella orientalis

Mantodea

Mantidae

Creobroter gemmata
Hierodula membranacea
Hierodula patellifera
Odontomantis sinensis
Statilia maculata
Tenodera angustipennis
Tenodera aridifolia
Tenodera sinensis

Orthoptera

Pseludophyllidae

Phyllominus sinicus
Tegra novaehollandiae-viridinotata

Conocephalidae

Conocephalus chinensis
Ruspolia lineosa

Mecopodidae*Mecopoda elongata***Tettigoniidae***Mirollia formosana**Tettigonia chinensis***Phaneropteridae***Ducetia japonica**Elimaea berezovskii**Ruidocollaris truncato-lobata**Sinochlora longifissa***Gryllotapidae***Gryllotalpa orientalis***Gryllidae***Loxoblemmus doenitzi**Tarbinskiellus portentosus**Teleogryllus emma**Velarifictorus asperses***Pamphagidae***Haplotropis btuneriana***Pyrgomorphidae***Atractomorpha sinensis***Catantopidae***Calliptamus abbreviatua**Catantopsbrachycerus**Chondracris rosea**Fruhstorferiola veridifemorata**Gesonula punctifrons**Patanga japonica**Stenocatantops splendens***Oedipodidae***Aiolopus tamulus**Gastrimargus marmoratus**Trilophidia annulata***Acrididae***Acrida cinerea***Tetrigidae***Tetrix japonica***D ermaptera****Labiduridae***Nala nepalensis***Homoptera****Cicadidae***Cryptotympana atrata**Platypleura kaempferi***Cercopidae***Callitettix versicolor**Cosmoscarta bispecularis***Fulgoridae***Lycorma delicatula***Ricaniidae***Cryptoflata guttularis**Euricania ocellus**Pochazia albomaculata**Ricania japonica**R. speculum**R. taeniata***Dictyopharidae***Dictyophara sinica***Flatidae***Geisha distinctissima***Cicadellidae***Bothrogonia sinica**Cicadella viridis**Kolla paulula***Typhlocybidae***Amrasca biguttula**Empoasca flavescence**Erythroneura melia**Thaia rubiginosa Kuoh**Typhlocyba sudra***Coccidae***Ceroplastes rubens**Ericeruspela**Ceroplastes pseudoceriferus*

Margarodidae*Lcerya purchasi***Diaspididae***Parlatoria zizyphus**Parlatoria camelliae**Aulacaspis rosarum**Phenacaspis cockerelli***Pseudococcidae***Pseudococcus citriculus***Aphididae***Aphisnerii Bayerde**Neophyllaphis podicalipi**Astegopteryx bambusifoliae**Takecallis arundinanae**Hyalop teruspruni**Takecallis taiwoaus**Pseudoregma alexanderi***Delphacidae***Trialeleurodes vaporariorum***Hemiptera****Pentatomidae***Eurydema gebleri**Halyomorpha halys**Plautia fimbriata**Nezaraviridula formaaurantiaca**Nezara viridulaforma toqua ta**Carbula crassiventris**Palomena crngulosa**Picromerusgriseus**Zicrona caerulea***Scutelleridae***Poecilocoris lewisi**Poecilocoris dissimilis***Acanthosomatidae***Anaxandra levicornis***Coreinae***Ochrochira ferruginea**Mictiopsis curvipes**Riptortus pedeseris**Riptortus parvus**Liorhyssus hyalinus***Pyrrhocoridae***Pyrrhocoris tibialis**Physopelta gutta***Lygaeidae***Diettes kansuensis***Reduviidae***Isyndus obscurus***Tingidae***Stephanitis pyriodes***Megaloptera****Corydidae***Acanthacorydalis orientalis**Neochauliodes sinnensis**Protohermes costalis***Neuroptera****Chrysopidae***Chrysopa Formosa**Chrysopa kulingensis**Chrysopa septempunctata**Chrysopa sinica***Coleoptera****Gerambycidae***Liuda vigro scutata**Bacchisa guerry**Gelonaetha hirta**Megopsis costipennis**Atimia chinesis**Amarisius altaiensis**Derolus volvulus**Dicelosteinus corallinus**Embric-Strandia unifasciata**Gelonaetha hirta**Margites luteopubens**Purpuricenussideriger**Acanthocius aedilis**Annamanum albiparsum**Anoplophora davidis*

Anoplophora nobilis
Anoplophora pachypezoides
Coscinesthes salicis
Diboma costata
Moechotypa delicatula
Olenecamptus bilobus
Thermistis croceocincta

E lateridae

Heterodeera albicans
Melanotus frequens
Melano thus brunnicornis
Melanothus binaghiiplatiaet

Tenebrionidae

Blaps japonensis

Coce inellidae

Calvia muiri
Harmonia sedecimnotata
Oenop iakirbyi
Coccinella septemptmctdta
Macroilleis hauseri
H armonia axyidis
Aiolocaria hexasp ilata
Lemnia biplagiata
Hippodamia variegata

Curcu lionidae

Lixzus distortus
Lephropus lateralis
Anosimufs klapperichi

Carab idae

Bembidion semilunium
Callida lepida

Melolonthidae

Holotrichia scrobiculata
Holo trichia scnensis
Malaisitts fujianensis

Getoniidae

Dicronocephalus bowringi
Oxy cetonna bealiae
Rhomborrhina unicolor
Rhomborrhina livacea

Rhomborrhina fortunei
Campsiura mirabilis

Rutelidae

Mimela splendens
Popillia quadrigullata

Chrysomelidae

Chrysolina aurichalcea

Diptera

Bibionidae

Pentheria japonica

Syrphidae

Metasyrphus nitens

Sarcophagidae

Parasalvophaga crassipalpis

Ch ironom idea

Hayesomyia trina
Procladius choreus
Cladopel maedwardsi
Micropsectra bidentata

Lepidoptera

Papilionidae

Troidc aeacus
Byasa alcinous
Byasame ncius
Papchliopta aristolochiae
Papilio polytes
Papilio xuthus
Papili omachaon
Papilioprotcnor
Graphiumsarpedon
Sericinus montela

Pierdae

Colias crate
Eurema hecabe
Glnepterye amintha
Pieris camcha
Pieri srapae
Anthocharis scolymus

Satyridae

Lethe chandica
Lethe christophi
Neopemuir headi
Mandarinia lugens
Mandarinia rcalis
Ypthima baldus
Ypthima zodia
Mycalcsis fiancisca
Ypthima conjuncta

Nymphalidae

Limenms helmanm
Acraea issoria
Hestina assimilis
Charaxes bemardus
Hestina mena
Argyreus hyperbius
Damora sagana
Limenms helmanm
Mepus ananma
Neptis sappho
Mimathyma cheyama
Vanessa medica
Vanessa cardui
Kamska canace
Polygonia calbum
Polygonia caureum
Junoma almuna
Junoma oruhya
Araschnia doris
Araschnia thasobrina

Lycaenidae

Amblopala avidiena
Lycaena phlaeas
Lampides boeticus
Celasir maoreas
Tongcra potamm
Everes fihcaudis
Rapala caerulea
Celastrina argiolus
Taraka hamade
Curetis dentata
Saryrium grandis
Pseudozieeria maha

Hesperiidae

Choaspes benjaminii
Pyrg us maculaius
Caltoris bromus
Pamar guttata
Potatnhus confucius

Noctuidae

Eupatulamacrops
Hulodes caranea
Cocytodes cllerulea
Anua tirhaca
Ischy iamanlia
Spodop teralitura
Agrotisyp silon
Eudocima salaminia
Lagoptera junio

Pyralidae

Bocchoris inspersalis
Chilo suppressalis
Diaphania bicolor
Diaphania indica
Diaphania perspectalis
Diaphania pyloalis
Diastictis inspersalis
Dichocrocis punctiferalis
Dioryctria spleudidella
Haritalodes derogata
Hypsopygia mauritalis
Maruca testulalis
Sylepta insignia

Geometridae

Arichanna melanaria fratema
Biston suipressaria
Erebomorpha consors
Gandaritis sinicaria
Naxa seriaria
P roblepsis eucircota
Problepsis minuta

Drepanidae

Cyclidia orciferaria
Oreta loochooana
Spectroreta hyalodisca

Arctiidae

Spilarctia oblique
P araona staud ingeri
Poricallia imperialis
Pericallia galactina

Cossidae

Zeuzera coffeae

Geometridae

Calospilos suspecta
Semiothisa cinerearia
Ourapteryx nivea

Saturniidae

Actias seleneningp oana
Actias rhodopneuma
Philosamia cynthia

Sphingidae

Kentrochrysalis sieversi
Ampelophaga rubiginosa
Cechenena lineosa
Clanis deucalion
Dolbina inexacta
Herse convolvuli

Lymantriidae

Cifuna locuples
Dasychira axutha
Dasychira melli
Euproctis bipunctapex
Euproctis pseudoconspersa
Euproctis pterofera
Lymantria dispar
Lymantria dissolute
Porthesia kurosawai
Porthesia simihs

Notodontidae

Bireta longivitta
Clostera anastomosis
Gangarides dharmia
Harpyia sangaica
Neocerura wisei
Neophyta sikkima
Netria viridescens
Phalera assimilis

Phalera birmicola
Phalera raya

Lasiocampidae

Dendro limus kikuchii
Gastropacha quercifolia
Paralebeda plagifera
Philudoria laeta
Trabala vishnou

Limacodidae

Thosea sinensis
Parasa consocia
Cnidocampf lavescens

Epicopeiidae

Eicopeiahainesi sinlcaria

Hymenoptera

Pamphiliidae

Acantholyda dimorpha

Tenthredinidae

Abeleses rufitibialis
Aneugmenus carinifrons
Aneugmenus pteridii
Athalia stenotheca
Athlophorus placidus
Beleses atrofemorata
Beleses stigmatalis
Caliroa angustata
Caliroa annulipes
Corrugia formosana
Eutomostethus clypeatus
Eutomostethus katonis
Eutomostethus longidentus
Eutomostethus nigratus
Eutomostethus zhangii
Formesempria mrtallica
Hemocla infumata
Jinia zhengi
Macrophya albannulata
Megabeleses liriodendrovorax
Moricella rufonota
Nesoselandria collaris
Nesoselandria metotarsis
Pachyprotasis eulongicornis

*Priophorus wui**Pristiphora zhejiangensis**Tenthredo indigena**Tenthredo poeciloptera**Tenthredo pseudolasurea**Yuccacia albipes***Argidae***Arge baishanzua**Arge coerulescens**Arge dentipenis**Arge nipponensis**Arge obtusitheca**Arge sauteri**Arge similes**Arge xanthogaster**Arge xiaoweii***Diprionidae***Diprion liuwanensis**Nesodiprion zhejiangensis***Cimbicidae***Abia imperialis**Leptocimbex potanini**Paleocimbex carinulata***Siricidae***Tremex apicalis***Cephidae***Hartigia rufoventralis**Janus piri***Trigonalyidae***Poecilogonalos fasciata**Poecilogonalos unifasciata**Taenigonalos sauteri***Evaniidae***Evania appendigaster**Prosevania quadrata***Aulacidae***Pristaulacus zhejiangensis***Gasteruptionidae***Gasteruption japonicum***Ibaliidae***Heteribalia divergens***Cynipidae***Andricus oblongus**Biorhiza weldi**Cynips mukaigawae**Diplolepis japonica**Dryocosmus kuriphilus***Leucospidae***Leucospis japonicus***Chalcididae***Brachymeria excarinata**Brachymeria femorata**Brachymeria fiskei**Brachymeria lasus**Brachymeria longiscaposa**Brachymeria menoni**Brachymeria podagrica**Brachymeria tapunensis**Haltichella nipponensis**Kriechbaumerella dendrolimi**Kriechbaumerella longiscutellaris***Eurytomidae***Aiolomorpha rhopaloides**Eurytoma brunniventris**Eurytoma setigera**Eurytoma verticillata**Sycophila flava**Sycophila variegata**Tetramesa bambusa**Tetramesa phyllostachitis***Torymidae***Diomorus aiolomorphi**Megastigmus maculipennis**Podagrion mantis**Torymus sinensis***Pteromalidae***Anysis saissetiae**Homoporus japonicus**Lariophagus distinguendus**Mesopolobus subfumatus*

Norbanus aiolomorphi
Pachyneuron aphidis
Pachyneuron nawai
Pachyneuron umbratum
Pateromalus puparum
Trichomalopsis apanteloctena

Eupelmidae

Anastatus albitarsis
Anastatus gastropachae
Anastatus japonicus
Eupelmus urozonus
Mesocomys orientalis

Encyrtidae

Adelencyrtus bifasciatus
Anicetus beneficus
Arrhenophagus chionaspidis
Homalotylus flaminius
Microterys breviventris
Microterys flavitibialis
Microterys metaceronemae
Microterys nuticaudatus
Microterys postmarginis
Microterys zhaoi

Aphelinidae

Coccophagus hawaiiensis
Coccophagus yoshidae

Eulophidae

Chrysocharis chilo
Pediobius ataminensis
Pediobius foveolatus
Pnigalio longulus
Pnigalio soemias
Tetrastichus ceroplasteae
Tetrastichus chara
Tetrastichus coccinellae

Trichogrammatidae

Trichogramma confusum
Trichogramma dendrolimi
Trichogramma evanescens

Scelionidae

Telenomus dendrolimi

Proctotrupidae

Nothoserphus mirabilis

Ceraphronidae

Ceraphron manilae

Ichneumonidae

Acerataspis clavata
Acerataspis sinensis
Acropimpla persimilis
Agriotypus zhejiangensis
Agrypon japonicum
Allophatnus fulvitergus
Atoptrophos fukienensis
Auberteterus alternecoloratus
Bathythrix kuwanae
Brachynervus confuses
Brachyscleroma chinensis
Brachyscleroma jiulongshanna
Callajoppa pepsoides
Campoletis chlorideae
Casitaria nigripes
Charops bicolor
Charops brachypterus
Chlorocryptus purpuratus
Coccygomimus aethiops
Coccygomimus carinifrons
Coccygomimus luctuosus
Diadegma akoensis
Diatora prodeniae
Dicamptus nigropictus
Dicamptus reticulatus
Diplazon laetatorius
Eccoptosage miniata
Enicospilus centralis
Enicospilus flavocephalus
Enicospilus formosensis
Enicospilus gaoldi
Enicospilus melanocarpus
Enicospilus plicatus
Enicospilus pseudantennatus
Enicospilus pseudoconsersae
Enicospilus ramidulus
Enicospilus shikokuensis
Enicospilus tenuinubeculus
Ephialtes taiwanus

Eriborus sinicus
Eriborus terebrans
Exenterus chinensis
Exenterus similes
Exeristes roborator
Exochus scutellatus
Facydes nigroguttatus
Goryphus basilaris
Gotra octocinctus
Habronyx heros
Heteropelma amictum
Heteropelma elongatum
Hyposoter takagii
Hypsicera formosana
Hypsicera lita
Ichneumon ocellus
Iseropus himalayensis
Iseropus kuwanae
Itoplectis naranyae
Lareiga abdominalis
Lophyroplectus chinensis
Mansa longicauda
Mansa tarsalis
Megalomya hepialivora
Megarhyssa jezoensis
Mesochorus discitergus
Mesoleptus laticinctus
Metopius metallicus
Metopius rufus browni
Netelia zhejiangensis
Neurogenia fujianensis
Neurogenia tuberculata
Nipponaetes haeussleri
Platylabus nigricornis
Pristomerus chinensis
Pristomerus scutellaris
Protichneumon nakanensis
Rothneyia sinica
Sphinctus submarginalis
Spilopteron hongmaoensis
Stauropoctonus bombycivorus
Stenichneumon posticalis
Stictopisthus chinensis
Temelucha biguttula
Temelucha ptilippinensis
Therion circumflexum

Therion rufomaculatum
Trathala flavo-orbitalis
Venturia canescens
Vulgichneumon diminutus
Vulgichneumon leucaniae
Vulgichneumon taiwanensis
Xanthopimpla konowi
Xanthopimpla naenia
Xanthopimpla pedator
Xanthopimpla punctata

Braconidae

Aleiodes cariniventrus
Aleiodes dispar
Aleiodes earias
Aleiodes esenbeckii
Aleiodes gracilipes
Aleiodes microculatus
Aleiodes narangae
Aleiodes pallescens
Aleiodes ruficornis
Apanteles cypris
Apanteles heichinensis
Apanteles jayanagarensis
Apanteles kurosawai
Aphidius gifuensis
Ascogaster dimorpha
Ascogaster hei
Ascogaster perkinsi
Ascogaster quadridentata
Austruzele nigricans
Bracon adoxophyesi
Bracon onukii
Braunsia antefurcalis
Braunsia matsumurai
Centistesmedythiae
Centistes ocularis
Centistes punctatus
Centistes chaetopygidium
Charmon extensor
Charmon rufithorax
Clinocentrus baishanzuensis
Clinocentrus rugifrons
Cotesia affinis
Cotesia dictyoplocae
Cotesia glomeratus
Cotesia miyoshii

Cotesia ordinaries
Cotesia ruficrus
Cremonops desertor
Dolichogenidea baoris
Dolichogenidea belippicola
Dolichogenidea locastrae
Dolichogenidea parasae
Dolichogenidea stantoni
Euagathis albiventris
Eurycardiochiles jiulong
Eurycardiochiles shezu
Euurobracon breviterebrae
Glyptapanteles liparidis
Gyroneuron testaceator
Habrobracon hebetor
Hartemita flava
Hartemita latipes
Homolobus truncator
Homolobus infumator
Laccagathis formosana
Leiophron flavicorpus
Macrocentrus baishanzua
Macrocentrus cingulum
Macrocentrus hemistriolatus
Macrocentrus lishuiensis
Macrocentrus parki van
Macrocentrus qingyuanensis
Macrocentrus thoracicus
Macrocentrus tritergitus
Macrocentrus zhejiangensis
Meteorus versicolor
Microgaster biacus
Microgaster kuchihgensis
Microgaster lishuiensis
Microgaster obscuripennatus
Microgaster zhejiangensis
Microplitis pallidipes
Microplitis zhaoi
Oligoneurus songyangensis
Orgilus kumatai
Paradelius chinensis
Perilitus liui
Peristenus montanus
Phanerotoma flava
Phanerotomella bicoloratus
Phanerotomella sinensis

Phanerotomella zhejiangensis
Proterops decoloratus
Stantonia ruficornis
Stenobracon deesae
Streblocera (Eutanycerus) obtuse
Streblocera (Eutanycerus) okadai
Xiphozele bicoloratus
Yelicones koreanus
Yelicones wui
Zeze caligatus
Zeze chlorophthalmus
Zombrus bicolor

Dryinidae

Anteon songyangensis
A.baishanzuensis
Gonatopus nigricans
Haplogonatopus apicalis
Haplogonatopus katangae
Haplogonatopus oratorius
Neodryinus baishanzuensis

Embolemidae

Embolemus pecki

Bethylidae

Apenesia okinawensis
Cephalonomia tarsalis
Epyris ovatus
Epyris transvevsarius
Goniozus japonicus
Goniozus xiaoi
Holepyris fuscus
Holepyris yambaru
Pristocera formosana

Formicidae

Aenictus laeviceps
Aphaenogaster smythiesi
Brachyponera luteipes
Crematogaster zoceensis
Euprenolepis emmae
Formica japonica
Gnamptogenys panda
Myrmica margaritae
Odontomachus haematodes
Odontomachus monticola

*Paratrechina bourbonica**Paratrechina longicornis**Paratrechina taylori**Polyrhachis dives**Polyrhachis halidayi**Polyrhachis illaudata**Polyrhachis jianghuaensis**Polyrhachis rastellata**Prenolepis naorojii**Pristomyrmex pungens**Tetramorium caespitum**Tetraoponera allaborans****Eumenidae****Anterhynchium flavomarginatum**Coeleumenes burmanicus**Eumenes labiaatussinicus**Eumenes quadratus**Eumenes rubronotatus**Eumenes species**Eumenes decoratus**Jucancistrocerus tachkensis**Orancistrocerus aterrimus aterrimus**Pseumenes imperatrix**Rhynchium fahitense**Rhynchium quinquecinctum**Stenodynerus frauenfeldi****Vespidae****Parapolybia indica indica**Parapolybia varia varia**Paravespula flaviceps flaviceps**Polistes chinensis**Polistes gigas**Polistes japonicus**Polistes jokahamae**Polistes olivaceus**Polistes rothneyi grahami van der**Polistes sulcatus**Ropalidia fasciata**Ropalidia variegata variegata**Vespa affinis affinis**Vespa analis parallela**Vespa binghami**Vespa magnifica**Vespa mandarinia japonica**Vespa mandarinia mandarinia**Vespa orientalis**Vespa tropica ducalis**Vespa velutina nigrithorax****Mutillidae****Odontomutilla sinensis**Smicromyrme chinensis**Smicromyrme davidi**Squamulotilla tuickel****Scoliidae****Campsomeris annulata**Campsomeris limbata**Campsomeris marginella**Campsomeris prismatica**Scolia formosicola**Scolia oculata**Scolia quadripustulatta**Scolia watanabei****Pompilidae****Anoplius hengchunensis**Anoplius valdezi**Aporus japonicus**Auplopus chusanensis**Batozonellus annulatus**Batozonellus maculifrons**Caliadurgus ussuriensis**Episyron arrogans****Colletidae****Colletes gigas****Apidae****Apis mellifera**Apis cerana**Bombus trifasciatus**Bombus flavus**Bombus remotus**Bombus imitator**Pithitis smaragdula**Psithyrus cornutus**Psithyrus pieli**Thyreus decorus****Sphecidae****Ammophila clavus*

Ammophila globifrontalis
Cerceris harmandi
Cerceris hortivaga
Chalybion japonicum
Crossocerus inundatiflavus
Crossocerus denticoxa
Crossocerus denticrus
Crossocerus odontochilus
Crossocerus vepectineus
Crossocerus flavopictus
Rhopalum poecilofemorale
Rhopalum coarctatum
Rhopalum antennatum
Rhopalum varicoloratum
Sphex haemorrhoidalis
Trirogma caerulea

Uloboridae

Hyptiotes paradoxus
Uloborus walckenaerius
Uloborus varians

Dictynidae

Dictyna sp.

Psechridae

Psechrus sp.

Pholcidae

Pholcus cryticolens

Tetragnathidae

Argyrodes sp.
Leucauge blanda
Tetragnatha japonica
Tetragnatha praedonia
Tetragnatha shikokiana
Tylorid striata

Argiopidae

Araneus ventricosus
Araneus ejusmodi
Argiope amoena
Argiope bruennichii
Argiope minuta
Cyclosa argenteoalba
Cyclosa kiangsica schenkel

Cyclosa laticauda
Cyclosa octotuberculata
Cyclosa sedeculata
Neoscona adiantum
Neoscona scylloides
Nephila clavata

Linyphiidae

Erigone prominens
Erigonidium graminicola
Floronia zhejiangensis
Lepthyphantes baishanzuensis sp.
 nov. ined.
Nerienne compta
Nerienne japonica
Nerienne limbatinella
Nerienne longipedella
Nerienne oidedicata
Nerienne radiata
Nerienne sinensis sp. nov. ined.
Ummeliata insecticeps

Theridiidae

Arachaeranea angulithorax
Arachaeranea tepidariorum
Ariamnes cylindrogaster
Episinus nubilus
Theridion kompirense
Theridion octomaculatum
Theridion Rapulum

Hersilidae

Hersilia albomaculata

Urocteidae

Uroctea compactilis

Agelenidae

Agelena difficilis
Agelena limbata
Tegenaria domestica

Lycosidae

Pardosa astrigera
Pardosa laura
Pirata piratoides
Pirata procurvus

Pirata subpiraticus

Trochosa ruricola

Pisauridae

Pisaura lama

Dolomedidae

Dolomedes insurgens

Clubionidae

Clubiona japonicola

Oxyopidae

Oxyopes lineatipes

Oxyopes sertatus

Ctenidae

Anahita fauna

Heteropodidae

Heteropoda venatoria

Thomisidae

Misumenops tricuspidatus

Thomisus labefactus

Xysticus croceus

Xysticus Ehippiatus

Salticidae

Euarcha albaria

Marpissa margister

Menemerus confusus

Myrmarachne gisti

Plexippus setipes

Silerella vittata

3.3 Fungus

ASCOMYCOTA

Helotiales

Helotiaceae

Bisporella citrina
Chlorociboria aeruginascens

Leotiales

Leotiaceae

Leotia lubrica

Pezizales

Helvellaceae

Helvella pezizoides

Morchellaceae

Morchella conica
Morchella esculenta

Pyronemataceae

Cheilymenia fimicola
Scutellinia sculellata

Sarcoscyphaceae

Microstoma floccosmn

Hypocreales

Cordycepitaceae

Isaria cicadae
Cordyceps militaris

Ophiocordycipitaceae

Ophiocordyceps mutans
Tolypocladium inegoense

Xylariales

Xylariaceae

Xylaria hypoxylon
Xylaria nigripes
Xylaria polymorpha

BASIDIOMY

Agaricales

Incertae sedis

Panaeolus papilionaceus
Panaeolus semiovatus
Panaeolus solidipes

Agaricaceae

Agaricus campestris
Agaricus moelleri
Agaricus radicans
Agaricus silvaticus
Agaricus silvicola
Agaricus subrutilescens
Calvatia craniiformis
Coprinus comatus
Coprinus giganteosporus
Crucibulum laeve
Lepiota erminea
Lepioloa helveola
Leucocoprinus fragilissimus
Lycoperdon perlatum
Lycoperdon pyriforme
Macrolepiota procera
Nidula niveotomentosa

Amanitaceae

Amanita alboflavescentis
Amanita avellaneosquamosa
Amanita brunneqfuliginea
Amanita caesareoides
Amanita castanopsis
Amanita cf. similis
Amanita chepangiana
A. cinereopanmosa sensu
Amanita citrina
Amanita citrina var. grisea
Amanita exitialis
Amanita farinosa
Amanita fritillaria
Amanita fuliginea
Amanita griseofolia
Amanita griseoverrucosa
Amanita hongoi
Amanita incarnatifolia
Amanita japonica

Amanita manginiana
Amanita orientifulva
Amanita ovalispora
Amanita pallidocarnea
Amanita parvipantherina
Amanita pseudopantherina
Amanita pseudoporphyrina
Amcinita rubrovolvata
Amanita rufoferruginea
Amanita sculpta
Amanita sepiacea
Amanita spissa
Amanita subglobosa
Amanita subjunquillea var. *alba*
Amanita sychnopyramis f. *subannulata*
Amanita umbrinolutea
Amanita virgineoides
Amanita virosa
Amanita zangii

Bolbitiaceae

Bolbitius titubans
Conocybe apala
Conocybe tenera

Clavariaceae

Clavaria purpurea
Clavaria vermicularis
Clavaria zollingeri
Clavulinopsis corniculata
Clavulinopsis fusiformis
Clavulinopsis miyabeana
Multiclavula clara
Ramariopsis kunze

Cortinariaceae

Cortinarius albobilaceus
Cortinarius caerulescens
Cortinarius claricolor
Cortinarius cotoneus
Cortinarius crocolitus
Cortinarius fulgens
Cortinarius pholideus
Cortinarius salor
Cortinarius violaceus

Cyphellaceae

Chondrostereum purpureum

Hydnangiaceae

Laccaria amethystea
Laccaria laccata

Hygrophoraceae

Hygrocybe calyptraeformis
Hygrocybe coccinea
Hygrocybe miniata
Hygrocybe nivea
Hygrophorus ceraceus
Hygrophorus leucophacus
Hygrophorus Incorum
Hygrophorus russula
Hygrophorus unicolor

Inocybaceae

Crepidotus applanatus
Crepidotus badiofloccosus
Crepidotus epibryus
Crepidotus mollis
Inocybe calamistrata
Inocybe calospora
Inocybe lutea
Inocybe rimosa

Lyophyllaceae

Termitomyces eurrhizus

Marasmiaceae

Gerronema fibula
Gymnopus acervatus
Gymnopus dryophilus
Lentinus edodes
Marasmiellus candidus
Marasmiellus ramealis
Marasmius androsaceus
Marasmius bekolacongoli
Marasmius confluens
Marasmius crinis-equi
Marasmius epiphyllus
Marasmius erythropus
Marasmius hymeniicephalus
Marasmius maximus
Marasmius neosessilis
Marasmius oreades

Marasmius purpureostriatus
Marasmius scorodoni
Megacollybia clitocyboidea

Mycenaceae

Mycena crocata
Mycena galericulata
Mycena haematopus
Mycena holoporphyra
Mycena lactea
Mycena prua
Mycena rosea
Panellus stipticus

Physalacriaceae

Flammulina velutipes
Oudemansiella mucida
Oudemansiella radicata

Pleurotaceae

Pleurotus ostreatus

Psathyrellaceae

Coprinellus disseminatus
Coprbiellus micaceus
Coprinopsis lagopus
Parasola plicatilis
Psathyrella armeniaca
Psathyrella candolleana
Psathyrella piluliformis

Entolomataceae

Entoloma album
Entoloma atrum
Entoloma clypeatum
Entoloma cyanoniger
Entoloma fragilipes
Entoloma gyayanum
Entoloma hirtipes
Entoloma madidum
Entoloma murrayi
Entoloma omiense
Entoloma quadratum
Entoloma sericellum
Entoloma subclitocyboides
Entoloma umbrinellum

Schizophyllaceae

Schizophyllum commune

Strophariaceae

Agrocybe farinacea
Agrocybe praecox
Hebeloma sinuosum
Hypholoma fasciculare
Hypholoma lateritium
Kuehneromyces mutabilis
Pholiota lubrica
Pholiota spumosa
Psilocybe coprophila
Stropharia rugosoannulata

Tricholomataceae

Clitocybe houghtonii
Lepista sordida
Leucopasillus giganteus
Myxomphalia maura
Omphalia gracillima
Omphalia epichysium
Tricholomopsis decora
Tricholomopsis rutilans

Auriculariales

Auricuhriaceae

Auricularia cornea
Auricularia delicata
Auricularia heimuer

Boletales

Boletaceae

Austroboletus schichianus
Boletellus ananas
Boletellus longicollis
Boletinus pinetorum
Boletus badius
Boletus bicolor
Boletus brunneissimus
Boletus edulis
Boletus fuscopunctatus
Boletus laetissimus
Boletus pulverulentus
Boletus reticulatus
Boletus roseoflavus
Boletus speciosus

*Boletus subtomentosus**Boletus variipes**Boletus zelleri**Heimioporus japonicus**Leccinellum albellum**Leccinellum crocipodium**Leccinum scabrum**Phylloporus bellus**Phylloporus rhodoxanthus**Porphyrellus nigropurpureus**Pulveroboletus auriflammeus**Pulveroboletus ravenelii**Retiboletus griseus**Retiboletus nigerrimus**Retiboletus ornatis**Rubinoboletus balloui**Strobilomyces confusus**Strobilomyces seminudus**Strobilomyces strobilaceus**Tylopilus alboalter**Tylopilus badiceps**Tylopilus felleus**Tylopilus fumosipes**Tylopilus neofelleus**Tylopilus plumbeoviolaceus**Tylopilus virens**Tylopilus virens**Xanthoconium affine**Xerocomellus chrysenteron**Xerocomus alutaceus**Xerocomus hortonii**Xerocomus illudens**Xerocomus subpaludosus**Zangia roseolus***Calostomaceae***Calostoma cinnabarinum**Calostoma japonicum**Calostoma junghuhnii***Diplocystidiaceae***Astraeus hygrometricus***Gyroporaceae***Gyroporus castaneus***Sclerodermataceae***Scleroderma polyrhizum***Suillaceae***Suillus albidipes**Suillus bovinus**Suillus granulatus**Suillus kunmingensis**Suillus luteus**Suillus placidus**Suillus spraguei**Suillus tomentosus***Tapinellaceae***Pseudomerulius curtisii***Cantharellales****Cantharallaceae***Cantharellus cibarius**Cantharellus cinereus**Cantharellus cinnabarinus**Cantharellus lutescens**Cantharellus minor**Cantharellus tubaeformis**Craterellus aureus**Craterellus cornucopioides***Clavulinaceae***Clavulina coralloides**Clavulina rugosa***Hydnaceae***Hydnellum conrescens**Hydnum repandum***Corticiales****Corticaceae***Pulcherricium coeruleum***Geastrales****Geastraceae***Geastrum saccatum***Gloeophyllales****Gloeophyllaceae***Boreostereum vibrans**Gloeophyllum sepiarium*

Gloeophyllum striatum

Gomphales

Gomphaceae

Gomphus floccosus

Ramaria apiculata

Ramaria botrytis

Ramaria eumorpha

Ramaria flaccida

Ramaria flava

Ramaria flavobrunnescens

Ramaria fuscobrunnea

Ramaria lutea

Ramaria mairei

Ramaria obtusissima

Ramaria secunda

Hymenochaetales

Hymenochaetaceae

Coltricia cinnamomea

Coltricia montagnei

Coltricia perennis

Hymenochaete xerantica

Inonotus hispidus

Phallales

Phallaceae

Dictyophora multicolor

Phallus rubicundus

Pseudocolus fusiformis

Polyporales

Fistulinaceae

Fistulina hepatica

Fomitopsidaceae

Laetiporus versisporus

Phaeolus schweinitzii

Postia caesia

Postia lactea

Ganodemataceae

Amauroderma elmerianum

Ganodenna applanatum

Ganoderma atrum

Ganoderma australe

Ganoderma calidophilum

Ganoderma hainanense

Ganoderma lingzhi

Ganoderma lobatum

Meripibceae

Grifola frondosa

Meripilus giganteus

Meruliaceae

Bjerkandera fumosa

Mycoleptodonoides aitchisonii

Irpex consors

Steccherinum ochraceum

Polyporaceae

Cerrena unicolor

Daedaleopsis purpurea

Daedaleopsis tricolor

Favolus alveolaris

Favolus arcularius

Favolus mollis

Fomes fomentarius

Lenzites betulina

Lopharia cinerascens

Microporus affinis

Microporus vernicipes

Nigroporus vinosus

Panus giganteus

Panus similis

Polyporus ciliatus

Polyporus dictyopus

Polyporus grammacephalus

Polyporus leptcephalus

Polyporus melanopus

Polyporus picipes

Polyporus squamosus

Polyporellus varius

Pycnoporus cinnabarinus

Pycnoporus sanguineus

Trametes gibbosa

Trametes hirsuta

Trametes insularis

Trametes pubescens

Trametes versicolor

Trichaptum bifforme

Russulales**Albatrellaceae***Albatrellus ovinus***Bondarzewiaceae***Amyloporus campbellii**Bondarzewia mesenterica***Russulaceae***Lactarius aurantiacus**Lactarius camphoratus**Lactarius deliciosus**Lactarius hatsudake**Lactarius hygrophoroides**Lactarius lignyotus**Lactarius mustens**Lactarius piperaius**Lactarius rufus**Lactarius scrobiculatus**Russula aeruginea**Russula albida**Russula alboareolata**Russula amoena**Russula aurea**Russula ballouii**Russula betularum**Russula caerulea**Russula crustosa**Russula cyanoxantha**Russula decolorans**Russula delica**Russula densifolia**Russula emetica**Russula foetens**Russula fragilis**Russula grata**Russula heterophylla**Russula lilacea**Russula nigricans**Russula ochroleuca**Russula olivacea**Russula pseudodelica**Russula pseudointegra**Russula rubra**Russula sanguinea**Russula senecis**Russula subdepallens**Russula turci**Russula vesca**Russula virescens***Stereaceae***Stereum ostrea**Xyloholus spectabilis***Thelephorales****Bankeraceae***Calodon ferrugineum***Thelephoraceae***Thelephora aurantiotincta**Thelephora ganbajun**Thelephora multipartita**Thelephora palmata**Thelephora penicillata**Thelephora vialis***Dacrymycetales****Dacrymycetaceae***Calocera Sinensis**Guepinia spathularia***Tremellales****Sirobasidiaceae***Sirobasidium magnum***Tremellaceae***Tremella aurantia**Tremella foliacea**Tremella fuciformis**Tremella mesenterica*