

Anxi *Tieguanyin* Tea Culture System

GIAHS Proposal



People's Government of Anxi County

Fujian • China

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Contents

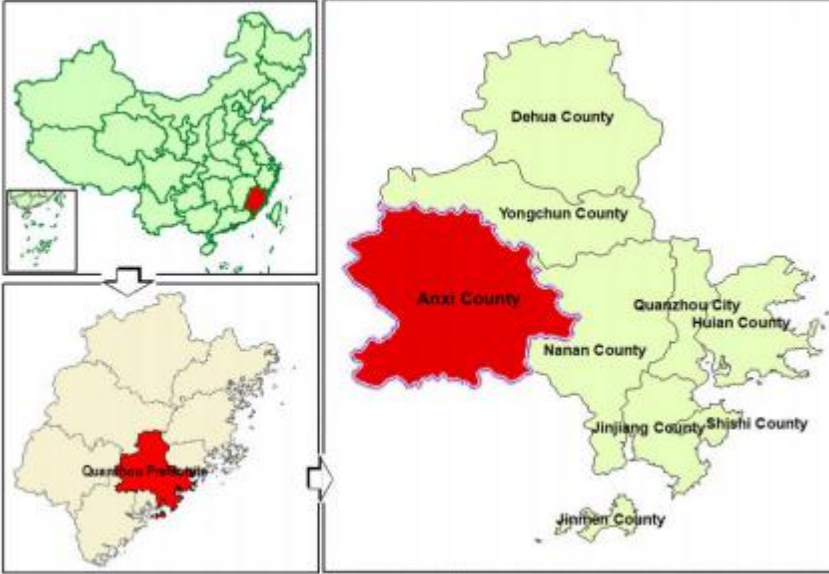

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1. SUMMARY INFORMATION

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| Name/ Title of the Agricultural Heritage System | Anxi <i>ʃjeguanʃjn</i> Tea Culture System |
| Requesting agency/organization | The People’s Government of Anxi County, Fujian Province, P. R. China |
| Responsible ministry (for the Government) | Ministry of Agriculture and Rural Affairs of the People’s Republic of China |
| Location of the site | <p>Anxi County is located in the southeast part of Fujian Province, China (see the figure below), at the upper reaches of Xixi River, Jinjiang City, 117°36~118°17'E, 24°50'~25°26'N. It lies in the joint of Quanzhou, Xiamen, and Zhangzhou, where is surrounded by mountains and close to sea. Anxi County is boarded with Nan’an County to the east, Hua’an County to the west, Tong’an District, Xiamen City to the south, Yongchun County to the north, Changtai County to the southwest, and Zhangping City to the northwest. From east to west, the County extends 74 kilometers, and it averages 63 kilometers from north to south. Total land size is 3,057.28 square kilometers. As the largest county in Quanzhou City, Anxi is commonly known as A Saucer, for it looks like an oval saucer on the map. The core zone of the heritage, i.e. the scope of the heritage, includes Lutian Town, Xiping Town, and Huqiu Town.</p> |

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| |  |
| <p>Accessibility of the site to capital city or major cities</p> | <p>The Site is easily accessible (see the figure below). It is 60 kilometers away from Quanzhou Highspeed Railway Station, from where people can arrive in Shanghai, Shenzhen, and other cities along the railway, within 6 hours. Distance from the Site to <i>Fuzhou Changle International Airport</i> (IATA: FOC) is 235 kilometers; and it is 76 kilometers away from <i>QuanzhouJinjiangInternational Airport</i> (IATA: JJN), and 79.3 kilometers from <i>Xiamen Gaoqi International Airport</i> (IATA: XMN).</p>  |
| <p>Area of coverage</p> | <p>40018.78 ha</p> |

| | |
|---|--|
| Agro-ecological zones | Hilly area of agroforestry eco-systems in Southeastern China |
| Topographic features | Mainly mountains and hills, approximately 85 percent of the total area. Basin valleys spread along the Xixi River and Lanxi River, like a string of beads, 15 percent of total area. |
| Climatetype | Subtropical oceanic monsoon climate |
| Approximate population (beneficiary) | In 2020, household registered population of the county is 1.2103 million persons; Household registered population of the core zone, the core zone of the Site, is 136.3 thousand persons. |
| Ethnicity/Indigenous population | Population of the <i>Han Nationality</i> : 98.8 percent; main ethnic minority group is the <i>Shes</i> (Chinese: 畲族) |
| Main source of livelihoods | <p>Main sources of livelihood are tea plantation, production of tea leaves, tea-related industries, and working as migrant labors. In 2020, rural per capita disposable income was RMB 19,145 <i>yuan</i> (USD 2,776), among which tea income RMB 10,759 <i>yuan</i> (USD 1,560), accounting for 56.2% of total per capita income. In 2020, in the core zone of the Site, per capita income was RMB 21,350 <i>yuan</i> (USD 3,095), among which tea income was RMB 15,265 <i>yuan</i> (USD 2,213), 71.5% of total per capita income. As for tea farmers, over 90% of per capita income comes from tea industry.</p> |
| Executive summary | <p>Anxi County is situated in the southeast part of Fujian Province, in subtropical oceanic climate. Because its main terrain is mountains and hills, Anxi County enjoys various microclimates. In summers and autumns, isolated thundershowers can be commonly seen. Locals call these phenomena “The wind is different on the other side of the mountain; the rains differ from each other at the same moment.” Red soil, yellow soil, and lateritic red earth are principal types of soils in Anxi County. Thanks to the unique physical geographic environment, which provides a superb habitat for tea trees, Anxi has a long history of tea cultivating and making: more than 1,000 years’ history of tea planting; nearly 300 years since <i>7jeguanyjn</i> was discovered and so named. During the</p> |

long course of tea planting and making, Anxi has formed a complex agricultural system that focuses on the variety breeding and cultivation of *Tieguanyin*, pest/disease control, eco-system management of tea gardens, tea leaves plucking and making process, and relevant culture, etc. This system is irreplaceably important for local people's livelihood. At the same time, it maintains the agricultural diversity and biological diversity of agriculture and related species. The System also owns ecosystem functions, for example, conserving water and soil, retaining water sources, accelerating nutrient cycling, and adjusting microclimates, etc. In addition, it shows a wonderful agricultural landscape in which the nature exists harmoniously with local people who understand how to utilize and remake natural conditions. The System is full of rich tea culture as well.

As the place of origin of Oolong tea craftsmanship, and as the place where the variety of *Tieguanyin* tea tree was discovered and so named, and as the birthplace of the tea brand *Tieguanyin*, Anxi *Tieguanyin* Tea Culture System is of an evident global importance. Anxi people pioneered and have been improving the vegetative propagation technology of tea trees in China. Hence, the origination and the whole course of evolution of tea tree vegetative propagation technology have been recorded in Anxi. Since Song Dynasty (960~1279 A.D.) and Yuan Dynasty (1206~1368 A.D.), Anxi tea culture has been spreading to the world via the Maritime Silk Road. In Europe, the pronunciations of "tea" in English, "thé" in French, and "tee" in German can all trace to their source in the dialect of Quanzhou City, of which Anxi County is a part. Anxi tea culture is still impacting the world through channels like tea trade and state leader diplomacy, etc. Anxi *Tieguanyin* Tea Culture System remains the traditional and sustainable ways of ecological tea planting. It maintains the stability of Anxi mountainous tea gardens' ecosystem, and serves as an important reference for the sustainable development of agriculture in other mountainous areas.

Pictures



LandscapesofAnxi TeaGardens



***Tieguanyin* Leaf-bud with Red Heart and Crooked Tail**



Plucking Tea Leaves



Sunning theGreen



Cooling theGreen



Folk Tea Battle



Tea Promoter Temple

2. DESCRIPTION OF THE AGRICULTURAL HERITAGE SYSTEM

2.1 Significance of the Proposed GIAHS Site

2.1.1 Location and General Information of the Proposed GIAHS Site

(1) Location of the Site

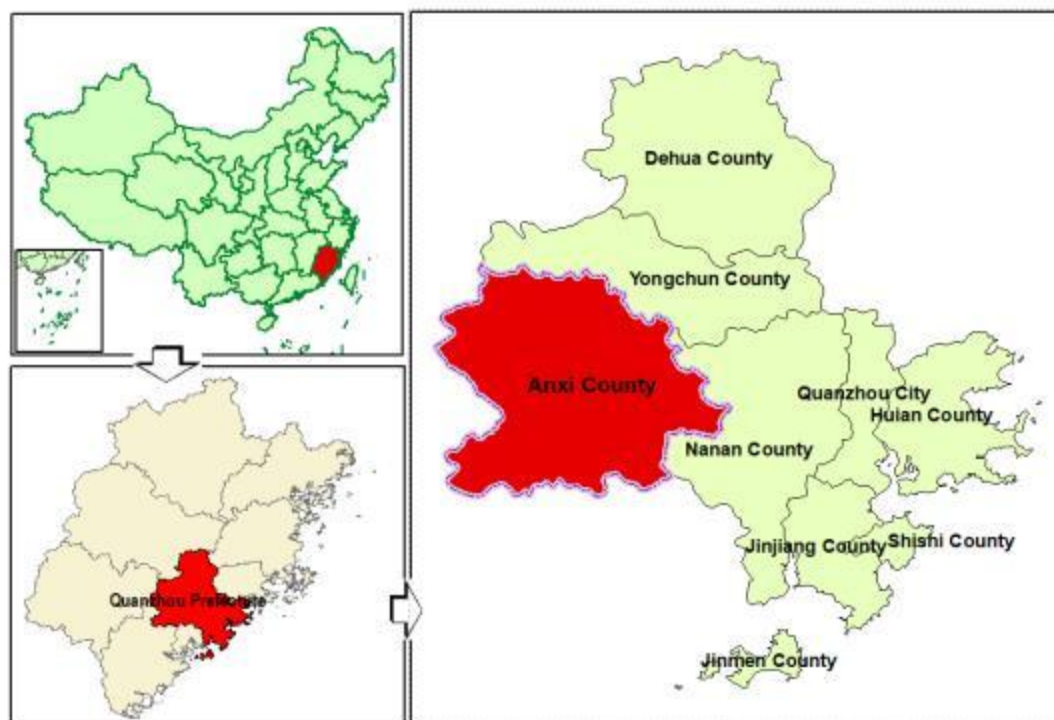


Fig. 1 Geographic Position of Anxi County, Fujian Province

Anxi *Tieguanyin* Tea Culture System is situated in the Anxi County, Fujian Province. The County lies in the southeast part of Fujian Province (see Fig. 1), at the upper reaches of Xixi River, Jinjiang City, $117^{\circ}36' \sim 118^{\circ}17'E$, $24^{\circ}50' \sim 25^{\circ}26'N$. Anxi is located in the middle of the Golden Delta (that consists of Quanzhou City, Xiamen City, and Zhangzhou City), surrounded by mountains and close to the sea. Anxi County borders with Nan'an City on its east, Hua'an County on its west, Tong'an District, Xiamen City to its south, Yongchun County to its north, Changtai County to its southwest, and Zhangping City to its northwest. From east to west, Anxi is 74 km long; from south to north, it is 63 km wide. As the largest county in Quanzhou region, total

coverage size of Anxi County is 3,057.28 km². The County, seen on the map, is like an oval plate. Hence it is also known as “a saucer.”

Tea terraces are distributed around the whole Anxi County, and approximate 67.5% of them are *Tieguanyin* tea tree. However, traditional *Tieguanyin* tea tree varieties still remain a relatively concentrated distribution, for instance, in Xiping Town, where *Tieguanyin* tea tree variety was originally discovered, and in Lutian Town and Huqiu Town, which used to belong to the same township with Xiping Town. In these three towns, great care is given to the ancient *Tieguanyin* maternal plants; more traditional *Tieguanyin* tea tree varieties are cultivated.

Xiping, Lutian, and Huqiu all belong to the southeast offset of Daiyun Mountain Ridge, and they are located on different altitudes of the Xixi Tributary of the Jin River—Lanxi River Basin. Since 955 A.D., when the first county was established in this area during the times of the Five Dynasties (907-960 A.D.), Xiping, Lutian and Huqiu had been part of the same township. Soil property is similar in these three towns—all yellow soil and red soil, which are suitable for growing tea trees. Tea gardens are mainly scattered in the low-latitude, high-altitude (averagely 300-800 meters high) mountainous and semi-mountainous regions here. Located on different heights of the same mountain ridge, the three towns make up a complete natural mountainous ecological cycle system.

Because of the adjoining locations and similar natural conditions, *Tieguanyin* variety was promptly popularized and cultivated in these three towns as soon as it was discovered in Xiping Town. In the same way, after Oolong tea making techniques were born in Xiping Town, they were quickly spread to Lutian and Huqiu, by means of mentor-apprentice inheritance practice. Farmers in this region proactively explored and creatively improved *Tieguanyin* planting and processing techniques, so a similar development and evolution process of *Tieguanyin* planting and making technology and tea culture/custom can be seen in these three towns. At the same time, due to subtle differences of micro-terrain, micro-climate and synchronous progress, certain diversity can be seen in aspects like tea planting and making processes. At present, traditional

tea-making process and tools, biological cultivation methods are still universally used in these three towns. Custom of tea-battle, inheritance system for tea art, and tea-related worship culture are prevalent in this area; some cultural forms, which had disappeared for some time, have been recovered. This area shows a significantly representative systematicness.

In addition, the three towns have their own characteristics. They jointly constitute an integral system to show the whole historic evolution of Anxi Tieguanyin tea culture system. In Xiping, there are still a large number ancient tea culture buildings, such as Rizhai, Yuezhai, Taishan Buliding, Jusi Building and Xinbao Building, which have witnessed the international trade of Anxi Tea and the spread of oolong tea culture to the outside world for thousands of years. Traditional tea-related customs are known for “Tea-worship Festival” .

Huqiu, located at the lower reaches of Lanxi River and geographically characterized by the plain of the river basin, used to be an important hub of the ancient Anxi Tea trade thanks to the convenient transportation. In history, Huqiu tea merchants used cattle as main traffic vehicles to carry tea outwards and at last they crossed mountains and rivers to sell Anxi Tea to the Southeast Asia, which has formed a hard-working “Niubang” spirit (a spirit of using cattle to carry tea to the outside world). Therefore, the semi-fermentation technique of oolong tea, *Tieguanyin* tea variety and single-node cutting propagation technology were widely spread through “Niubang” Tea Transport Group.

Lutian is characterized by less population and more hilly lands and quite suitable for tea planting in a large scale, driving the promotion and application of Tieguanyin tea variety and oolong tea semi-fermentation technology. In 1950, a state-owned tea farm was also established in Lutian Township, which trained lots talents of planting and making tea. Now, it has become a tea industry talent hub and tea tea-technology research base.

At present, from the perspective of planting proportion of Tieguanyin tea tree variety, these three towns prevail with absolute predominance that is higher than 70

percent—respectively 73.7% (Lutian), 74.2% (Xiping), and 73.1% (Huqiu). Planting and processing the Anxi Tieguanyin tea are the principal source of local farmers' livelihood. Individually, tea-related income accounts for 69.4%, 74.8%, and 72.6% of the household income in Lutian, Xiping, and Huqiu. Although Tieguanyin planting is also popular in other towns, the traditional characteristics are not as typical as the three towns we proposed. This is the result of new technologies adoption for higher tea productions. In order to effectively protect Anxi Tieguanyin tea culture system, we propose to divide Anxi County into 2 parts: a buffer zone and the core zone (the GIAHS site). For better protection, different measures will be taken between the buffer zone and core zone. Within the core zone, traditional protection and inheritance will be carried out, mainly including the protection of Tieguanyin varieties, traditional ways of planting, tea-making, and related culture. In the buffer zone, besides the above-mentioned protections of traditional tea tree varieties, planting and making of tea, traditional tea culture, modern technologies will be adopted in a degree under the principles of dynamic protection and management.

Core Zone of Anxi Tieguanyin Tea Culture System is situated in the Xiping township, Lutian township, and Huqiu township, Anxi County, Quanzhou City, Fujian Province (see Fig.2), $117^{\circ}46'3'' \sim 118^{\circ}17''E$, $25^{\circ}5'45'' \sim 24^{\circ}52'17''N$. Total area of the town is 40018.7 ha. In 2020, the total registered population were 136.3 thousand persons, of which the rural registered population were 11.85 thousand persons. Germplasm resources of ancient tea trees mainly distribute in 10 villages in 3 townships: *Lutian*, *Sanyang*, and *Fuling* in Lutian Town; *Songyan*, *Yaoshan*, *Yaoyang*, *Shangyao*, and *Nanyang* in Xiping Town; *Luoyang* and *Meizhuan* in Huqiu Town. Altitude of this area is 350 m to 950 m above the sea level. Annual mean air temperature is 16~18°C; annual precipitation is about 1,800 mm. In late spring and early summer, rains fall as temperature rises; in autumn and winter, illumination and humidity complement each other. The environment is perfectly suitable for the growth of tea trees. Since the end of Tang Dynasty (618~907 A.D.), tea trees have been cultivated in this area. And it is the birthplace of Anxi *Tieguanyin* tea.

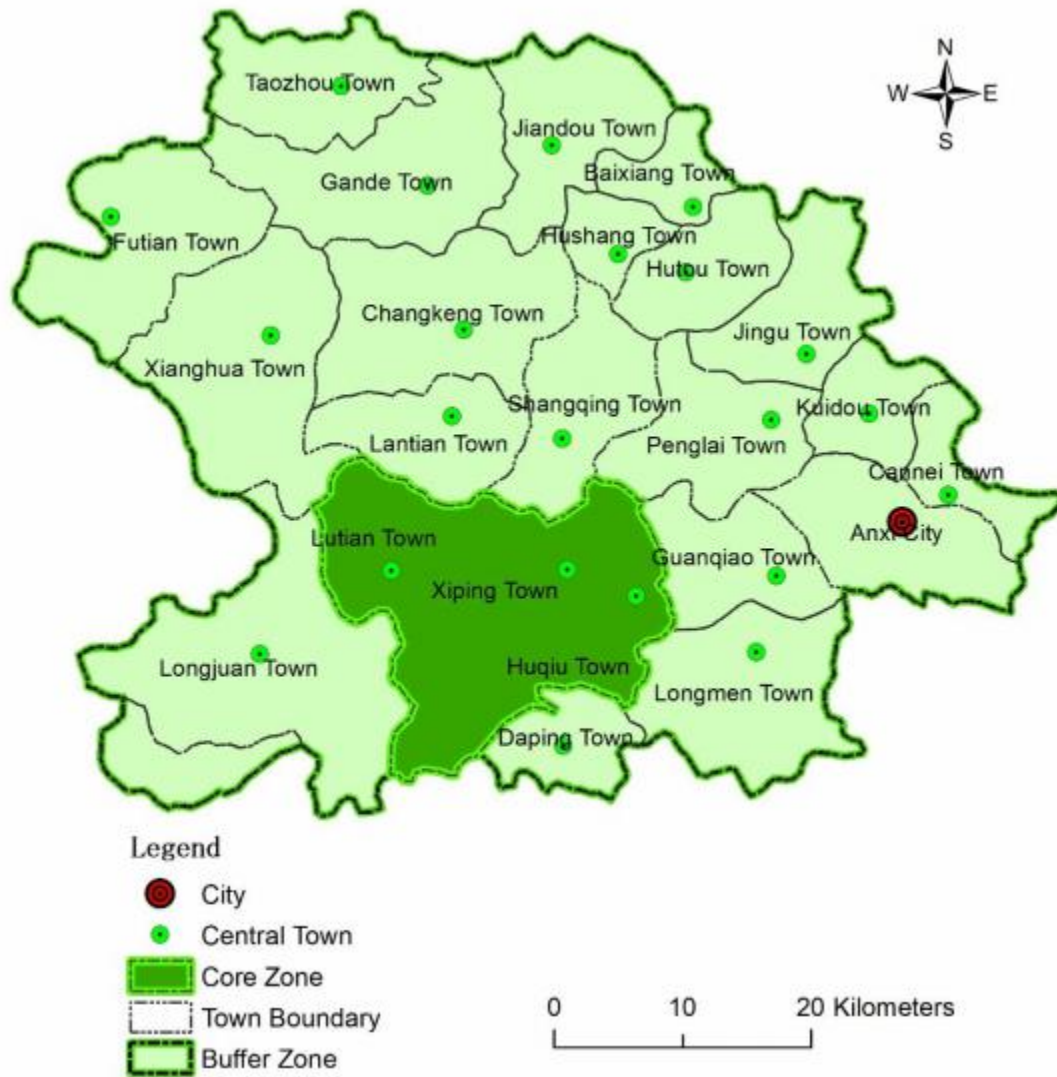


Fig. 2 Perimeters of the Site and Its Core Zone

The Buffer Zone includes other 21 towns in Anxi County, which are Fengcheng Town, Hutou Town, Penglai Town, Guanqiao Town, Jiandou Town, Chengxiang Town, Kuidou Town, Jingu Town, Longmen Town, Gande Town, Cannei Town, Changqing Town, Hushang Town, Shangqing town, Daping town, Longjuan Town, Lantian Town, Xianghua Town, Taozhou Town, Baita Town, and Futian Town. The total area of the Buffer Zone is 265,709.22 ha. Registered population is 1.074 million persons in 2020, of which the rural registered population is 728.8 thousand persons.

(2) An Overview of the Site

A. Natural and Geographic Profile

Anxi County belongs to the southeast-extending branch range of Daiyun Mountain that stands in the central and eastern part of Fujian Province. Terrain of Anxi County: high in the northwest, where is mainly mountainous, and low in the southeast, where relatively slopes gently. Main landforms: low hills, high hills, low mountains, and middle mountains, with basins and valleys scattered among them. These unique geographical conditions constitute a greater ecological environment that is suitable for the growth of *Tieguanyin* tea trees. The proximity to the sea, and the mountains that block the sea wind from effecting Anxi directly, bring Anxi moderate temperature and precipitation, therefore an extraordinary habitat for tea trees. Within the borders of Anxi County, surface water resources mainly come from rainfall—annual mean total rainfall of the County is $2.99 \times 10^9 \text{m}^3$. Principal water systems in Anxi County belong to the Jinjiang River System and Jiulong River System; annual natural groundwater resource is $373 \times 10^6 \text{m}^3$. The Core Zone of the heritage site locates in the upper reach of Lanxi River, the branch of Xixi River, Jinjiang River System.

Anxi has lower- and middle-subtropical oceanic monsoon climates. The different terrain and landform between the east and the west parts of Anxi lead to obviously distinct climatic features between the inner Anxi and the outer Anxi. East Anxi—outer Anxi—belongs to the lower subtropical monsoon climate with an annual mean temperature 19 to 21 °C, and 1,600 mm annual rainfall. It has long and hot summers, nearly as long as six months; it has short winters without frost. So, it brings in three harvests a year. As a contrast, west Anxi—inner Anxi—is mountainous with complex landforms. Northwest air stream intensively impacts it. At the same time, for mountain ranges align differently, inner Anxi has a much more complex climatic situation—with various types of microclimates. In summers and autumns, isolated thundershowers can be frequently seen. Locals summarize it: “The wind is different on the other side of the mountain; the rains differ from each other at the same moment.” Annual mean temperature of inner Anxi is 16 to 18 °C, and annual precipitation 1,800 mm. It has four distinctive seasons: late spring, not-so-hot summer, relatively earlier (and colder) autumn and winter. Crops of inner Anxi are usually under the threats of “three chills”:

spring chill (cold spell in spring), plum blossom chill, and autumn chill. In inner Anxi, the growth of crops is normally half a month later than outer Anxi, for this reason, there are only 2 crop harvests a year. In respect of the whole county, there are abundant resources of illumination, heat, and water. Temperature varies widely between day and night. It has 16~21C annual mean temperature, 1,782.4 mm annual mean precipitation, 78.5% annual mean relative humidity, 1,943.5 annual average sunshine hours, and a 260-day frost-free season. Anxi County has four distinct seasons a year, with neither intensive heat in summer, nor severe coldness in winter. Its climatic features, for example, low temperature, high humidity, and being foggy, constitute a unique natural environment for the growing the *Tieguanyin* tea trees that are of excellent quality.

Soil in Anxi can be roughly classified into 6 types: lateritic red soil (lateritic red loam), red soil, yellow soil, yellow-brown soil, purple soil, and limestone soil (4.61%, 83.22%, 11.95%, 0.01%, 0.04%, and 0.18%, respectively). Thickness of soil layer is usually 70 to 168 cm, while the depth of humus layer 2 to 15 cm. A distribution pattern of lateritic red soil—red soil—yellow soil can be seen horizontally from southeast to northwest, and vertically from lower altitude to higher altitude. Anxi County is mainly covered by red soil. Its pH values are between 4.0 and 5.5. Deep layer and soft texture of the soil give it better capability of water conservation. The soil has higher content of organic matters, rich mineral elements and abundant nutrients. Especially higher content of manganese (Mn), zinc (Zn), and copper (Cu), which serve as natural foundations of the color, fragrance, and aroma that only *Tieguanyin* is endowed to have by nature.

Northwest part of the county is mainly middle mountains and low mountains that belong to the middle-subtropical evergreen broad-leaved forest vegetational zone (laurel forest); southeast part of the county is mainly hills and low mountains that belong to the subtropical rainforest vegetational zone. Typical vegetations are evergreen broad-leaved forest, bamboo, warm-temperate coniferous forest, and herbal shrubs.

Thanks to its natural advantages, Anxi County has been a perfect home for *Tieguanyin* cultivating and growing. Firstly, optimal altitude for growing *Tieguanyin*

tea trees is between 300 m and 1,000 m above the sea level. Fog prevails at this height. Diffused light and appropriate temperature provide *Tieguanyin* trees with more content of amino acid, which is the secret of the unique quality of *Tieguanyin* tea. Secondly, best position of a *Tieguanyin* tea garden should be north-facing. For this position gives the garden more oblique sunlight instead of direct one. Thirdly, the red soil and yellow soil in Anxi are neutral to acidic, and rich in chemical elements and microelement. They are highly appropriate for growing *Tieguanyin* tea trees.

B. Socioeconomic Profile

The land area of Anxi County is 305,728 ha, of which tea garden area accounts for 13.41% , other gardens area 5.31% , paddy field 9.95% , dry field 0.68% , forest land 52.96% , grassland 5.96% (see Fig.3 and Tab. 1). At present, tea garden area constitutes a large part of the total garden area in Anxi County, approximate 71.6%. The Core Zone area is 40018.78 ha, of which tea garden area accounts for 24.60% , other gardens area 0.34% , paddy field 21.39% , dry field 0.99% , forest land 28.86% , grassland 9.26% (see Fig.3 and Tab. 1). This situation is close relationship to the climate, soil, and landform in Anxi County.

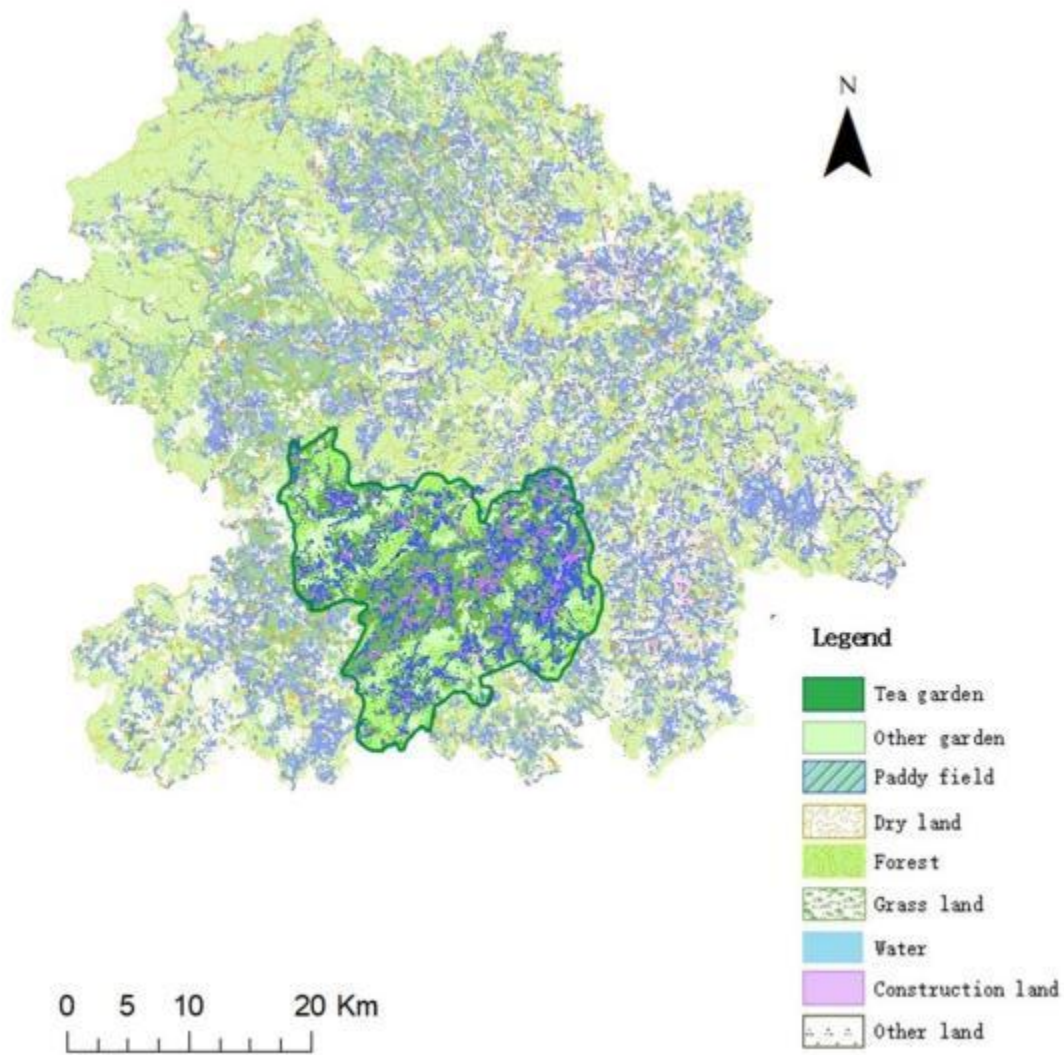


Fig.3 Map of land use type in The Core Zone and the whole county of Anxi

About tea garden coverage, by varieties (Tab.2): *Tieguanyin* remains an absolute majority: 67.5% of the County's total area of tea planting. It is followed by *Benshan* (11.4%), *Maoxie* (7%) and *Huangdan* (6.8%), *Meizhan* (2.4%) and *Daye Oolong* (1.6%) (see Table 2). In Xiping Town, the core zone of the Site, total area of tea gardens is 43,400 mu (2,865 has). It has an even higher proportion of *Tieguanyin* planting. In sequence, The Core Zone has following tea varieties: *Tieguanyin* (73.6%), *Benshan* (7.5%), *Huangdan* (9.1%), and others. In regard to the unit price, in 2020, *Tieguanyin* raw tea was *yuan* RMB 150/kg (Appx. USD 21.75/kg), twice the price of other varieties. In general, *Tieguanyin* is economically more important in the core zone than in the rest

of the County.

Tab.1 Type and area of Land use in Anxi County

| Land use Type | Anxi County | | Core Zone | |
|-------------------|-------------|----------------|-----------|----------------|
| | Area (ha) | Proportion (%) | Area (ha) | Proportion (%) |
| Tea garden | 40998.12 | 13.41 | 9844.37 | 24.60 |
| Other garden | 16232.28 | 5.31 | 137.21 | 0.34 |
| Paddy field | 30419.94 | 9.95 | 8561.07 | 21.39 |
| Dry land | 2078.95 | 0.68 | 394.83 | 0.99 |
| Forest | 161913.6 | 52.96 | 11547.99 | 28.86 |
| Grass land | 18221.39 | 5.96 | 3705.21 | 9.26 |
| Water | 5472.53 | 1.79 | 144.25 | 0.36 |
| Construction land | 21706.69 | 7.10 | 5500.80 | 13.75 |
| Other land | 8682.68 | 2.84 | 183.06 | 0.45 |
| Sum | 305728 | 100 | 40018.78 | 100 |

Tab.2 Oolong tea varieties condition in the core zone and Anxi County

| Tea Variety | Mean Price | Core Zone | | Buffer Zone | | Anxi County | |
|-------------------|------------|--------------|------|--------------|------|--------------|------|
| | | Planted area | | Planted area | | Planted area | |
| | Yuan/kg | ha | % | ha | % | ha | % |
| <i>Tieguanyin</i> | 150 | 5751 | 73.6 | 17117 | 66.0 | 27671 | 67.5 |
| <i>Benshan</i> | 75 | 585 | 7.5 | 3142 | 12.3 | 4667 | 11.4 |
| <i>Maoxie</i> | 56 | 302 | 3.9 | 2137 | 7.7 | 2867 | 7.0 |
| <i>Meizhan</i> | 80 | 264 | 3.4 | 553 | 2.2 | 993 | 2.4 |
| <i>DayeOolong</i> | 53 | 56 | 0.7 | 452 | 1.8 | 667 | 1.6 |
| <i>Huangdan</i> | 93 | 710 | 9.1 | 1734 | 6.3 | 2800 | 6.8 |

In recently years, Anxi County has been promoting the development of tea industry through the implementation of various projects, and accelerating transformations. The county has guided and pushed the developments of urban area and

rural areas, and improved people's livelihood with best efforts. As a result, all social undertakings of the county have attained an all-around progress.

In 2020, GDP of Anxi County is RMB 74.763 billion *yuan* (USD 10.84 billion), 3.3% up over the previous year. Structure ratio of primary, secondary, and tertiary industries was 7.52/50.76/41.72. Total retail sales of consumer goods were RMB 56.842 billion *yuan* (USD 8.241 billion), 0.9% up over previous year. Per capita disposable income of urban residents was RMB 35,548 (USD 5,154), 2.8% up over previous year; per capita disposable income of rural residents was RMB 19145 *yuan* (USD 2,776), 6.2% up over previous year. Gross output value of farming, forestry, animal husbandry and fishery was RMB 9.222 billion *yuan* (USD 1.337 billion), 4.0% up over previous year. The County saw a significantly improved comprehensive economic strength in this year.

Tea industry is the leading industry of Anxi County. Total area of tea gardens in Anxi is 40998.12 ha, among which the area of *Tieguanyin* tea gardens is 27671 ha, 2% of total area of tea gardens in China. Yearly output of tea leaves is 67,000 t, 4% of total tea leaves output of China. Annual tea export is around 13,000~15,000 t. Annual foreign exchange earnings are USD 160~180 million. In 2015, annual output of tea leaves was 57,946 t. Total area of transferred tea gardens was 17,100 *mu* (1,140 ha). 14,200 *mu* (946 ha) of tea gardens were soil-improved. 43,300 person-time tea-related training were performed. Eligible rate of tea product sampling inspection was 99.5%. In 2016, annual output of tea leaves was 59,987 t, 2,041 t more than previous year. Total area of transferred tea gardens was 65,000 *mu* (4,333 ha). Approximate 60,000 *mu* (4,000 ha) of high-standard ecological tea gardens was built, while 26,000 *mu* (1,733 ha) tea gardens was reused for other purposes. In 2017, annual output of tea leaves was 62,082 t, 2,095 t more than previous year. 16,000 *mu* (1,067 ha) of high-standard ecological tea gardens was built, while 10,000 *mu* (667 ha) tea gardens was repurposed, 35,800 *mu* (2,387 ha) of tea garden soil was improved, and 2,000 *mu* (133 ha) of *Tieguanyin* germplasm resources was under protection. In 2020, annual output of tea leaves was 62,000 t, remaining the same as previous year. Total area of transferred tea gardens was

26,200 mu (1,747 ha)

In 2020, household registered population of Anxi County was 1.2103 million, among which 84,7300 was agricultural population, accounting for 70.0% of total. The population of *Han* nationality was 119.6 million, around 98.82% of total; population of minority people was 14282, among which the *Shes* account for 81.4%. Among the 260,000 agricultural households in Anxi County, 200,000 households are engaged in tea leave cultivation and processing. More than 500,000 people live on tea industry, and over 350,000 take up careers in tea-related industries. For tea farmers, income from tea leaves is over 90 percent of their net income. According to the field surveys, 71.2% of the households' income was from tea industries.

2.1.2 Historical Evolution and Its Significance

(1) Historical Evolution

Anxi County, the famous tea country, has a long-standing history tea planting and well-established tradition of tea making. Over 200,000 rural households are engaged in tea. *Tieguanyin* was created by Anxi people between 1725 and 1736 A.D. It belongs to and is the symbol of the Oolong Tea—one of the six major categories of Chinese Tea.

As a type of semi-fermented tea, *Tieguanyin* falls in between the green tea and the black tea. Its unique orchid-like fragrance is delicate and lasting. From the ancient Maritime Silk Road till current the Belt and Road initiative, *Tieguanyin* has never ceased being a popular commodity. The craftsmanship of tea producing and making has been passed on generation after generation. The history and culture of *Tieguanyin* are well known at home and abroad. From the perspective of history, the evolution of Anxi *Tieguanyin* Tea Culture System mainly consists of phases shown



Photo 1. Ancient Wild Tea Tree in Anxi

below:

A. Origination and Development of Anxi Tea and Tea Culture

Chinese tea originated in the Tang Dynasty (618~907 A.D.). It was known to history as “Tea originated in the Tang Dynasty and flourished in the Song Dynasty (960~1279 A.D.)” . According to local pedigree records, Anxi people began to cultivate and make tea during the late Tang Dynasty and the Five Dynasties (907~960 A.D.). *Mr. Han Wo*, a scholar at the Hanlin Royal Academy of the Tang Dynasty, once wrote a poem: “On the rocky cliff, men are hunting larcyl. And he hears the tea-pickers’ song.”. It showed that the Anxi people had begun to grow tea at least in late Tang Dynasty (see Photo 1).

In Chinese history, the Song Dynasty was the golden age of tea producing and saw the great development of tea culture. Anxi tea attained a great development during this period of time. When retired and settled down to Anxi, *Mr. Huang Yijian*, a poet in the Song Dynasty, wrote that “After a rainy night, vegetables look so tender and fresh; after several brewing, the spring tea is still full of aroma.” During the reign of the Wanli Emperor (1573 ~ 1620 A.D.), Ming Dynasty, the official archives of Anxi County recorded: “...The tea was named after the *qīngshuǐ* (literally *Clear Water*), and it is also named after the *shèngquán* (literally *the Holy Spring*).” The *qīngshuǐ* refers to the *qīngshuǐ* Rock that lies on the Penglai Mountain, Anxi County. Facilities of this area were built in the sixth year of Emperor Zhaoxu’s reign, Song Dynasty (1083 A.D.). The *shèngquán* refers to the *shèngquán* Rock that is located on the left side of the Sima Mountain, Anxi County. Facilities of this area was built during the Tianyou Period, Tang Dynasty (around 905 A.D.). From historical materials, we can see that both farmers and temples were cultivating tea in Anxi County during the Song Dynasty. Furthermore, people had been capable of identifying, evaluating, and comparing the qualities of tea leaves. It clearly shows that, as early as the Song Dynasty, tea cultivating, making, and drinking had been developed to a significantly high level.

B. Ming Dynasty and Qing Dynasty: Discovery of Tieguanyin, techniques of

Oolong tea making

The Ming Dynasty (1368~1644 A.D.) and the Qing Dynasty (1644~1911 A.D.) was the period during which Chinese ancient tea and traditional tea studies went from prosperity to a peak. Anxi tea was no exception. Contributions made by Anxi people to the world's tea industry, during this period, included the invention of tea tree short-scion cutting techniques, creation of the Oolong tea, discovery of famous *Tieguanyin*, transmission of Oolong tea-making techniques and the *Tieguanyin* seedlings from the mainland China to Taiwan, etc.

In late Ming Dynasty and early Qing Dynasty, Anxi tea farmers invented a unique process of tea leaves plucking and tea making. Hence a special category of Chinese tea—Oolong tea—came into being. *Tea Making*, the state-compiled textbook for agricultural colleges and universities, states that “Dark Green Tea (i.e., Oolong Tea) was created by the farming people of Anxi County, Fujian Province, between the third and the thirteenth year of the Emperor Yongzheng's Reign (1725~1735 A.D.), Qing Dynasty. It spread to Taiwan Province later.”. Official Archives of Jian'ou County, which was compiled in the 1920s, states that “Oolong tea has thicker leaves and darker color, and a more intensive and lasting taste. It grows on lands that are high and open. Oolong tea variety originated from Anxi County, Quanzhou City.”.

During the Emperor Yongzheng's reign (1678~1735 A.D.), Qing Dynasty, *Tieguanyin* was discovered in Yaoyang Village, Xiping Town, Anxi County. There are two different legends about the discoverer of *Tieguanyin*: *Mr. Wei Yin*¹, and *Mr. Wang*

¹Legend has it that, around the third year of the Emperor Yongzheng's reign (1725 A.D.), there was an old tea farmer who lived in *Songlintou* (currently named Songyan Village, Xiping Town). His name was *Mr. Wei Yin* (1702~1774 A.D.). He was a diligent farmer who sincerely believed in *the Guanyin Buddha*. For dozens of years in a row, he worshiped the statue of the Buddha, with a cup of tea, every morning and every evening. One evening, he had a dream in which he found a tea tree on the top the waterfall near where he worked. The tree had strong branches and thick leaves with fragrance, quite exotic. The next morning, he went to the place that he dreamt about and he found a tea tree. It was exactly the same with the one in his dream. Very carefully, he dug the small tea tree out and took it home. He planted it in a broken iron pan that was full of red soil and took great care of it. He picked its tender leaves, when the tree grew up, and brewed it in the fashion of Oolong tea making. It turned out to be a remarkably wonderful tea. A private school teacher in his neighborhood named the tea “*Tieguanyin*” (literally *Iron Guanyin Buddha*).

*Shirang*². By the middle Qing Dynasty, Anxi *Tieguanyin* had been remarkably famous with a high output. Official Archives of Anxi County (compiled during the Emperor Qianlong's reign, Qing Dynasty) indicated that "Chongxin (ancient name of the region of Xiping Town) abounds [in tea], yet only the tea produced in Fengshan and Qingshui Rock are well known." Official Archives of Jinjiang County, which was compiled during the Emperor Qianlong's reign (1735~1796 A.D.), stated that "the tea consumed by the urban people came from Anxi County." Official Archives of Tong'an County, which was also written during the Emperor Qianlong's reign, said that "There is no tea trees planted in the city. The tea that people drink comes from Anxi, Qingshui, and Liushan, etc." In the thirtieth year of the Emperor Guangxu's reign (1904 A.D.), the Oolong tea produced in Anxi was rejuvenated. The total output of the entire County reached 1,250 t, 414 t exported. From then on, production of *Tieguanyin*, as well as its quality, has been continuously improved. Therefore, *Tieguanyin* became the king of tea. It was popular at home and abroad. Drinkers all over the world give *Tieguanyin* an extraordinarily good reputation.

C. Development of Anxi Tea Cultivation System

Around the thirteenth year of the Emperor Chongzhen's reign (1640 A.D.), Anxi tea farmers were inspired by the fact that the tea tree branches buried accidentally could take root and sprout, therefore they created the *Tea Tree Whole-plant Layering Propagation Method*. It symbolized the transformation from tea-tree generative

² According to the legend, there was a scholar-official in Nanyan Yaoyang Village, Xiping Town (now Nanyan Village, Xiping Town). His name was *Wang Shirang*. He loved collecting exotic flowers and rare herbs. In the spring of the first year of the Emperor Qianlong's reign (1736 A.D.), Mr. Wang and his friends frequented the "South House" for literary salon. They enjoyed walking near the House before sunset. One evening, in the rocks of a deserted garden, Mr. Wang found a tea tree that was of a totally different variety. He transplanted it to the garden of the South House and took care of it every morning and evening. He took its leaves and made it new tea. It was dark green with strong texture and extraordinary aroma. After brewing, its soup tasted profound and lasting. In the sixth year of the Emperor Qianlong's reign (1741 A.D.), Mr. Wang was summoned by the Emperor. He took the tea with him and gave it to *Mr. Fangbao*, the Minister of Rituals who had an uncommon taste. Minister Fang contributed the tea to the Emperor. He was delighted after trying it. So, he met with Mr. Wang and learnt the history of Yaoyang Village. Mr. Wang told the Emperor exactly how he found the tea. The Emperor examined the tea carefully and found that the tea was of a dark color and solid structure, as heavy as "iron". At the same time, it was fragrant with a beautiful shape, just like the "Guanyin Buddha." Hence, he named it *Tieguanyin* (literally *Iron Guanyin Buddha*).

propagation to vegetative propagation. About 1920 A.D., tea farmers of Xiping Town experimented on the *Tea Tree Long-scion Cutting Propagation Method* successfully. In 1935 A.D., Mr. *Wang Chengwen*, a teacher of the Pingyuan Village, Xiping Town, changed the *Long-scion Cutting Propagation Method* into the *Short-scion Cutting Propagation Method*. This change overcame various shortcomings of generative propagation methods that depend on seeds, and the disadvantages of vegetative propagation methods like layering. It requires fewer branches of the parent plants and save operating hours. At the same time, it can effectively maintain the excellent attributes of the parent plants and is capable of cultivating a great number of robust seedlings in a shorter time.

D. Transmission of Anxi *Tieguanyin* Tea Culture

Soon after *Tieguanyin* was created in Anxi in late Ming Dynasty and early Qing Dynasty, it was introduced to Taiwan. Around the third year of the Emperor Jiaqing's reign (1789 A.D.), Mr. *Wang Yicheng*, an Anxi man, took the techniques of Oolong tea making to Taiwan and further improved it. This was how the famous *Pouchong Tea* was created. Mr. Wang also actively promoted and taught people about *Pouchong Tea* in the extensive tea-cultivating region of northern Taiwan. In the eleventh year of the Emperor Guangxu's reign (1885 A.D.), Mr. *Wang Shuijin*, and Mr. *Wei Jing*, Anxi men, arrived in Taiwan successively. They taught locals the cultivating and making techniques of *Pouchong Tea* in Nankang Dakeng (literally *the pit*), Qixing District, Taipei (now Nankang District, Taipei). Since 1920, teaching sessions of *Pouchong Tea* techniques were given twice a year, one in spring, and the other in autumn. It has played an important role in the diffusion and improving of *Pouchong Tea* techniques. As a result, up until 1930, all tea-producing areas in Taiwan have been capable of making *Pouchong Tea*. With its rapidly increased output, the export of *Pouchong Tea* has been much higher than other types of Oolong tea. Anxi people are not only the inventor of *Pouchong Tea*, but also the pioneers who opened the market in mainland China and international markets for the Taiwan *Pouchong Tea*. In the eighth year of the Emperor Guangxu's reign (1882 A.D.), Mr. *Wang Anding*, and Mr. *Zhang Zhankui*, both Anxi

men, and others partnered up and established the *Jiancheng Tea Shop*, mainly selling the *Pouchong Tea*. It developed new markets and became very successful.

Around the twenty-second year of the Emperor Daoguang's reign (1843 A.D.), Anxi *Green-tip Oolong* was introduced to Jian'ou County. About the eleventh year of the Emperor Xianfeng's reign (1885 A.D.), Qing Dynasty, *Mr. Lin Fengchi*, an Anxi man, returned to Taiwan with Anxi's *Green-tip Oolong* and planted it on the Tung-ting Mountain. It has grown into the dominant variety with the largest plantation area in Taiwan. In the twenty-second year of the Emperor Guangxu's reign (1896 A.D.), *Mr. Zhang Qiumiao* returned to Taiwan with a bunch of genuine *Tieguanyin* seedlings from his hometown—Daping Town, Anxi County. Successfully, these seedlings were planted on the Zhanghu Mountain, Mucha Region. This region, after gradual development, became the most representative producing area of genuine *Tieguanyin* tea in Taiwan. Nowadays, the *Mucha Tea Garden*, as part of Taiwan's sightseeing agriculture, has been an excellent choice of local people and tourists for recreation and traveling.

(2) Contemporary Value and Practical Significance

A. An Important Instruction for the Sustainable Development of Agriculture

As the environmental pollution and decreased biodiversity caused by the high-input, modern means of agricultural production develops, international community pays more and more emphasis on the sustainable development of agriculture. In the construction and management courses of Anxi *Tieguanyin* Tea Culture System, thanks to the implementation of *Tea Trees—Forest—Green Manure* compound cultivation method, the rational construction of water conservancy facilities and transportation facilities, an organic combination of trees, herbs, fertilizers, water, and road was realized. Therefore, a tea garden model with stable terrace wall, orderly terraces, and good capability of water and soil conservation was formed. In respect of pesticides and fertilizers, biopesticide and bio-organic fertilizers have been positively promoted, while toxic and highly-toxic pesticide, herbicide, foliar-fertilizer, and fertilizers containing rare-earth element have been strictly prohibited. At the same time, based on the actual

status of tea garden soil, nitrogenous fertilizer, phosphatic fertilizer, and potash fertilizer are deployed appropriately, in order to realize a balanced fertilization and prescription fertilization, and to avoid soil acidification or hardening. This model of construction and management is helping Anxi *Tieguanyin* ecological tea gardens reduce the use of artificial fertilizers and pesticides that are harmful to the environment. It remarkably builds the production capabilities of tea gardens' soil itself as an ecological carrier. It protects the production environment of the tea gardens, and realizes the sustainable agricultural development.

B. A Critical Path to Construct Agricultural Ecological Civilization

Resource constraint tightens, environmental pollution is aggravated, and ecosystem degradation gets worse. Under these circumstances, Chinese government put forward the ideas of ecological civilization construction that respect the nature, get along with the nature harmoniously, and protect the nature. It aims to integrate the ecological civilization construction into all aspects of the whole process of the economic development, political construction, cultural development, and social construction. It seeks to elevate sustainable development to the level of green development. Chinese government promotes the construction of ecological civilization by instituting a series of assessment indicator system. For example, in the spirit of *Indicators of National Eco-Civilization Construction Pilot Programs and Demonstration Areas (on a trial basis)*, main obligatory targets for county-level ecological civilization construction are “proportion of organic or green food plantation area shall be higher than 60% of total plantation area of principal crops” and “Rate of agricultural non-point source pollution prevention and cure shall be higher than 98%.”. In Anxi *Tieguanyin* tea gardens, the proportion of organic/green plantation has reached 66%. Organic fertilizers are widely applied to these tea gardens, supplemented by appropriate basal fertilizers formulated according to soil testing. These measures have effectively prevented tea gardens' non-point source pollution. In consequence, the construction of Anxi *Tieguanyin* ecological tea gardens has been an important basis for the realization of Anxi County's ecological civilization, and has accelerated the

sustainable development of the local agriculture.

C. A Key Role in Alleviating Poverty and Rural Revitalization

It can be easily found that, the first requirement of China's rural revitalization guideline—"to build rural areas with thriving businesses, pleasant living environments, social etiquette and civility, effective governance, and prosperity"—is the development of relevant businesses, which is the foundation of rural revitalization and development. It would not be possible to realize 'prosperity' before the farmers' income is increased, and their living conditions are improved. In 2017, the per capita disposable income of Anxi rural residents was RMB 15,145 *yuan* (USD 2,172), 8.1% up over the previous year, among which 56% derived from tea industry. There are more than 1,000 tea-processing enterprises in Anxi, 15 percent of which have an annual value of production over RMB 5 million *yuan* (USD 700,000). Over 800,000 people benefit from tea industry. The development of Anxi tea industry involves pre-production, production, and post-production stages. It prolongs the industrial chain, and promotes the growth of labor-intensive enterprises that are engaged in processing agricultural products. These enterprises have plenty of advantages to leverage: labor-absorbing capability, comparative benefit improving, proximity to raw materials, and rich human resource. These enterprises have realized the targets of increasing farmers' income, promoting the economic development in rural area, and absorbing the surplus rural labor, etc . Moreover, it is paving the way for the optimization of industrial structure and the development of non-agricultural industries. The robust development of tea industry has laid a solid foundation for Anxi County's "social etiquette and civility, effective governance, and prosperity.". It has improved farmers' income and accelerated the development of tea industry. On the top of this, it makes tea industry the pillar of agriculture development, prosperity of rural area, and the increase of farmers' income. In effect, it is making contribution to the cause of rural revitalization.

2.1.3 System Structure and Functions

Anxi *Tieguanyin* Tea Culture System was created by Anxi people in the

mountainous natural environments. Relying on their wisdom, Anxi people leverage the features of local biological resources, and creatively utilize natural conditions. Efforts made by many generations of Anxi people lead to a cyclic production system that safeguards local people's livelihood and a healthy and stable living environment.

Based on the climate type and the microclimate conditions in the mountain area, Anxi people plant hilltop head-water forests, construct villages and tea gardens on hillside, and reclaim farmland and build villages in the foothills. Combined with the rivers at the lowest altitude, a top-down spatial pattern of “Head-water Forests—Tea Gardens and Villages—Farmland and Villages—Rivers” has been formed (see Fig.4). This characteristic and well-arranged pattern reflects the harmonious environmental features that “tea trees under the forests, villages scattered in tea gardens, farmland within villages.”. This spatial arrangement of the landscape is also described as “hat on the head (hilltop forests), belt on the waist (hillside tea gardens), and shoes on the feet (foothill farmlands).”. It implies the ecology wisdom under which man and nature exist with each other harmoniously.

The mountainous terrain requires the planting of hilltop head-water forests that have functions of climate adjusting, soil and water conserving, providing habitats for various organisms, increasing soil nutrients, and providing nutrients for downstream farmland and gardens, etc. People live and plant tea trees on the hillside. The proximity between houses and tea gardens makes tea trees cultivation, tea leaves plucking, and tea garden management easier. Tea gardens can adjust climate, provide organism with habitats, and create income for farmers. Meanwhile, forest resources and water sources on the upper side can be made use of by farmers.

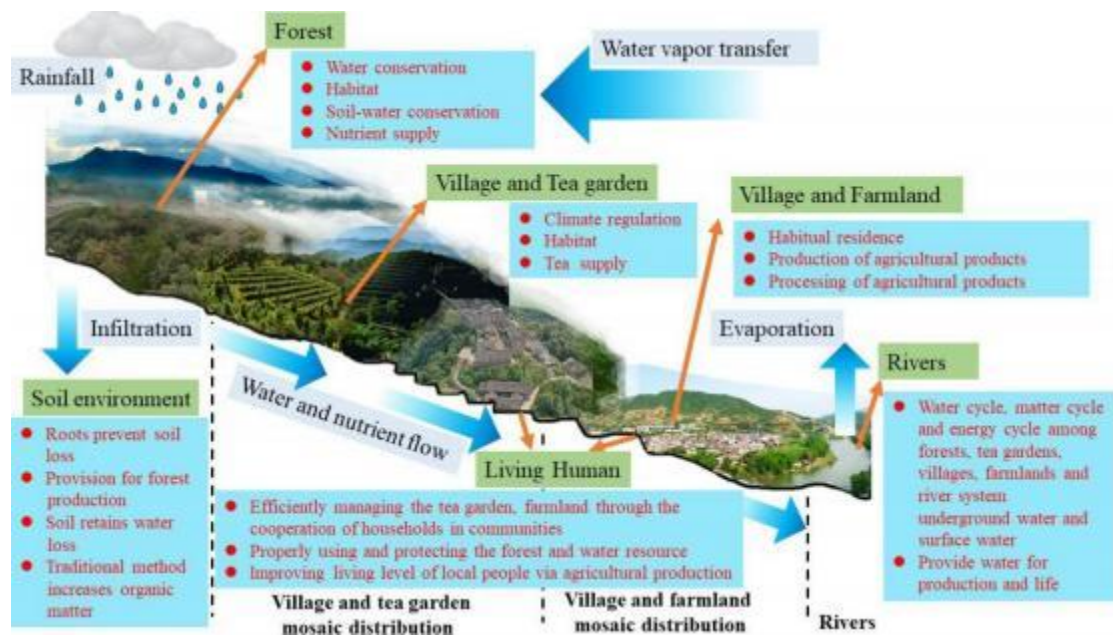


Fig.4 Structure and Functions of Anxi Tieguanyin Tea Culture System

Farmers living on the foot of mountains and valley plains are able to utilize the adequate heat and water to reclaim farmlands for crop and fruit trees planting. Farmlands produce agricultural products and provide organism habitats. In addition, the flat terrain of farmlands means convenient transportation, which is important to the development of processing industry. Rivers, situated at the lowest altitudes, can take in direct surface runoff, subsurface runoff, and the nutrients carried by the runoffs. Through evaporation and water vapor transfer, water is returned to the hilltop and hillside, and the water circulation is so realized. The nutrients, on the other hand, are carried to hilltop and hillside through human efforts like consumption, fertilizer making and fertilizer applying. Circulations of nutrient and energy are accomplished in this way. From farming practice, Anxi people have summarized and created a series of agricultural production knowledge, techniques, and indigenous culture that effectively maintain the stability and sustainability of tea gardens and relevant agricultural production systems.

2.1.4 Difference from Other Tea-oriented GIAHS Sites

As of now, there have been four GIAHS sites that focus on tea production and tea

culture, including the Pu'er Tea Agricultural System in China (2012), the Traditional Tea-grass Integrated System in Shizuoka in Japan (2013), the Fuzhou Jasmine and Tea Culture System in China (2014), and the Traditional Hadong Tea Agrosystem in Hwagae-myeon in the Republic of Korea (2017). Although it also a tea culture system, the Anxi *Tieguanyin* Tea Culture System is largely different from these Sites.

From the perspective of natural conditions, such as climate and landform, Anxi *Tieguanyin* Tea Culture System is different from the other four tea culture systems. For example, Pu'er Tea Agricultural System lies in subtropical mountain monsoon climatic region. Because its main landform is middle mountain and high mountain, the system has good heat conditions and relatively complex microclimates. Both the Traditional Tea-grass Integrated System in Shizuoka and the Traditional Hadong Tea Agrosystem in Hwagae-myeon are located near 35-degree north latitude, which is relatively higher than Anxi. Both of the Sites belong to temperate marine climate, with moderate temperature yet inferior heat conditions. Compared with Anxi *Tieguanyin* Tea Culture System, the Fuzhou Jasmine and Tea Culture System is situated in a slightly lower latitude. Although both Sites have subtropical oceanic monsoon climate, Fuzhou is closer to the seashore. Moreover, particular regions that are suitable for jasmine planting determine the geographic location of the latter. This leads to the environmental difference between them.

As results of different natural circumstances, major differences between Anxi *Tieguanyin* Tea Culture System and other tea-oriented GIAHS sites are: tea tree varieties and diversity, type of tea and key techniques, characteristic culture, and landscape (see Tab.3).

Firstly, in regard to tea tree variety and diversity, principal variety of tea tree in the Anxi *Tieguanyin* Tea Culture System is the *Tieguanyin*. It was discovered and so named in Anxi. Currently, there are more than 100 varieties of tea trees in Anxi, mainly varieties suitable for Oolong tea making. The richness of tea tree varieties is one of the key differences between Anxi and the above-mentioned four GIAHS sites.

The second point is type of tea leaves and key techniques. Anxi *Tieguanyin*

belongs to Dark Green Tea (also known as Oolong Tea), and it is categorized as semi-fermented tea. Anxi *Tieguanyin* has a highly complex process of making, with more procedures than those of other four GIAHS sites. The most vitally important procedure is *yáoqīng* (Tossing the Green). Besides, it also contains unique techniques, for example, *bāoróu* (Wrapping-twisting).

Thirdly, in term of characteristic culture, Anxi *Tieguanyin* Tea Culture System is very rich in relevant culture. In local community, there is a complete system of tea culture, for example, Tea Battle, Tea King Contest, Tea Art performance, customs of tea, and the culture of master-apprentice inheritance, etc. Quanzhou, of which Anxi is part, was the starting point of Chinese ancient Maritime Silk Road. So, *Tieguanyin* has been a state gift for the cultural exchange between China and other countries. For example, Chinese president Xi Jinping have been greeting the national leaders from the United Kingdom, Russia, the United States, and France, etc., with *Tieguanyin* tea. Anxi local enterprises welcome their international guests with *Tieguanyin* tea, too. Anxi County is the birthplace of the techniques of Oolong tea making, and where *Tieguanyin* was discovered and so named.

Fourthly, Anxi *Tieguanyin* Tea Culture System is apparently characterized with its three-dimensional features. Tea gardens are mainly located on the hillside area that is between 300 meters and 1,000 meters above the sea level. Arbor trees, which have higher capability of water conserving, are planted on hilltop. Grain crops like paddy and subtropical fruits are mainly cultivated in foothill area and basin valleys, where the heat is relatively more abundant. In this three-dimensional pattern, there are forests on hilltop, tea gardens on hillside, and farmland in foothill. This landscape pattern is evidently different from those of the foresaid four GIAHS sites.

Tab.3 Anxi *Tieguanyin* Tea Culture System in Comparison with Other Tea-oriented GIAHS Sites

| System Name | Geographical Location | Climate Type | Major Differences of Systems' Features | | | |
|--|---------------------------------|--------------------------------------|--|---|--|--|
| | | | Tea Tree Varieties and Diversity | Type of Tea, and Key Techniques | Characteristic Culture | Landscape |
| Pu'er Tea Agricultural System, China | 22°02'~24°50'N, 99°09'~102°19'E | Subtropical mountain monsoon climate | 15 varieties of tea trees, featured by ancient wild tea trees. Main variety of tea tree is the tall arbor tree that belongs to the large-leaved species. | A type of dark tea. Complete-fermented. It applies the method of Green Roasting for green leaf drying. It has special procedure that other types of tea do not have, for example, pile fermentation, and braising and pressing. | 78.97 percent of the population is ethnic minorities. Rich in ethnic cultures of the Hani people, the Yi people, and the Lahu people. There are different ways of tea making and cooking for different ethnic peoples. It was an important node of the Ancient Tea-horse Road network. | Tall arbor tea trees, mainly ancient tea trees. Crops and tea trees interplanted. Villages scattered in tea gardens. |
| Traditional Tea-grass Integrated System in | 35°11'18"N, 138°37'31"E | Temperate marine climate | 14 varieties of tea trees, mainly small- | A kind of steamed tea. Steaming the | It has close relationship with Buddhist culture. | Tea gardens are mainly located in |

| System Name | Geographical Location | Climate Type | Major Differences of Systems' Features | | | |
|--|----------------------------------|------------------------------------|--|---|---|---|
| | | | Tea Tree Varieties and Diversity | Type of Tea, and Key Techniques | Characteristic Culture | Landscape |
| Shizuoka, Japan | | | or medium-size leafed scrub tea trees. Dominant species is Yabukita that accounts for 80 percent of total area of tea garden plantation. | fresh green leaves for drying. Its key technique is to cut the semi-natural grass from the lands that surround the tea garden, and cover the root of tea trees with the grass, in order to enhance the fragrance of the tea leaves. | For example, the “silver grass” of the tea-grass integrated system is a must-have for Japanese New Year celebration. Tea is also used for worshiping the God. | the slope toe of hilly and mountains region, and mingled with semi-natural grasslands. |
| Fuzhou Jasmine and Tea Culture System, China | 25°15'~26°29'N, 118°08'~120°31'E | Subtropical marine monsoon climate | Main variety of tea tree: the medium- and small-size leafed scrub tea trees that produce green teas. Keystone species of the system is | Scented tea. Non-fermentation tea. Process of tea base is the same with the green teas. Jasmine tea is made of the scented jasmine | Majority of the population is the Han people. Jasmine flower used to be related to the Buddhism. It has rich symbolic significance (Jasmine means sweet | Three-dimensional landscape with tea trees, forest, villages, jasmines, and rivers. Tea trees planted on the mountains, |

| System Name | Geographical Location | Climate Type | Major Differences of Systems' Features | | | |
|--|----------------------------------|------------------------------------|---|---|---|--|
| | | | Tea Tree Varieties and Diversity | Type of Tea, and Key Techniques | Characteristic Culture | Landscape |
| | | | jasmine. | flowers that are used to make green teas. Its key technique is the process of scenting. | love, and purity and honesty) and exquisite tea art culture. | jasmine flowers blooming along the rivers. |
| Traditional Hadong Tea Agrosystem in Hwagae-myeon, Republic of Korea | 35°11'18"N, 127°37'31"E | Temperate marine climate | Main varieties are the native small-leaved scrub tea trees. Different with Chinese and Japanese teas. | Green tea. Non-fermentation tea. Roasting the Green for drying the fresh leaves. Key process is Green Roasting. | Earliest growers were monks. Tea was closely related to the culture of Buddhism. Rich folk customs and rituals of tea drinking and tea culture. | Tea gardens are located around temples. Size of tea gardens varies, due to the steep-sloped terrain. |
| Anxi <i>Tieguanyin</i> Tea Culture System, China | 24°50'~25°26'N, 117°36'~118°17'E | Subtropical marine monsoon climate | More than 100 varieties of tea trees, among which 81 have been discovered and utilized. Six main | Dark green tea or Oolong tea. Semi-fermented tea. Roasting the Green for drying the fresh leaves. Crucial | Majority of the population is the Han people. There is a complete system of tea culture, including Tea Battle, Tea King | Distributed in the hillside area between 300 and 1,000 meters above the sea level. With head- |

| System Name | Geographical Location | Climate Type | Major Differences of Systems' Features | | | |
|-------------|-----------------------|--------------|---|---|---|--|
| | | | Tea Tree Varieties and Diversity | Type of Tea, and Key Techniques | Characteristic Culture | Landscape |
| | | | scrub tea tree varieties are <i>Tieguanyin</i> , <i>Huangdan</i> , <i>Benshan</i> , <i>Maoxie</i> , <i>Meizhan</i> , and Large-leafed Oolong. Plantation area of them accounts for 64 percent of total. | process is Tossing the Green. Wrapping-twisting (<i>bāoróu</i>) is the special process that only <i>Tieguanyin</i> has. | Contest, tea art performance, tea customs, and master-apprentice inheritance culture, etc. <i>Tieguanyin</i> is the state tea for the cultural exchange between China and other countries. Anxi County is the birthplace of Oolong tea and <i>Tieguanyin</i> . Quanzhou was the starting point of the ancient Maritime Silk Road. | water forest on hilltop, tea trees on hillside, crops and fruits on foothill, a three-dimensional <i>forest-tea garden-crops andfruit</i> landscape pattern is formed. |

2.1.5 Global Importance

(1) Place of Origin of *Tieguanyin* Variety and Its Uniqueness

Tieguanyin is the name of tea tree variety and brand name of tea leave at the same time. It was discovered in Xiping Town, Anxi County during the Emperor Yongzheng's reign (1722~1735 A.D.) and the Emperor Qianlong's reign (1735~1796 A.D.), Qing Dynasty (1644~1911 A.D.), and was named so. Plant of pure-variety *Tieguanyin* belongs to a type of shrub. It has oval leaf that is margined by sparse and blunt leaf-teeth. Leaf surface is in a wavy curve, with obvious rib-like shape. The leaf rolls backward slightly. It has thick mesophyll and bright dark green color. Leaf base is a bit thicker while leaf apex slightly concaves. Because the leaf apex is a little bit aslant to its left side and slightly pointing to the ground, in addition, because its tender shoot is fuchsia, *Tieguanyin* is also named "Leaf-bud with Red Heart and Crooked Tail" (see Photo 2). The variety of *Tieguanyin* is perfectly suitable for Oolong tea making. Tea infusion made of *Tieguanyin* has a high-level fragrance and a lingering aroma, mellow and refreshing. With characteristics of the "Guanyin Aroma" and the "Orchid Fragrance", its finished tea is named *Tieguanyin*; and it is hailed as the highest grade of Oolong tea. As the representative type of Oolong teas, Anxi *Tieguanyin* has been repeatedly awarded China's Famous Tea and World's Famous Tea.



Photo 2 Plant of Anxi *Tieguanyin*

(2) Place of Origin of Oolong Tea Making Techniques, Intricate and State-of-the-art Tea Making Process

Oolong tea making techniques originated from Anxi County. During the late Ming Dynasty and early Qing Dynasty, Anxi tea farmers drew on the experiences of green tea and black tea making techniques, through repeated attempts of improvement, created special plucking and making process for, and finally formed a unique category of Chinese tea—the Oolong tea. *Tea Making*, the state-compiled textbook for agricultural colleges and universities, states that “Dark Green Tea (i.e., Oolong Tea) was created by the farming people of Anxi County, Fujian Province, between the third and the thirteenth year of the Emperor Yongzheng’s Reign (1725~1735 A.D.), Qing Dynasty. It spread to Taiwan Province later.”. Official Archives of Jian’ou County, which was compiled in the 1920s, states that “Oolong tea has thicker leaves and darker color, and a more intensive and lasting taste. It grows on all high and open lands. Oolong tea originated in Anxi County, Quanzhou Prefecture.”. What’s more, Anxi County participated the development of the “*Technology Regulations for Oolong Tea Processing*”, a national standard.

Tea-making techniques of Anxi *Tieguanyin* are unique and delicate. They extensively incorporated the principles of completely-fermented black tea and nonfermented green tea, and, as a result, developed its own semi-fermented *Tieguanyin* tea making theory. In order to realize the state of semi-fermentation, more complex process is needed, as well as more tools and higher difficulties of operating. Take the process for example, compared with red tea and black tea, which have only four procedures of making, *Tieguanyin* requires six more procedures. Level of semi-fermentation must be controlled precisely, with neither non-fermentation nor overfermentation. The uniqueness of *Tieguanyin* making techniques can be also reflected in its special processes, for example, Wrapping-twisting (*bāoróu*, literally “Wrap and Twist”) is what other tea categories do not have.

(3) It Initiated Tea Tree Vegetative Propagation Technology

Anxi County is the place of origin of tea tree vegetative propagation technology. Around the thirteenth year of the Emperor Chongzhen's reign (1640 A.D.), Anxi tea farmers, inspired by the fact that the tea tree branches buried accidentally could take root and sprout, created the *Tea Tree Whole-plant Layering Propagation Method*. Around 1920, tea farmers of Xiping Town innovatively developed the *Tea Tree Long-scion Cutting Propagation Method*. About 1935, Mr. Wang Chengwen, a tea farmer of Xiping Town, created the more advanced *Short-scion Cutting Propagation Method*, which won the National Award of Scientific and Technological Progress in 1978. Short-scion cutting can maintain the features of fine-variety tea trees. It leads to a higher propagation coefficient and more consistent offspring characteristics. Additionally, this method makes it possible to cut scions from both young plants and adult plants. It means an earlier readiness of tea gardens and higher economic benefits.

(4) Anxi is An Important Source of World Tea Culture Transmission

According to the private family archives, as early as late Tang Dynasty and the Five Dynasties period (907~960 A.D.), Anxi people had begun planting and making tea. It achieved great developments in aspects of tea leave production and tea-related culture during the Song Dynasty (960~1279 A.D.). From the Quanzhou Port, tea leaves and tea culture were introduced to the world. Linguists affirmed that the transliterations of the word "tea" in European countries derive from the pronunciation of "tea" in Quanzhou local dialect. In southern Fujian region, where Anxi is located in, the word "tea" sounds like "TAY" in local dialect. The Dutch, who were the first importer of Fujian tea, translated it into "THEE", according to the pronunciation of Xiamen people (who speak Quanzhou dialect). This word, which belongs to the Indo-European languages, was imitated by other European countries. For example, it was spelled as "TEA" in English, "THÉ" in French, "TEE" in German, and "TE" in Danish and Swedish, all variants of "TAY". What's more, the pronunciation of "THÉ" in French is exactly the same with "TAY" in southern Fujian dialect. Since the Emperor Qianlong's reign (1735~1796 A.D.), Qing Dynasty, Anxi businessmen began to open tea shops in Southeast Asian

countries and sell *Tieguanyin* tea throughout the region. *Tieguanyin* therefore became an important cultural symbol of the Maritime Silk Road.

(5) The Scientific Agricultural Landscape Structure and Tea Planting Method Are Maintaining the Sustainability of Tea Garden Systems

Based on the understanding of the growth habits and characteristics of the forests, tea trees, and fruit trees, Anxi people have established the three-dimensional landscape structure with head-water forests on the hilltop, tea tree on the hillside, and fruit tree on the foothill. This structure makes full use of local illumination, heat, water, and soil resources. Appropriate tree planting has led to the model of *tea tree—forest* strips. Grass planted on the terrace wall is protective. Grass can also be cut and cover or be buried between rows of tea tree in the garden. Annual green manure is interplanted in tea gardens; it can reduce evaporation of water and improve fertility of the soil at the same time. In order to improve tea gardens' capability of drainage and moisture conservation, and to build better growing environment for tea trees, Anxi people constructed medium-sized and small reservoirs around their tea gardens where rainwater influx; they built horizontal drainage ditches on the upper side and middle part of the tea gardens, dug "bamboo-joint ditches" on the inner side of tea gardens, and ditches or isolated channels around the gardens. By means of traditional tea-garden pest/disease control techniques, physical and mechanical methods against pest/disease, biological pest/disease control, and integrated with techniques of traditional organic fertilizer making and deployment, the biodiversity and the pollution-free environment of tea gardens are guaranteed. Vegetative propagation technology, which was also invented by Anxi people, sustains the long-term reproduction of tea tree varieties without gene degeneration. These traditional knowledge and techniques maintain the long-term stability and sustainability of Anxi *Tieguanyin* tea gardens' ecological systems.

2.2 Characteristics of the Proposed GIAHS Site

2.2.1 Foods and Livelihood Security

(1) Categories of foods that derive from the system

Anxi *Tieguanyin* tea leaves is the main agricultural product by “Anxi *Tieguanyin* Tea Culture System” . Besides *Tieguanyin*, the System also include: some flora and fauna growing naturally in the System, plants intercropped artificially, and animals that are raised and fed with these intercropped plants, etc. (see Fig.5). Through compound cultivation of “tea—arbor (fruit trees, bamboo, etc.)—crop and herb (grains, tubers, oil plants, vegetables, and edible fungi, etc.)”, the System produces not only best-quality Anxi *Tieguanyin* tea leaves, but also vast varieties of agricultural products, forest products, fruits, livestock products, and aquatic products. Mainly grains like maize, tubers like sweet potato, oilseeds like soybean, vegetables like broad bean, fruits like pomelo, edible fungi like shiitake mushroom, bamboo shoot, livestock products like pork, and freshwater aquatic products like carp, etc.

A. Anxi *Tieguanyin* tea leaves and extended products

The most important products of “Anxi *Tieguanyin* Tea Culture System” are *Tieguanyin* fresh leaves and the finished tea made of fresh leaves. Over the past few years, Anxi County has actively promoted the development of extended industries of *Tieguanyin* tea industry, such as packaging products, supporting products, creative products, and tea-related foods, etc., and has made breakthroughs in aspects of full use and further processing of tea leaves. Using Anxi *Tieguanyin* fresh leaves or finished tea as raw materials, Anxi has developed over 50 types of further-processed tea products, such as tea buccal tablet, tea powder, tea drinks, tea crunchy candy, tea-flavored fine dried noodles, and tea alcohols, etc.

B. Foods

Planted around the Anxi *Tieguanyin* tea gardens, or interplanted between tea trees, crops (like maize and paddy), tubers (like potato and sweet potato), and oil-yielding crops (like soybean, peanut, and oilseed rape) are providing sufficient foods and edible vegetable oil for locals. They are main sources of starch, vegetable protein, and vitamins needed by Anxi people. Meanwhile, straw and vine of these food crops can serve as not

only fodder for livestock and poultry raised by local people, for example, hog, chicken, duck and goose, etc., but also as organic fertilizers that carpet right under tea trees.

C. Vegetables

Indifferent seasons, dozens of kinds of vegetable are cultivated around Anxi *Tieguanyin* tea gardens, on terrace slopes, or interplanted between tea trees, for example, broad bean, cowpea, chili pepper, spinach, water spinach, eggplant, loofah, cucumber, pumpkin, wax gourd, and carrot, etc. These nutrients-rich vegetables can basically satisfy local vegetable consumption needs throughout the year, while helping to improve biodiversity of the System.

D. Fruits

More than 10 varieties of nutrient-rich fruit trees are growing around Anxi *Tieguanyin* tea gardens and in the river valley area under the tea gardens, including pomelo, tangerine, orange, plum, grape, and banana, etc. These fruits can help to satisfy locals' needs for diverse vitamins, sugars, minerals, microelements, carbohydrate, pectin, and amino acid, etc. Plantation of fruit trees gives the mountain of Anxi *Tieguanyin* tea "shoes on the feet" that enable conserving water source and preventing water loss and soil erosion.

E. Animals

Local farmers have long been raising livestock and poultry like hog, chicken, duck, goose, sheep, and cattle, etc. For local people, these livestock and poultry serve as main source of animal protein. Fodders of these livestock and poultry mainly come from maize and the straw/vine of crops planted in and around tea gardens. Excrement of livestock/poultry and other wastes, after composting, are returned to Anxi *Tieguanyin* tea gardens as an important organic fertilizer.

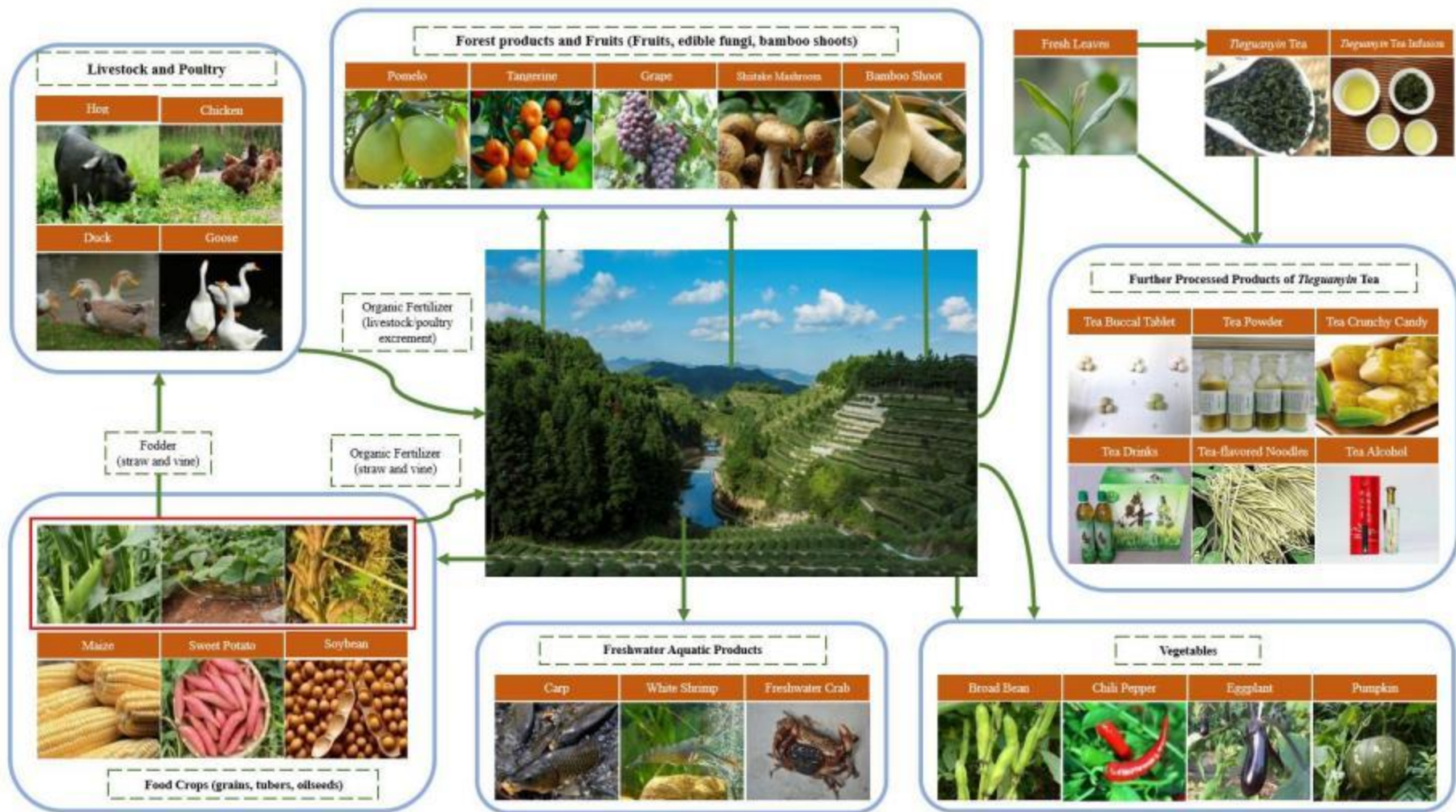


Fig.5 Foods Provided by “Anxi *Tieguanyin* Tea Culture System”

F. Fungi

On tea mountains and in Anxi *Tieguanyin* tea gardens, there live dozens of edible fungi, such as shiitake mushroom, *Auricularia auricula*, straw mushroom, bamboo fungus, and *Flammulina velutipes*, etc. These edible fungi are rich in nutrients like protein, amino acid, vitamins, minerals, and microelements, etc. They broaden nutrient sources for local farmers. These edible fungi are not only tasty and nutrient-rich, but also able to lower blood cholesterol and to treat high blood-pressure, etc.

G. Others

Freshwater aquatic products, like carp, grass carp, silver carp and white shrimp, are cultured in the ponds in and around Anxi *Tieguanyin* tea gardens. In waterways and irrigation ditches, wild potamons and paludinacan also be commonly seen. Bamboo shoot flourishes in the bamboo groves in and around tea gardens, from April to November every year. Bamboo shoot, rich in protein, amino acid, sugars, calcium (Ca), phosphorus (P), iron (Fe), carotene, and vitamins, etc., contains cellulose that can accelerate intestinal peristalsis, and prevent constipation as well. These foods enrich local people's food structure.

(2) Medicinal Values and Healthcare Functions of Anxi *Tieguanyin* Tea Leaves

A. Anxi *Tieguanyin* tea leaves contain diverse types of microelements, minerals and organic components

From the perspective of minerals, tests find more than 30 types of mineral elements in Anxi *Tieguanyin* tea leaves. The highest content in Anxi *Tieguanyin* tea leaves is potassium (K) that is up to 19.2 mg/g. Next are phosphorus (P), calcium (Ca), and magnesium (Mg), between 1.6 to 4.7 mg/g, then silicon (Si), aluminum (Al), manganese (Mn), and chlorine (Cl), from 0.2 to 1.2 mg/g. Contents of sodium (Na), iron (Fe), rubidium (Rb), zinc (Zn), cooper (Cu), strontium (Sr), and fluorine (F) are normally lower than 0.1 mg/g (except sodium, 0.14~0.16 mg/g). Compared with other types of tea, Anxi *Tieguanyin* tea leaves have apparently higher contents of manganese (Mn), iron (Fe) and fluorine (F), as well as higher K/Na ratio. Contents of zinc (Zn),

magnesium (Mg), and selenium (Se) are higher than other types of tea, while lower contents of sodium (Na) and nickel (Ni). Because Anxi *Tieguanyin* fresh leaf material is comparatively more mature, Anxi *Tieguanyin* tea infusion has higher leaching rate of manganese (Mn), zinc (Zn), and selenium (Se), respectively 23.9%, 35~50%, and 35%. Higher leaching rate means easier absorption by human body. Thus, drinking Anxi *Tieguanyin* tea serve as an excellent nutrient source of manganese (Mn), zinc (Zn), and selenium (Se) supplement. (Huang, 2008).

From perspective of organic components, Anxi *Tieguanyin* tea leaves contain multiple water-soluble vitamins that can be dissolved in water during tea steeping then be fully absorbed and utilized by human body (Wang et al., 2019). Tests indicate that content of Anxi *Tieguanyin* three-leaf water extract is 36.29%, content of tea polyphenols is 21.14%, and total content of catechins is 146.31 mg/g. In regard to the catechins in Anxi *Tieguanyin* tea leaves, content of ester-type catechins (L-EGCG, L-ECG) is 89.07 mg/g, while content of non-ester-type catechins (L-EGC, D、L-GC, L-EC, D、L—C) is 60.64 mg/g; ratio between ester-type and non-ester-type catechins is 1.468:1. Anxi *Tieguanyin* is rich in multiple types of amino, especially amine, which is one of the particular organic components of tea trees. Among all kinds of teas, Anxi *Tieguanyin* has the highest content of amino, which makes up over 50% of total free amino acids. (Huang, 2008).

B. Anxi *Tieguanyin* tea leaves are with high medicinal values and healthcare functions

Anxi *Tieguanyin* tea leaves own the same common medicinal values and healthcare function as other tea leaves, for example, bringing about mental alertness, helping to digest, eliminating phlegm, relieving internal heat or fever, quenching thirst, being diuretic, improving eyesight, sobering up, being bactericidal and anti-inflammatory, and soothing digestive system, etc. (Huang, 2008). TP (Tea Polyphenol) in Anxi *Tieguanyin* tea leaves is one of the most important components for tea trees' secondary metabolism, and main active component for tea leaves' medicinal values. Principal benefits of TP: protecting blood vessels from hardening, hypolipidemic, anti-

inflammatory, bacteriostatic, radiation protection, helping battle cancer, anti-mutation, and anti-aging, etc. (Li et al., 2014). Catechins in Anxi *Tieguanyin* tea leaves, especially EGCG, have strong anti-cancer and antioxidant activities. (Huang, 2008). Also, people have discovered, from living practices, some special medicinal effects of Anxi *Tieguanyin* tea leaves (Li et al., 2010). For example, put Anxi *Tieguanyin* tea leaves and honey together, stir, seal it in a bottle, and keep it for next year. This candied tea leaves can cure heatstroke, dysentery, and abdominal distension; second example, put Anxi *Tieguanyin* tea leaves and certain amount of salt together, fry, mix them with water, and steep; it can treat abdominal distension (Cai, 2009); third example, using tea soup that made of Anxi *Tieguanyin* tea leaves and dandelion for sitz-bath can help cope with chronic prostatitis (Liu, 2019).

(3) Livelihood Security

A. Tea industry's contributions to local economic development

Since Chinese Economic Reform and Opening-up (1978), Anxi *Tieguanyin* tea is the very first category of tea that has fast risen in China. In recent years, in aspect of gross tea garden area, annual output of tea leaves, tea industry's total output value, population that is benefited by tea industry, number of tea industry practitioners, level of tea industrialization, etc., *Tieguanyin* has helped Anxi create many firsts among tea-producing counties in China. *Tieguanyin* tea industry has been the leading industry of Anxi County. Relying on the development of tea industry, Anxi County has transformed from a "National Poverty County" to one of "Top 100 Counties of China". In 2020, total area of Anxi's tea gardens reached 39,665 ha (area of *Tieguanyin* tea gardens is 27,671 ha), approximately 2% of China's total tea plantation area. Tea production was 62,000 t, remaining the same as previous year. Tea output value was RMB 6.71 billion *yuan* (USD 97.28 million), up by 3% over the previous year. Tea output value accounted for 72.8% of total output value of agriculture, forestry, animal husbandry and fishery industries. Total output value of tea-related industries was RMB 25 billion *yuan* (USD 3.62 billion), up by 15.6% over previous year, accounting for 33.4% of GDP. In recent

years, tea exports have been 13,000 to 15,000 t, earning foreign exchange up to USD 160 to 180 million (Anxi County Bureau of Statistics, 2021).

B. Contributions made by the development of tea industry for improving farmer's employment and increasing farmers' income

The development of Anxi *Tieguanyin* tea industry has provided a livelihood for local farmers. Moreover, it has become local farmers' main source of employment and income, and made their lives more and more prosperous (see Photo 3). In 2020, about 80% of Anxi population, or around 960,000 people, were receiving benefits from tea industry. Average income that was related to tea industry was RMB 10,759 *yuan* (USD 1,560), accounting for 56.2% of local farmers' per capita disposable income. (Anxi County Bureau of Statistics, 2021). Field researches show that, in the 3 villages (*Lutian* Village, *Shipan* Village, and *Fuling* Village) of Lutian Town, 5 villages (*Songyan* Village, *Yaoshan* Village, *Yaoyang* Village, *Shangyao* Village, and *Nanyan* Village) of *Xiping* Town, and 3 villages (*Huqiu* Village, *Zhuyuan* Village, and *Shishan* Village) of *Huqiu* Town, where is the core zone of "Anxi *Tieguanyin* Tea Culture System", in 2018, average per capita income was RMB 14286.7 *yuan* (USD 2,048.9), among which, 10373.7 *yuan* (USD 1,487.7) came from tea industry (72.6% of per capita income). For tea farmers, per capita income from tea industry accounted for over 90 percent of total per capita income.

On the one hand, the development of Anxi *Tieguanyin* tea industry provides immediate job opportunities for local farmers, who can earn extra money by engaging in tea-related work during slack seasons (see Photo 4). Currently, farmers can earn RMB 80 to 100 *yuan* per day for weeding tea gardens; RMB 100 to 150 *yuan* per day for fresh tea leaves plucking; and RMB 300 to 500 *yuan* per day for making tea in traditional way. On the other hand, development of tea industry also drives the development of other relevant industries, such as food processing, transportation and logistics, e-commerce, packing and printing, machinery manufacturing, cultural tourism, and accommodation & catering, etc. These industries have taken in a large number of local farmers who need job opportunities or start their own businesses, and

increased local farmers' income.



Photo 3 Tea trading in “China Tea Capital”(Chinese “中国茶都”) of Anxi County



**Photo 4 Tea farmers are working under the guidance of
Tieganyin master**

C. Women’s involvement in tea industry

At the end of 2019, in the 11 villages of the core zone of “Anxi *Tieganyin* Tea

Culture System”, average number of rural household members is 6.2, among which 2.8 people are female, accounting for 44.6%; average labor-force number of each rural household is 4.1, among which 1.9 people are female, accounting for 46.2%; average labor-force number involving in tea industry work per household is 2.9, among which 1.3 people are female, accounting for 46.4% of household work-force. That means a high involvement of local women in Anxi *Tieguanyin* tea industry. Actually, many parts of this industry rely on local women, for example, tea trees planting, weeding of tea gardens, pest control, fresh leaves plucking, tea making (see Photo 5), etc., especially weeding tea gardens, fresh leaves plucking, and tea making, etc.



Photo 5 Women are accepting training on tea processing techniques

2.2.2 Agricultural Diversity

(1) Diversity of Tea Varieties

With a remarkable richness of tea tree variety, Anxi County is well known as a prominent “treasure house of improved varieties of tea trees”. Currently in Anxi, total area of tea cultivation is 600,000 *mu* (40,020 ha), 100% asexual reproduction. Anxi has more than 100 varieties of tea tree, among which 81 local ones have been discovered and utilized (see Annex 1). Principal tea varieties in Anxi are *Tieguanyin*, *Huangdan*, *Benshan*, *Maoxie*, *Meizhan* and *Daye Oolong* (see Atlas 1). *Tieguanyin*, in particular, is the most representative one; approximately, plantation of *Tieguanyin* accounts for 64 percent of Anxi’s total area of tea gardens.



Tieguanyin

Huangdan

Benshan



Maoxie

Meizhan

Daye Oolong

Atlas 1 Principal Tea Tree Varieties on Heritage Site

The six principal tea varieties exist differences each other in biological feature:

Tieguanyin. It belongs to the shrub family, characterized by purple shoot and slightly curled leaf bulge. The picking season is in early May. It is used to make oolong tea with lasting aroma and orchid fragrance. It can also be made into both black tea and green tea.

Huangdan. It belongs to small arbor family, characterized by Kelly shoot and slightly inside-folded oval leaf. The picking season is in mid-April. It is used to make oolong tea with strong aroma and peach or osmanthus fragrance. It can also be made into black tea, green tea and white tea.

Bashan. It belongs to the shrub family, characterized by light-green and purple shoot and flat leaf. The picking season is in mid-April. It is used to make oolong tea with long-lasting aroma and orchid or osmanthus fragrance. It can also be made into both black tea and green tea.

Maoxie. It belongs to the shrub family, characterized by light green shoot, more furry hair and leaf-teeth barbs. The picking season is in mid-April. It is used to make oolong tea with strong aroma and jasmine fragrance. It can also be made into black tea,

green tea and white tea.

Meizhan. It belongs to the shrub family, characterized by green shoot and oval leaf. The picking season is in mid-April. It is used to make oolong tea with strong aroma and orchid and jasmine fragrance and also to make black tea, green tea and white tea.

Daye Oolong. It belongs to the shrub family, characterized by green shoot and oval leaf. The picking season is in Mid-April. It is used to make oolong tea with thick aroma and caramel or gardenia fragrance and also to make both black tea and green tea.

(2) Diversity of other Agro-species

Anxi County has rich agro-species (see Tab.4, Annex 2) that consist of crops, animals and microorganism. Except tea trees, there are 8 kinds of crops: food crop (4 species), oil crop (6 species), vegetable (37 species), sugar-yielding crop (1 species), green manure crop (4 species), fiber crop (3 species), fruit crop (9 species), and other cash crops (2 species). There are 2 kinds of agricultural animals in Anxi: livestock (10 species) and aquatic animal (11 species). Agricultural microorganism in Anxi mainly refers to edible fungi (27 species) (see Tab.4, Annex 3).

Tab.4 Catalog of Other Agricultural Species

| Germplasm Resource Type | Subclass | Specifics |
|-------------------------|----------------|--|
| Crops | Food Crop | Paddy, Sweet Potato, Potato, Maize |
| | OilCrop | Soybean, Sesame, Peanut, Rapeseed, Sunflower, Oil-tea Camellia |
| | Vegetable Crop | Edamame, Kidney Bean, Lentil, Broad Bean, Sweet Broad Pea, Cowpea, Green Bean, RedBean, Taiwan Ginger, Chili, Lettuce, Asparagus lettuce, Taro, Chayote, Luffa, Gourd, Cucumber, Pumpkin, Wax Gourd, Balsam Pear, Eggplant, Tomato, Green Chinese Onion, Spinach, Cauliflower, Chinese Cabbage, Pakchoi Cabbage, Amaranth, Shepherd's Purse, Celery, White Radish, Carrot, Cane Shoots, Endive, Wild Cabbage, Water Spinach, Cassava |

| | | |
|---------------|---------------------|--|
| | Sugar-yielding Crop | Sugarcane |
| | Green Manure Crop | Milk Vetch, main varieties: <i>Minzi 1</i> , <i>Minzi 5</i> , <i>Minzi 6</i> , and <i>Minzi 7</i> |
| | Fiber Crop | Mainly Ramie, Jute and Mat Grass |
| | Fruit Crop | Shatian Pomelo, Guanxi Honey Pomelo, Chandler Pomelo, Tangerine, Sweet Orange, Gold Citrus, Furong Plum, Grape, Loquat |
| | Other Cash Crops | Tobacco, Cotton |
| Animal | Livestock | Domestic Hog, Rabbit, Chicken, Duck, Goose, Sheep, Dairy Cattle, Buffalo, Dog, Pigeon |
| | Aquatic Animal | Loach, Ricefield Eel, Grass Carp, Carp, Silver Carp, Bighead Carp, Prawn, Macrobrachium, White Shrimp, <i>Cipangopaludina cathayensis</i> , <i>Rivularia auriculata</i> , Potamon |
| Microorganism | Edible Fungi | Bamboo Fungus, <i>Hericium</i> , Matsutake, <i>Auricularia auricula</i> , <i>Lentinula edodes</i> , Straw Mushroom, <i>Tremella</i> , <i>Russula virescens</i> , <i>Russula foetens</i> <i>Russula</i> , <i>Agrocybe cylindracea</i> , <i>Russula cyanoxantha</i> , <i>Lactarius deliciosus</i> , Mushroom, Enokitake, <i>Marasmius oreades</i> , <i>Pleurotus sajor-caju</i> , <i>Termitomyces</i> , Cepe, <i>Pleurotus ostreatus</i> , <i>Auricularia polytricha</i> , <i>Ganoderma lucidum</i> , <i>Ganoderma sinense</i> , <i>Pisolithus tinctorius</i> , <i>Oudemansiella radicata</i> , <i>Antrodia camphorata</i> |

(3) Diversity of species that support agricultural production

A. Plant Diversity

Anxi County lies in southern central subtropical zone with favorable geographical conditions and vast varieties of plant population. It has rich species resources that support agricultural production (see Annex 2). Within Anxi County, there are vascular plants belonging to 152 families, 497 genera and 940 species, among which are ferns

(29 families, 44 genera, 68 species), gymnosperm (8 families, 9 genera, 10 species), and angiosperm (116 families, 444 genera, 862 species). At the same time, *Taxus chinensis* var. *Mairei* and ginkgo are under first-class national protection; camphor, *Alsophila spinulosa* tryon, *Cibotium barometz*, *Fokienia hodginsii* and *Ormosia henryi* are under second-class national protection; *Keteleeria fortune* and *Cryptomeria fortune* are under Fujian provincial key protection. (see Atlas 2)



Taxus chinensis var. *Mairei*

Ginkgo

Camphor



Alsophila spinulosa tryon

Cibotium barometz

Fokienia hodginsii



Ormosia henryi

Keteleeriafortune

Cryptomeriafortunei

Atlas 2 Protected Plant Species on Heritage Site (Part)

B. Animal Diversity

- Diversity of Mammals

Mammals in Anxi account for 33.6% of mammal population in Fujian Province.

Anxi mammals belong to 7 orders, 17 families and 37 species. There are carnivorous families (45% of total): 4 families, 15 species; order rodentia: 5 families, 11 species; order artiodactyla: 3 families, 6 species; order insectivora: 2 families, 2 species; pholidota: 1 family, 1 species; lagomorpha: 1 family, 1 species; and order chiroptera: 1 family, 1 species (see Annex 4). Among which, 2 families (clouded leopard, black muntjac) are under first-class national key protection; 5 families (otter, small Indian civet, golden cat, jackal and black bear) under second-class national key protection; 5 families (Mustela kathiah, yellow weasel, leopard cat, and tufted deer) under Fujian provincial key protection (see Atlas 3).



Clouded leopard



Black muntjac



Otter



Golden cat



Small Indian civet



Jackal



Mustela kathiah



Tufted deer



Leopard cat

Atlas 3 Wildlife (mammals) under key protection on heritage site (part)

● Diversity of Birds

Birds in Anxi County account for 26.5% of bird population in Fujian Province. Anxi's birds belong to 13 orders, 34 families and 144 species (see Annex 4). 107 species

of birds (including resident birds and summer resident birds, 74.3% of Anxi's bird population) stay in Anxi for breeding, and 37 species of non-breeding birds (including winter resident birds, passing migrant birds and straggler birds, 25.7% of Anxi's bird population). In addition, Anxi has 1 species of bird (Cabot's Tragopan) under Class-I national key protection; 23 species (mandarin duck, accipiter virgatus, black eagle, kestrel and common buzzard, etc.) Under Class-II national key protection; 4 species (egret, red turtle dove, barn swallow and red-rumped swallow) under Fujian provincial key protection. (see Atlas 4).



Cabot's Tragopan



Mandarin duck



Black eagle



Accipiter virgatus



Kestrel



Egret



Red turtle dove



Barn swallow



Red-rumped swallow

Atlas 4 Wildlife (bird) under key protection on heritage site (part)

● Diversity of amphibians and reptiles

In Anxi Country, there live 64 species of amphibians and reptiles that belong to 4 orders, 16 families (see Annex 4). Amphibians: 2 orders, 6 families, 21 species. Reptiles:

2 orders, 10 families, 43 species. Among 6 families of amphibians, *Rana rugulosa* is under Class-II national key protection. In regard to reptiles, there are a large number of species under Testudinata, suborder Sauria and suborder Ophidia. There live 31 species of snakes in Anxi. Boa, whose population size is relatively large, is under Class-I key national protection. In addition, soft-shelled turtle, which is under Class-I key national protection, can be infrequently seen in Anxi, too. There is 1 species of snake in Anxi under Fujian Provincial key protection: king cobra. (See Atlas 5).



Rana rugulosa

Soft-shelled turtle

Boa

King cobra

Atlas 5 Wildlife (amphibians, reptiles) under key protection on heritage site

(part)

C. Microorganism Diversity

Diversity and richness of microorganism are key features of the soil in Anxi tea gardens. Shannon index and Simpson index, that indicate bacterial microbial diversity, are 7.994 and 0.993 respectively. Chao 1 index and ACE index, that represent the richness of microflora, are averagely 943.023 and 918.128 individually. Shannon index and Simpson index, which indicate fungus microbial diversity, are 5.026 and 0.872 respectively. Chao 1 index and ACE index, which represent fungi community richness, are averagely 576.566 and 586.135 individually.

At phyal level, dominant bacterial taxa are Proteobacteria, Acidobacteria, Firmicutes, Actinobacteria, Chloroflexi and Verrucomicrobia (see Fig.6). At phyla level, dominant fungus taxa are Ascomycota, Mortierellomycota, Basidiomycota, Glomeromycota, Mucoromycota, Chytridiomycota, Entomophthoromycota, Rozellomycota and Kickxellomycota. (see Fig.7).

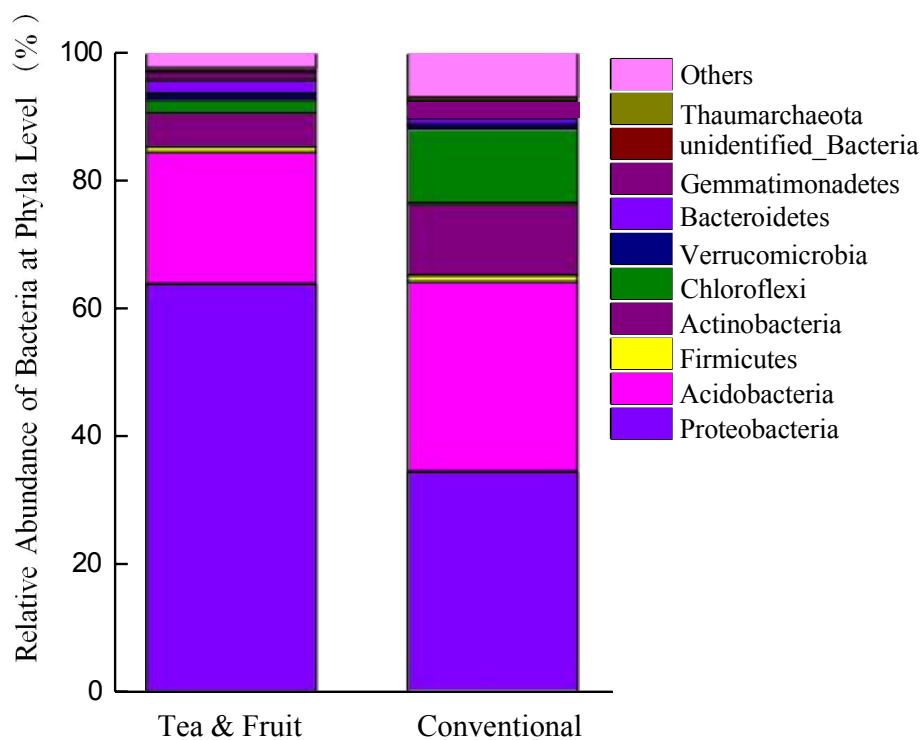


Fig.6 Structural Composition of Bacterial Community at Phyla Level

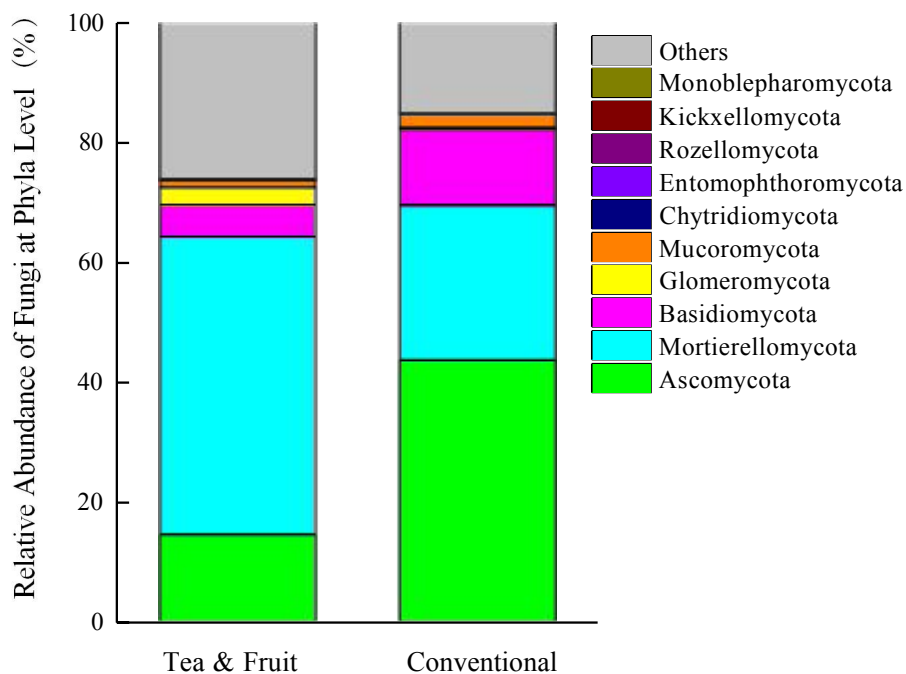


Fig.7 Structural Composition of Fungi Community at Phyla Level

(4) Ecosystem Service

Within “Anxi *Tieguanyin* Tea Cultural System”, tea garden ecosystem refers to a dynamic synthesis that consists of plants, animals, microflora and abiotic environment. Through exchanges of substance and energy between internal parts of the system, and between the system and surrounding environment, tea garden systems plays various roles in multiple functions, and provide people with various services directly and indirectly. They’re indispensable in terms of sustaining livelihood and supporting the dynamic balance between the system and environment. In addition to material products, “Anxi *Tieguanyin* Tea Cultural System” plays an important role in regard to biodiversity protection, water conservation, climate regulation, nutrient cycling, and water-soil conservation. It keeps the ecological environment of local tea garden system sustainable and stable.

A. Biodiversity Protection

The structure of habitat ecosystem has a profound impact on biodiversity. Good habitat is essential to the protection of biodiversity. Being characterized with “natural farming, ecological management”, tea gardens on heritage site form a three-dimension multilayer that is close to nature with a three-tier spatial pattern: Tea Mountain--Tea Garden--Soil. As a result, these green gardens form a stable ecosystem with strong regulation and control capabilities. Intercropping and relay-cropping approaches, such as tea-fruit symbiosis and tea-grass symbiosis, maintain rich habitat diversity within the tea gardens, turning them into important habitats for plants, animals and microorganism. The enhance of biodiversity without using herbicides and chemical pesticides will protect and cultivate a variety of tea garden inhabits. It comes along with a biodiversity network with stable structure and rich diversity that can better sustain and protect the biodiversity of the tea gardens.

Within the network, many species, from macroscopic to microscopic, from animals to plants, rely on and utilize mutually one another, and develop an intricate and complex ecological correlation. Excellent habitats give “Anxi *Tieguanyin* Tea Cultural

System” rich vegetation, including arbor trees like *Sophora xanthantha*, litchi and geranium etc., shrubs like tea trees and *Rhus chinensis* etc., and herbs like *Eleusine indica*, *Dicranopteris pedate* and *Adenostemma Lavenia* etc. Meanwhile, various animals make tea gardens their home, for example, birds like pheasant, turtledove and grass owl, etc., and poultry like chicken, goose, etc. Some predators live in tea garden, too, for example, predatory mammals, amphibians and insects. Besides, various species of edible fungi and agro-production-supporting microorganism flourish in tea gardens. Compared with conventional tea gardens (tea-tree single cropping, chemical control, field management relying on small machinery, the same below), traditional tea gardens (intercropping and relay-cropping of tea trees and other crops, physical and biological control, mainly manual field management, the same below) has significantly increased soil microorganism diversity and richness (see Tab.5, see Annex 5). It is the harmonious coexistence between habitat and organism that sustains the biodiversity of the tea garden ecosystem.

Tab.5 Indices of Soil Microorganism Diversity

| Microorganism | Sample name | Shannon Index | Simpson Index | Chao1 | ACE |
|---------------|------------------------|---------------|---------------|----------|---------|
| Bacteria | Traditional Tea Garden | 8.176 | 0.994 | 1039.483 | 996.060 |
| | Regular Tea Garden | 7.812 | 0.992 | 846.562 | 840.195 |
| Fungi | Traditional Tea Garden | 4.093 | 0.786 | 601.898 | 614.491 |
| | Regular Tea Garden | 5.958 | 0.957 | 551.234 | 557.778 |

B. Water conservation

Based on the implementation of “tea--forest--green manure” compound cultivation method, “Anxi *Tieguanyin* Tea Cultural System” facilitates the organic combination of arbor trees, shrubs and herbs. In traditional tea gardens, water conservation is realized by canopy interception of arbor trees and shrubs, water-holding

by herb and litters, and water-storage soil noncapillary porosity. Field survey shows that the canopy density of traditional tea gardens reaches 20% to 30%, while tea tree canopy density is over 95%. As such, rain cannot directly erode the soil. Rainfall can be intercepted partially or entirely. Direct surface runoff can be avoided as a result. At the same time, in this relevant vertical structure, erosional force of rain will be mitigated by arbor trees through interception and stemflow. Litters of arbor trees and tea trees carpeting the surface of soil can further decrease the speed of water circulation within the ecosystem. In this way, more water resource is conserved by litter, root system and soil. As we can see in Tab.6, in traditional tea gardens and organic tea gardens (passed the national organic certification), the maximum noncapillary porosity in 0- 10cm soil layer is 16.30%, and 11.86% in 10-50cm soil layer. According to the determination result of noncapillary porosity, water-holding capacity of 50cm-deep soil layer is 61.03mm maximum and 40.83mm minimum in the Anxi *Tieguanyin* traditional and conventional tea gardens.

Tab.6 “Anxi *Tieguanyin* Tea Cultural System” Tea Garden Noncapillary Porosity (%)

| Sampling Location | Soil Depth (cm) | |
|---|-----------------|-------|
| | 0- 10 | 10-50 |
| Penglai Traditional Tea Garden | 5.16 | 9.41 |
| Gande Traditional Tea Garden | 13.58 | 11.86 |
| Taozhou Organic Tea Garden | 14.05 | 9.27 |
| <i>Tieguanyin</i> Birthplace Traditional Tea Garden | 7.61 | 8.31 |

Take example for saturation moisture capacity that represents maximum water holding capacity, in traditional tea gardens, saturation moisture capacity of all soil layers is higher than regular tea gardens that of the same period (see Tab.7). It shows that traditional tea gardens have a better water-holding capacity.

Tab.7 Soil Saturation Moisture Capacity of “Anxi *Tieguanyin* Tea Cultural

| Sampling Location | System” (%) | | |
|------------------------|-----------------|-------|-------|
| | Soil Depth (cm) | | |
| | 0-10 | 10-20 | 20-30 |
| Traditional Tea Garden | 76.92 | 71.46 | 72.29 |
| Regular Tea Garden | 63.88 | 66.04 | 68.63 |

C. Climate Regulation and Adaptation

Under traditional management model of “Anxi *Tieguanyin* Tea Cultural System”, appropriate arbor-shrub-herb management model serves as air temperature adjuster. Therefore, in summer time, temperature of traditional tea gardens is apparently lower than regular tea gardens’ temperature. Traditional tea garden model can increase air humidity as well. It remains a relatively stable humidity in tea gardens: from 10 a.m. to 5 p.m., relative humidity in *Tieguanyin* traditional tea gardens is 51.4%, in contrast with 44.9% humidity in regular gardens. Obviously, relatively air humidity of traditional tea gardens is higher than that of regular gardens. Secondly, traditional tea garden management model has climate regulation functions, such as decreasing illumination intensity, and improving light quality, etc. Throughout long-term phylogeny, tea trees have developed features like being heliophilous and shade-tolerant, intolerant to strong direct sunlight, and broad-light loving, etc. Tea tree has higher photosynthesis compensation point and lower light saturation point (see Tab.8). Illumination intensity of conventional tea gardens is obviously higher than that of traditional gardens (see Photo 6): average illumination intensity of traditional tea gardens is 30,263 lux in comparison with 41,479 lux in regular gardens. It is clear that, in traditional tea gardens, the forming of vertical arbor-shrub-herb structure, shade of upper-layer arbor trees and the evaporation of upper-, middle-, and lower-layer vegetation are playing important roles in balancing the temperature, humidity and moisture of the environmental system.



Photo 6 Traditonal Tea Garden vs. Conventional Tea Garden

Thirdly, traditional tea gardens own superior natural environments and fresher air. Known as “Air Vitamin”, negative air ions are one of the most important indicators of the quality of atmospheric environment. It is essential to life and highly beneficial for human health. Negative air ions have effects of inhibition, mitigation and adjuvant therapy against over 30 diseases in 7 human body systems. Man feels refreshed when negative ion concentration reaches above 700 anions/cm³ ; it is good for health when above 1000 anions/cm³ ; and it is recuperative when above 8000 anions/cm³ . During research period, “Anxi *Tieguanyin* Tea Cultural System” has shown a negative ion concentration over 1000 anions/cm³ , demonstrating an effective healthcare function (see Tab.9). Additionally, in traditional tea gardens, all arbor (fruit trees), shrub (tea trees) and herb (vegetables and green manure) can absorb CO₂ and release O₂ through photosynthesis. It achieves significant results in improving air quality.

Tab.8 Temperature, Humidity and Illumination Characteristics of Anxi *Tieguanyin* Traditional Tea Garden and Conventional Tea Garden

| Observation Time | Temperature (°c) | | Humidity (%) | | Illumination (lux) | |
|------------------|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Traditional Tea Garden | Conventional Tea Garden | Traditional Tea Garden | Conventional Tea Garden | Traditional Tea Garden | Conventional Tea Garden |
| 10:00 | 32 | 35 | 64 | 68 | 21400 | |
| 10:30 | 32 | 33.5 | 56 | 48 | 16800 | 98600 |
| 11:00 | 33 | 35 | 57 | 44 | 20200 | 32400 |

| | | | | | | |
|---------|------|------|------|------|-------|-------|
| 11:30 | 32 | 35 | 52 | 45 | 16310 | 28100 |
| 12:00 | 33.5 | 35.5 | 21 | 47 | 19800 | 27800 |
| 12:30 | 37 | 37 | 45 | 35 | 86300 | 80200 |
| 13:00 | 34 | 37 | 50 | 40 | 12340 | 20600 |
| 13:30 | 36 | 38.5 | 70 | 38 | 78500 | 87600 |
| 14:00 | 36 | 38 | 45 | 39 | 31300 | 39700 |
| 14:30 | 41 | 40 | 34 | 41 | 68200 | 55500 |
| 15:00 | 40 | 43.5 | 36 | 36 | 48700 | 51800 |
| 15:30 | 39 | 39.5 | 48 | 41 | 14200 | 17600 |
| 16:00 | 33.5 | 35.5 | 51 | 48 | 3650 | 7700 |
| 16:30 | 34 | 36 | 50 | 42 | 15230 | 30500 |
| 17:00 | 26 | 31.5 | 92 | 62 | 1012 | 2610 |
| Average | 34.6 | 36.7 | 51.4 | 44.9 | 30263 | 41479 |

Tab.9 Negative Air Ions Parameters of Traditional Tea Garden and Conventional Tea Garden

| Time | Negative Air Ions (anions/cm ³) | |
|-------|---|-------------------------|
| | Traditional Tea Garden | Conventional Tea Garden |
| 10:00 | 1090 | 21 |
| 10:30 | 2200 | 30 |
| 11:00 | 1650 | 14 |
| 11:30 | 1780 | 58 |
| 12:00 | 3400 | 33 |
| 12:30 | 1240 | 60 |
| 13:00 | 4200 | 45 |
| 13:30 | 1080 | 58 |
| 14:00 | 2800 | 27 |

| Time | Negative Air Ions (anions/cm ³) | |
|-------|---|-------------------------|
| | Traditional Tea Garden | Conventional Tea Garden |
| 14:30 | 3600 | 10 |
| 15:00 | 1530 | 50 |
| 15:30 | 4500 | 55 |
| 16:00 | 1470 | 28 |
| 16:30 | 1240 | 13 |
| 17:00 | 1830 | 56 |

D. Nutrient Cycling

Tea garden soil refers to the loose surface layer that is suitable for growing tea trees. As a growth base of tea trees and nutrient storehouse, it provides mineral elements and water that are essential to the survival of tea trees. Tea trees serve as a protective screen for a sustainable use of the soil. Through metabolic process and ecological functions, tea trees rectify unfavorable physicochemical properties of the soil and make full use of the soil's potential. Tea trees create a green space, improve the temperature and humidity of the tea gardens, and regulate the temperature and humidity of the soil. In tea gardens, the litter layer can reduce erosion and retain surface runoff, increase soil humus and nutrient elements, and enhance soil's water-holding capacity and fertilizer-conserving capacity. Biological groups living deep in the soil help to improve biochemical activities and accelerate soil fertility. Deeply penetrating into the soil, root system can accelerate the process of soil-ripening and improve soil structure. By means of grass-reserving and grass-planting on slopes, interplanting green manure, and green crops cutting and burying as green manure, "Anxi *Tieguanyin* Tea Cultural System" traditional tea garden remarkably improves the nutrients of soil, and has formed an appropriate vertical structure of arbor-shrub-herb structure. This proper management model optimizes the growth of tea trees, water holding, soil-and-water conservation, biodiversity and other functions in tea gardens. It brings a more efficient nutrient utilization as well. For example, in traditional tea gardens, (1) grass-cutting instead of

hoeing; grass that has been cut covers the garden and brings more organic matter and humus. Aggregated structure of soil is therefore improved; (2) green manure interplanting; (3) tea-fruit planting and coexistence of flowers and fruits drive a highly effective utilization and balance of the nutrients in tea garden. From the perspective of soil nutrients, in traditional tea gardens, organic matter (3.26%), total Nitrogen (0.07%), total Phosphorus (0.40%), available Phosphorus (0.09%) and total K (0.51%) are higher than those of regular tea gardens, which are correspondingly 1.59%, 0.04%, 0.21%, 0.04% and 0.30%. It proves that traditional tea gardens have better nutrient elements holding and supplying capabilities than regular gardens (see Tab. 10).

Tab.10 Soil Nutrient Characteristics of Anxi *Tieguanyin* Traditional Tea Garden and Conventional Tea Garden

| Type | Organic Matter (%) | Total Nitrogen (%) | Total K (%) | Total Phosphorus (%) | Available Phosphorus (%) |
|-------------------------|--------------------|--------------------|-------------|----------------------|--------------------------|
| Traditional Tea Garden | 3.26 | 0.07 | 0.51 | 0.40 | 0.09 |
| Conventional Tea Garden | 1.59 | 0.04 | 0.30 | 0.21 | 0.04 |

Arbor-shrub-herb cultivation method formed in traditional tea gardens can conserve water-soil resources, accelerate nutrient sequestration in soil, and therefore improve soil nutrient supply. In regard to plants, since arbor, shrub and herb have different demands for different soil nutrients, through effects of fungus mycorrhiza, a nutrient network is formed underground by different plants. Utilization efficiency is improved as a result. Additionally, multiple kinds of litter, which come from various species of cultivated plants, mean diversified sources of energy and nutrients. By this means, activity and number of decomposers are increased. Processes of litter decomposition and subsequent nutrient input to the soil are catalyzed. Anefficient nutrient utilizing and virtuous cycling model is thereby formed in traditional tea gardens. Naturally, quality of tea leaves is optimized and improved.

E. Water-soil Conservation

As a result of traditional tea gardens' intercropping cultivation model, twisted root networks grow underground. In case that tea trees have prosperous root system, depth of root can be normally 60cm to 80cm, with a root range over 100cm. It helps tea garden to retain more soil. Diversified plantation can increase soil organic matters, soil ph and soil biodiversity. These features are in favor of improving stability of soil physical structures and higher water-soil conservation capacities (see Fig.8).

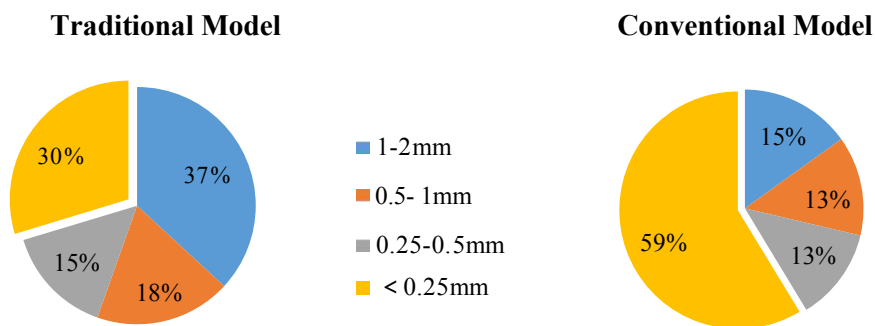


Fig.8 Soil Particle Composition of Different Fractions (diameters), Traditional Tea Garden vs. Conventional Tea Garden

What's more, in accordance with terrain, local tea growers build level terrace, grow grass on dam walls and field ridges to protect slopes, and to recover and improve land surface vegetation cover (see Photo 7). Compared with bare-soil model, these measures can literally reduce 80% of water loss and soil erosion. Fruit trees are planted in the areas surrounding the tea gardens. Alley trees are planted alongside roads. Irrigation and drainage canals, which connect with flood discharge trenches, are normally laid on the borders between hilltop forests and tea gardens. For the purpose of preventing water loss and soil erosion, uphill, hillside and foothill reservoirs are built accordingly to specific water consumption.



Photo 7 Landscape of Slope Herb in Traditional Tea Garden

2.2.3 Local Traditional Knowledge and Techniques

(1) Tea Garden Site Selection and Construction

A. Site Selection

For reasonableness of site selection of tea gardens has immediate impact on the quality and output capacity of *Tieguanyin* tea, generations of tea farmers have devoted particular care to where the gardens should be built. Usually, tea gardens should be located in mountainous areas that are between 300 meters to 1,000 meters above sea level. Basically, a good site should possess fundamental conditions like: deep soil layer, higher natural fertility, subacidity (pH values 4.5~6.5), good water-permeability and water-holding capability, groundwater table lower than one-meter, sustainable water source, and excellent ecological environment, etc. What make unique tea-leaf quality and therefore an excellent tea garden are advantageous features like: slightly acidic red-yellow soil, leeward and sunward, gently-sloping plot that is higher than 500 meters above sea level, foggy, with more diffused light and favorable temperature (Zhang,

2016) .

B. Reclamation of Tea Gardens

Tea farmers have accumulated knowledges and techniques about reclamation according to terrain and topography. Regarding to land on slope lower than 15° , straight-lined tea gardens (Photo 8) are usually built horizontally according to contour lines. The best arrangement is east-west going. With regard to land on gentle slopes ($15^\circ\sim 25^\circ$), wide strip-cropping or terrace gardens (Photo 9) are adopted. Narrow horizontal terrace gardens (Photo 10) are built on steep slope land above 25° . During terrace layer division, steepest slope is defined as the fixed point of the baseline; then contour lines are marked, following the principles of “greater curvatures going with terrain; smaller curvatures going straight; from the bottom up”. Terraces are divided in accordance with the contour lines. Optimal terrace height is one meter or so, not exceeding 1.5 meters. Gradient of terrace wall should be around 80° . Surface of terrace needs to slightly incline inward, with fieldridges on the bank rim, and ditch on the inner side of the bank. Grass sown and reserved on terrace walls makes garden tillage easier, helps conserve water and soil, and improves tea gardens’ water-holding and fertilizer-preserving capabilities. Planting furrows are dug on terrace surfaces. Width and depth of the furrows, which depend on planting patterns and types of base fertilizers, are usually 50cm wide and 45cm~50cm deep. Surface soil should be back filled to furrows after enough base fertilizer is applied. At this point, the soil is fully prepared for tea trees planting.



Photo 8 Straight-line Tea Garden



Photo 9 Wide Terrace Gardens



Photo 10 Narrow Horizontal Terrace Tea Garden

C. Tea Garden Water Drainage and Conservancy System

Anxi tea farmers have created water drainage and conservancy systems that can store water when it's abundant, drain water away when waterlog, and irrigate when drought. Flood control and water drainage system consists of isolated canals on upward side of tea gardens, and drainage ditches (Photo 11) surrounding tea gardens. Small-sized reservoirs (Photo 12) are constructed on top of col or hills for water preserving and irrigating purposes. Ponds are built on hillside depressions or in areas that is close to water source, or to where more rainwater influxes. These ponds can preserve water and improve the microclimate environment of tea gardens as well.



Photo 11 Drainage Ditches



Photo 12 Small-sized Reservoir

D. Tea Garden Shelter-Forest System

Shelter forest system contributes to forming excellent tea garden ecological environments, enhancing withstanding capabilities against natural disasters, pests or diseases, and improving the quality of tea leaves. During garden reclamation, original

trees on hilltop, on roadside and in upwind inlet areas are usually kept. After garden land preparation, based on specific location of the garden, shelter forest and alley trees are planted on hilltop, in upwind inlet areas, or alongside roads. At the same time, tea gardens are divided, according to terrains and topography, into a certain number of plots. For contiguous tea gardens on flatland or hilly land, each plot is normally as large as 10 to 15 *mu* (1.65 to 2.47 acres). Along the perimeter of each plot, a row of shelter forest (Photo 13) is planted. For tea gardens on slopes, shelter forests are usually planned according to slope gradient and wind direction, normally 1 forest belt (see Photo 14) every 15 to 20 rows of tea trees.



Photo 13 Network of Shelter Forest Belts on Flatland



Photo 14 Forest Belts around Tea Gardens in Hillsides

(2) Tea Tree Cultivation Techniques

A. Tea Tree Vegetative Propagation Techniques

Anxi County is the birthplace of tea tree vegetative propagation techniques in China. Around the thirteenth year of Emperor Chong-zhen's Reign (1640), Ming Dynasty (1368~1644), Anxi tea farmers found out, from long-term practice, that branches bent and buried in soil can grow roots. Inspired by this discovery, "*Tea tree whole-branch layering propagation method*" (Photo 15a) was developed. About the ninth year of the Republic of China (1920), tea farmers in *Xiping Town* created "*Tea tree long-scion cutting propagation method*" (Photo 15b), on the basis of "*Tea tree whole-branch layering propagation method*". Around the twenty-fourth year of the Republic of China (1935), after his study and exploring on tea tree propagation, *Mr. Wang Chengzhi*, a tea farmer from *Xiping Town*, developed "*Tea tree short-scion cuttage techniques*". Leveraging tea trees' regenerative action and polarity phenomenon, this technique guarantees that, in appropriate environments, the short portion of branch (or scion) detached from patent plant can be cut and continue to

come into missing parts (rooting, sprouting) as a separate nursery stock. “*Tea tree short-scion cottage*” has many advantages. For example, it can maintain female parent’s species attributes, lower likelihood of variation, decrease propagation cost, support faster seedling establishment, enable higher survival rate, and realize easier transplanting. This technique has been thereupon widely adopted in tea gardens in Anxi, in China, and even in all around the world.



**Photo 15 Tea tree whole-branch layering propagation method (a)
and long-scion cutting method (b)**

B. *Tieguanyin* Scion Cutting and Cuttage

Female parents of *Tieguanyin* are usually fine, pure-variety plants that grow robustly without insect pests or diseases. After the female parents are identified, people take great care of the water and fertilizer management, disease prevention, and pest control, in order to accelerate the growth of new shoots. 10 to 15 days before scion cutting, apical buds are removed. When shoot turns green brown and semi-lignified with plump axillary bud that has not sprouted, it is ready for scion cutting. Branches that are cut from female parent plants not long ago should be kept fresh and carried back timely, with neither heavy pressure on them nor exposure to the weather. Branches should be kept in cool places that take shelter from the wind. Spray water on the branches to make them moist. It is when the branches are ready for scion cutting. There should be 1 perfect leaf and 1 axillary bud on the twig; its lower wound callus 3cm~4cm from the petiole, and upper wound callus 2cm~2.5cm from the petiole (Photo 16).

Wound callus should be smooth; its bevel is in the same direction with leaflet orientation. The twigs should be planted right after cutting. Cuttage timing are usually: February and March (Spring Cuttage), second half of April to Mid-May (Summer Cuttage), August and September (Autumn Cuttage), and November and December (Winter Cuttage). In cold regions, Summer Cuttage is a better choice. To be prepared for cuttage, seedbed needs to be sprayed until fully moist, and dried in the air until the soil is still damp yet it does not feel sticky. Standard row spacing is 8cm~9cm, plant spacing 2.5cm~3cm, with no overlapping leaves (Photo 17), usually 150,000~160,000 plants per *mu* (0.067ha). Appropriate depth of cuttage planting should let the axillary bud above the ground surface; leaf orientation follows the wind. Spray water and provide shade as twigs are planted. Soil must be kept moist during the whole course.



Photo 16 Short-scion cutting method



Photo 17 Short-scion cottage method

C. Planting *Tieguanyin*

Tieguanyin is usually planted in early spring or late autumn. Spring planting occurs during the period between *lichūn* (literally “Spring Commences”, one of 24 solar terms in Chinese traditional lunar calendar, February 3 or 4) and *jīngzhé* (literally “Hibernating Insects Awaken”, one of 24 Chinese solar terms in Chinese traditional lunar calendar, March 5 or 6), while Autumn planting between *shuāngjiàng* (literally “Frost Descends”, one of 24 Chinese traditional solar terms, October 23 or 24) and *lìdōng* (literally “Winter Commences”, one of 24 Chinese traditional solar terms, November 7 or 8). Farmers usually choose to plant in early spring, this is because drought is not uncommon during autumn planting time, there could be even frost damages happening to high-altitude regions. Main planting pattern is “single-row, dual-plant” or “dual-row, single plant” (see photos below). Tea seeding transplanting should be performed when wind comes from southeast or south. Tea seeding should be planted as deep as appropriate, with mulch on both sides of the seeding. Concave surface around tea seeding make water conservation easier. Cover the concaves with grass after watering the seedlings.

D. Ecological Cultivation of *Tieguanyin*

Firstly, tea gardens need to plant trees properly and promote *tea trees-forest belt* model (Photo 18). Main varieties of the trees are legume arbors, deciduous arbor trees,

and evergreen arbor trees or small arbors. These trees can provide shades in summertime, and cover ground surface with fallen leaves in winters. Secondly, tea gardens need to plant grass and preserve weeds on terrace walls (Photo 19). Weeds on terrace walls should be preserved, so as to cover ground surface, conserve water and soil, and provide life habitats. The grass shall be mowed after tea harvest, cover or be buried between rows in tea gardens. Thirdly, interplanting green manure (Photo 20). Interplant annual green manure in tea gardens that have no rows sealed or between rows of tea trees in young tea gardens. The green manure can effectively prevent evaporation of moisture, or water loss or soil erosion in surface soil. At the same time, green manure planted in tea gardens can be used as fertilizers. This type of compound ecosystem possesses many ecological functions, such as biodiversity maintenance, water and soil conservation, and soil nutrient cycling, etc.



Photo 18 Tea Tree-Forest Mixed Planting



Photo 19 Grass Planting and Weed Preserving on Terrace Walls



Photo 20 Interplanting Green Manure

(3) Tea Garden Management

A. Soil Management

Tea farmers improve soil quality in ways of hoe tillage, grass mulch, and green manure interplanting, etc. Regarding to hoe tillage, there are farmer's proverbs like “Shallow tillage 3 times a year; Deep tillage once every other year and every other row”, “Best season for tillage is the seventh month of lunar year; the second best tillage season is the eighth month of lunar year”, and “Tea seedlings won’t sprout without garden soil tillage”, among others, that evocatively depict how to flexibly perform shallow tillage, intertillage, and deep tillage according to parameters like farming seasons and tea garden conditions, etc. For grown-up tea gardens, 1 intertillage needs to be applied when tea buds germinate in spring; 1 shallow tillage after spring tea harvest and 1 after summer tea harvest; 1 deep tillage every other year or every other row after autumn tea and winter tea harvests. For younger tea gardens, it is easy to breed weeds due to low tea tree coverage and bigger row spacing. Shallow tillage is what younger gardens mainly need: 3 to 5 shallow tillage each year. In regard with grass mulch, it mainly refers to covering with native weeds, green manure grass, paddy stem, and wheat straw, etc. It can preserve soil moisture, adjust soil temperature, improve soil fertility, suppress weed growing, as well as it functions with other comprehensive effects. Interplanting green manure mainly applies to tea gardens that are 4 years old or younger. Soil of these gardens is improved through planting soybean, *Astragalus sinicus*, and *campsis grandiflora*, etc. Particular planting time and interplanting method depend on age of tea trees, farming seasons, and cultivation methods of gardens. Normally, summer green manure is sown in spring during early or middle April, while winter green manure sown in autumn during the span from late September to early October.

B. Water management

Anxi tea farmers believe that “Water determines harvest or not, while fertilizer determines more harvest or less.”. Hence water preservation and supply are paid much emphasis on by local farmers, in order to improve the moisture of soil, and to guarantee the growth of tea trees. Water preservation measures can be categorized in two groups: increasing water-preserving capabilities of tea garden soil; decreasing soil water loss. The former includes tea garden deep tillage, interception drain ditches in tea gardens,

etc., while the latter include grass mulch (Photo 21), grass planting around the garden, and appropriate intertillage, etc. Water supply mainly refers to various irrigation methods, such as controlled flooding, furrow irrigation, sprinkler irrigation, and trickle irrigation, etc.



Photo 21 Mulching tea gardens with grasses

C. Fertilization

Anxi tea farmers have found out a series of fertilization techniques, from base fertilizer, basal fertilizer to additional fertilizer. The first key point of the techniques is heavier use of organic fertilizers that are supplemented by inorganic fertilizers. Organic fertilizers mainly include people and livestock manure (e.g. cattle and sheep manure), river mud, pond sludge, furrow mud, and various decomposed plants (e.g. agricultural left over and by-products from locally produced soybean products and peanut oil, rice straw, hay and herbage, leftover of growing mushrooms, and sawdust, etc.). In terms of fertilization method, there are 2 types of tea gardens in Anxi: gardens that entirely apply organic fertilizers, and gardens that apply both organic and inorganic fertilizers. Total

area of the former is around 250,000 *mu* (16,500 ha), 41 percent of the County's total tea garden area (certified organic gardens make up about 2.3 percent of the County's total tea garden area). In Xiping Town, the core zone of the Site, area of organically-fertilized tea gardens is about 20,000 *mu* (1,320 has), 46 percent of the total tea garden area of the Town (3.5 percent of which is certified organic). Normally, 200 to 300 kg of organic fertilizer is needed for each *mu* (0.066 ha). Total area of the latter is around 360,000 *mu* (23,760 has), accounting for 59 percent of the County's total tea garden area. It mainly applies organic fertilizer, which is effectively supplemented by inorganic fertilizers. Organic/Inorganic ratio is around 6:1. Total area of the latter is 360,000 *mu* (23,760 has), 59 percent of the County's total tea garden area. In Xiping Town, area of tea gardens that apply both organic and inorganic fertilizers is 23,400 *mu* (1,545 has), accounting for 54 percent of the Town's tea garden area. Compound fertilizers (N:P:K=21:6:13) and special fertilizers for tea trees (N:P:K=18:6:10) are main categories of inorganic fertilizers that are applied by Anxi tea farmers. Most popular brands of inorganic compound fertilizers are CNAMPGC (China National Agricultural Means of Production Group Corporation), SINOCHEM, and Fujian Zhongnuo, etc. Commonly, 20 to 30 kg of inorganic fertilizer is needed for each *mu*.

The second key point is basal fertilizers complemented by proper additional fertilizer. Basal fertilizer refers to the fertilizer applied after tea tree harvest in the same year. It has direct impact on the quantity and quality of spring buds that sprout in the next spring. Additional inorganic fertilizer is usually applied during the growth phase of the tea trees, when the trees need the maximum amount of nutrients. Additional fertilization can provide sufficient nutrients that are vital to the growth of the trees, and guarantee a stable output of tea leaves. Principle of inorganic fertilizer usage is "to give the soil what it lacks.". Tea farmers learn to follow this principle and apply inorganic fertilizers more scientifically. Beneficial outcomes of this change are obvious: it effectively avoids the degradation of soil environment caused by inorganic fertilizer misuse, maintains the soil environment clean in tea gardens, and improves the soil fertility and quality of tea leaves. Measurements show that, in 2018, the average content

of soil organic matter increased by 30 percent over the level three years ago, while 95 percent of tea garden soil organic matter content reached an excellent level; high-quality rate of tea leaves went up by 20 percent.

The third key point is soil testing and formulated fertilization. Fertilizer is applied “*according to weather, soil, and tea trees*”. Based on the cyclicity and seasonal characteristics of tea trees, climate and soil conditions, right types of fertilizers and appropriate timing, amount and method of fertilization are determined. “*Fertilization according to soil*” means that, for tea gardens that have higher content of organic matter, cake fertilizer should be applied as basal fertilizer; for tea gardens that has low content of organic matter, manure fertilizer, compost, and mixed mud fertilizer should be applied as supplement for cake fertilizer and phosphatic fertilizer. “*Fertilization according to tea trees*” refers fewer fertilizer applied to young tea trees, while more applied to grown-up ones. “*Fertilization according to weather*” means that additional fertilizer needs to be applied in all seasons when the temperature is high, growing period is long, and there are more sprout rounds. On the contrary, less fertilization and low frequency when the temperature is low, or when growing period is shorter.

D. Disease and Pest Control

Principle of tea tree disease and pest control is “*prevention first, integrated control*” which includes specific measures like agricultural control, physical and mechanical control, chemical prevention, and biological control, etc. Agricultural control means directional change of the habitat of pests through application of cultivation measures, in order to prevent tea tree diseases or pests from happening, or mitigate its harm. For example, flowers of legume trees that are planted in tea gardens can attract pests (Photo 22); *Sophora japonica* planting around the tea garden also attract honey bees and butterflies; fruit trees like peach trees were planted in the tea garden, 4-5 per Chinese *mu* (every 100 square meters 1 fruit tree), which can attract bees, birds, and other natural enemy to catch the insects; Trees planted in and around the tea garden work as fence to divide the tea garden into different blocks and strips. Hence these methods reduce pests’ impact on tea trees. Or, keeping reasonable row spacing between tea trees is helpful for

ventilation and breathability or. As a result, it can prevent pests from happening, transmitting, or spreading.



Photo 22 Tea trees interplants with legumes

Physical and mechanical control mainly refers to measures like hunting, extirpating, prey trapping or color trapping, and acousto-optic mating disruption (Photo 23), etc. These measures are, indeed, innovative ways to combine traditional ecological pest control with modern technology, which are both an innovative use of traditional pest control knowledge and an increase in efficiency. Meanwhile, they replace chemical pesticides, reduces the pollution of the environment and the damage to the biological chain within the ecosystem of the heritage site, and makes the ecology of the tea plantation healthier and more stable. Chemical prevention includes measures like spraying chili solution and casting quick lime, etc. Biological control refers to utilization of natural enemies, or applying plant-derived or animal-derived biopesticides.



Photo 23 Yellow Sticky Trap Paper and Moth-killing Lamp

Si Lei Biological Countermeasure Technology. Selei biological countermeasure technology is different from the traditional insect-repellent method. It is a combination of acoustic and opto-electronic effects, which interferes with mating and reproduction through visual and auditory channels, thereby reducing the number of insects in the field (Photo 24). The system consists of plant protection operation and maintenance management platform, biological information confrontation station and intelligent control terminal group. It has functions such as drone management, natural enemy launch management, energy management, pest monitoring, environmental monitoring, growth monitoring and video monitoring. It can realize the close connection between the management platform, plant protection workers and the field, and solve the problem that the various links of plant protection operations are disconnected and inefficient, and realize one-stop plant protection. It can achieve high-efficiency remote self-control, and can be widely and accurately controlled, and rapid scale deployment, not only solves the problem of serious shortage of rural plant protection labor force. It can also

help managers to view the growth status and environmental data of crops in real time, and accurately present the trend of pest changes, realize the intelligent planning and management of plant protection operations, and reflect the advantages of digital agriculture.



Photo 24 Si Lei Biological Countermeasure Technology

Currently in Xiping Town, the core zone of the *Tieguanyin* Tea Culture System Site, conventional insect-prevention techniques, such as plant-ash water spray or pepper spray, quicklime casting, or even manual hunting, are still applied by some tea farmers. It involves tea gardens of more than 500 *mu* (33 has). In order to improve the quality of tea leaves and the ecological environment of tea gardens, Anxi County has been promoting the constructing of standard ecological tea garden during recent year. An important measure is pollution-free, ecological tea garden management that requires more physical approaches like sticky trap, light trap, and insect breed opto-acoustic interference device, etc. These ecological and physical insect-preventing methods, combining the ecological principles of traditional agricultural practices and modern agricultural technologies together, have been widely adopted in Anxi County. 57

percent of the County's tea gardens, with an area of 350,000 *mu* (23,100 has), have applied these ecological insect-preventing and disease control methods. In the core zone, tea gardens as large as 31,000 *mu* (2,046 has), 71 percent of the total, are using these methods. Introduction of ecological technologies efficiently maintains the cleanness of tea garden environment and rich biodiversity in the whole county; it improves the quality of tea leaves as well.

(4) Making *Tieguanyin* Tea

In Anxi, the birthplace of Oolong Tea, tea farmers have created, according to tea-making principles of completely-fermented black tea and non-fermented green tea, a complete set of process for “semi-fermented” Oolong Tea making. Taking factors like season, climate, variety, and maturity of fresh leaves into consideration, this process seeks to have the optimal quality of tea leaves. It consists of 2 processing stages: primary processing and refinement processing. The former includes 10 procedures: Picking the Green (*cǎiqīng*, literally “Picking the Green”), Sunning (*shàiqīng*, literally “Withering the Green in Sunlight”), Cooling (*liàngqīng*, literally “Cooling the Green”), Tossing the Green (*yáoqīng*, literally “Shake the Green”), Roasting the Green (*chǎoqīng*, literally “Fry the Green”), Rolling (*róuniǎn*, literally “Knead and Twist”), Wrapping-twisting (*bāoróu*, literally “Wrap and Twist”), Preliminary Drying (*chūhōng*, literally “Preparatory Drying”), Second Rolling (*fùróu*, literally “Twist It Again”), and Drying (*hōnggān*). The latter consists of 7 procedures: Screening (*shāifēn*, literally “Screen and Sort”), Winnowing (*fēngxuǎn*, literally “Wind Select”), Stalk Extraction (*jiǎntī*, literally “Pick and Choose”), Blending (*pīnduī*, literally “Blend and Pile Up”), Roasting (*hōngbèi*, literally “Bake and Roast”), Spreading for Cooling (*tānliáng*, literally “Spread Out and Cooling”), and Packaging (*bāozhuāng*, literally “Packing”).

A. Picking the Green

It means plucking the buds of fresh tea leaves. Timing of tea leaves plucking is related to tea tree variety, altitude, climatic conditions, tea garden management measures, among other factors. Normally, “the Green” can be “Picked” in all four

seasons: Spring Tea, from *gǔyǔ* (literally “Wheat Rain”, the 6th solar terms in Chinese traditional lunar calendar) to *lìxià* (literally “Summer Commences”, the 7th solar term) (Mid- or late-April to the first half of May); Spring Tea accounts for one third of yearly production. Summer Tea was picked from mid- or late-June to first half of July, i.e., from *xiàzhì* (Summer Solstice) to *xiǎoshǔ* (literally “Moderate Heat”, the 11th solar term). High Summer Tea is plucked from second half of July till early- or mid-August, i.e., from *dàshǔ* (literally “Great Heat”, the 12th solar term) to *chǔshǔ* (literally “End of Heat”, the 14th solar term). The last harvest season in a year begins in mid-September and ends mid-October. In this period of time, Autumn tea is harvested, from *qiūfēn* (Autumn Equinox, the 16th solar term) to *hánlù* (literally “Cold Dew”, the 17th solar term). Spring Tea and Autumn Tea are with the best quality. In regard to Spring Tea, those picked around the day of *lìxià* is optimal. Prime Autumn Tea is usually picked around the day of *hánlù*. Spring Tea contents more matters. Spring Tea leaves can last longer-time brewing without losing its thick and mellow flavors. Autumn Tea has remarkable fragrances, especially fruit and flower fragrances. These features of Spring Tea and Autumn Tea are summarized by local farmers as “*More Water in Spring [Tea], More Fragrance in Autumn [Tea]*.”.

Tea leave plucking should be carried out in sunny weather (Photo 25, 26); the best timing starts at 9 a.m. And ends at 4 p.m. Tea leaves plucked in this period is commonly known as *wǔqīng* (literally “Noon Green”, tea leaves picked at noon), which has the best quality. Leaves plucked before 9 a.m. Is called *zǎoqīng* (literally “Morning Green”, tea leaves plucked in the morning) whose quality is the second best. While *wǎnqīng* (literally “Evening Green”, referring to the tea leaves picked later than 4 p.m.) is relatively poor in terms of quality. Good tea leaves are mainly plucked by hand. All the top-quality and high-end finished tea is made with hand-plucked leaves.



Photo 25 Tea Farmers Are Plucking Tea Leaves



Photo 26 Tea Farmers' Outfit for Tea Plucking

Anxi tea farmers summarized, from long-time practice, a special kind of plucking method: *hǔkǒu-duìxīn* (literally “Tiger’s Mouth Pointing to the Sprout”; *hǔkǒu* (tiger’s mouth) refers to the part of the hand between the thumb and the index finger). This method requires picker to open her thumb and index finger, move her hand downward from the top of the sprout, slightly twist and pluck, then lift her hand with the sprout. In this way, each shoot is plucked with half of the leaf in hand, while the other half out of grip. It can, at the most extent, keep the fresh leaf from being affected by the heat of

palm or being bruised by hand. At the same time, this method can avoid “rough plucking”. Refresh leaves picked in this way are consistent and homogeneous. Required by the plucking standards, fresh leaves are ready to be plucked when there is inert bud on the top of the shoot, and the uppermost leaf is growing from *xiǎokāimiàn* (literally “Showing Her Face Slightly”, referring to the growth stage when the uppermost leaf just unfold itself) to *zhōngkāimiàn* (literally “Showing Half of Her Face”, referring to the growth stage when the size of uppermost leaf is half the size of the second leaf) and *dàkāimiàn* (literally “Show Her Whole Face”, referring to the growth stage when the size of the uppermost leaf is 75 percent of or the same size with the second leaf). There should be 2 to 4 leaves left on the shoot after each plucking; 3 is the best. The principle of “3 Withouts, 2 Separations” must to followed, too. *Three Withouts* means that the shoots plucked should be without stalks (pedicles), without *yúyè* (literally “Fish Leaf”, referring to the first leaf grown when germination starts), without simple leaf. *Two Separations* means that Morning Green, Noon Green, and Evening Green should be separated; different types of fresh leaves should be kept away from each other. Since Spring Tea has better capability of tenderness keeping, it can be plucked in batches. Summer Tea and High Summer Tea can be picked when the shoots are still younger, while Autumn Tea usually cannot be plucked before it’s relatively mature.

B. Sunning (shàiqīng)

Sunning refers to the process during which portion of tea leaves’ moisture are evaporated by the heat of sunlight. This process needs to lose part of the moisture while keeping the rest at the same time. It includes three methods, namely sunlight sunning, outdoor natural-wind withering (Photo 27), and indoor hot-wind withering. Sunlight sunning is performed in sunny weather. Duration of Sunning is up to sunlight intensity. Usually it is conducted when the sun shines aslant with milder light. It can also be done all-weather if protected by 70 percent sun-shading net. Duration of Sunning is usually 15 minutes to half an hour. The leaves need to be stirred during the whole process. When it is cloudy or overcast, outdoor natural-wind withering is a suitable way to choose. Duration of this method needs to be longer than sunlight sunning. The leaves

need to be stirred constantly. Indoor hot-wind withering is usually applied in rainy weather. Normal chemical changes within fresh leaves are accelerated by indoor heating and dehumidification. After Sunning, the fresh leaves will lose 4 percent to 12 percent of weight. Sunning process is completed when the color of leaf surface turns into dark green, leaf blade gets softer, the first and second leaf hang down a little, and a faint scent of fresh grass can be smelled.



Photo 27 Sunning the Green

C. Cooling (*liàngqīng*)

Cooling is undertaken before and after Sunning (*shàiqīng*). Purposes of this process are to emit the heat hidden between leaves, and to let moisture re-distribute and re-permeate to a balanced point. Cooling usually lasts for 1 hour. When this process is finished, the Green loses its weight by about another 1 to 2 percent (Photo 28).



Photo 28 Cooling the Green

D. Tossing the Green (*yáoqīng*)

Tossing the Green is the process during which farmer, with hands on the rim of tea sieve, rhythmically rotate and rock the tea sieve, to make tea leaves go in circular motion and up-and-down motion (Photo 29). Under certain circumstances and within given time, tea farmers conduct alternatively Cooling (*liàngqīng*) and Green Tossing (*yáoqīng*). The association of activity (Tossing the Green, *yáoqīng*) and inertia (Cooling, *liàngqīng*) is known as *zuòqīng* (literally “Making the Green”, meaning the fine manipulation of fresh tea leave) that can induce physicochemical reactions of leaves’ inclusion. As the most complicated process and the very core of *Tieguanyin* tea making, Green Making’s (*zuòqīng*) procedures and their parameters, for example, length and strength of operation, must be maneuvered flexibly according to varied season, climate, fresh leaf, and operation room, etc.

This expertise is known as “*Green Making Based on Green*” and “*Green Making Based on Weather*” (Tab. 11). The former means making the green based on season: Spring Tea needs more Sunning and Green Tossing, longer timer of Cooling, with full fermentation; Summer Tea and High Summer Tea needs lighter Sunning and milder

Green Tossing, thinner Spreading and shorter time of Cooling, with relatively full fermentation; while Autumn Tea and Winter Tea requires lighter Sunning, intensive Green Tossing, in order to “conserve moisture, preserve freshness”, with lighter fermentation. The latter means carrying out corresponding green-making techniques in line with indicators like wind direction, wind speed, temperature, and humidity, etc. Green Tossing shall be repeated for multiple times with revolution and duration gradually increased, Cooling time gradually prolonged, thickness of Leave Spreading gradually raised, until green taste is replaced by tea fragrance and the visual effect of “*green leaf with red edge*” can be seen. Proper Green Making can only be flexibly controlled through observing, smelling, and feeling the changes of the color, shape, and scent of the leaves.



Photo 29 Tossing the Green

**Tab. 11 “Green Making Based on Weather” for the Making of
Anxi Tieguanyin**

| Weather | Temperature & Humidity | Techniques of Green Making |
|-----------------|------------------------------|--|
| South Wind | Hightemp. Medium humidity | Lighter Sunning, milder Green Tossing, appropriate water-preserving, shelter the Green from the wind |
| South Wind | Southwest Wind | Slight Sunning, mild Green Tossing, More Frequent Green Tossing, Multiple Times, Preserving Water, Shelter the Green from the Wind |
| Regular Weather | Medium temp. Medium humidity | Heavy Sunning, Intensive Green Tossing, Normal <i>xingshui</i> (Movement of Moisture), moisture flows to and fro distinctly |
| North Wind | Northwest Wind | Heavier Sunning, Tossing the Green with gradual increased strength, thicker spreading for moisture preserving and keeping out the wind |
| North Wind | Cold North Wind | Heavy Sunning, Intensive Tossing and thick spreading for the 3rd and 4th Green Tossing, Larger piles can be made for heat preservation and fermentation acceleration |

E. Roasting the Green (*chǎoqīng*)

Closely following **Making the Green (*zuòqīng*)**, **Roasting the Green (*chǎoqīng*)** (Photo 30) is the process of stir-frying tea leaves in high temperature, in order to instantly stop the enzymatic oxidation that happens during the previous step, and to fix the established quality characteristics. Meanwhile, part of chlorophyll is destroyed by the humidity and high temperature. Hence, the color, fragrance, and taste of tea leaves are improved. Green Roasting has to be performed flexibly in accordance with the characteristics of the results of Green Making. General requirements are: high temperature, appropriate amount each time, stew-frying, and swiftness.



Photo 30 Roasting the Green (*chǎoqīng*)

F. Rolling and Drying

Rolling (*róuniǎn*), **Wrapping-twisting** (*bāoróu*), **Primary Drying** (*chūhōng*), **Second Rolling** (*fùróu*), and **Drying** (*hōnggān*) can be collectively called **Rolling and Drying** (*róuhōng*, literally Rolling and Drying). Rolling and Drying are shaping processes of *Tieguanyin* Tea. Specifically speaking, **Rolling** (*róuniǎn*) process, by actions like rolling, twisting, crushing and pressing, disrupts part of mesophyll tissue, lets out tea juice and makes the juice solidified on the surface of leaves. When Rolling process is done, tea leaves are preliminarily rolled into strips. This procedure can

improve tea leaves' cohesiveness and plasticity, and prepare the Green for Roasting. **Wrapping-twisting (*bāoróu*)** (Photo 31) is an important technique for shaping the appearance of tea leaves. Right after Green Roasting, when the leaves are still warm, wrap them up and twist. For each time, put 0.5 kg to 1 kg roasted leaves into a bag. By techniques of “rolling, twisting, pressing, and scratching”, cellular tissues are further destroyed, more tea juice is squeezed. As a result, tea leaves become tight, curly, firm, into mellow and full shape. Wrapping-twisting (*bāoróu*) can also increase the concentration of tea. **Preliminary Drying (*chūhōng*)** and **Drying (*hōnggān*)** are performed in roasters. During each time, 1 kg to 1.5 kg of leaves are processed. The temperature of 75 to 90 degree centigrade and 3 to 4 times of stirring can evaporate the moisture, catalyze further chemical changes happen to the contents of the leaves, and enhance the fragrance and taste. When the leaves feel prickly, colors of the leaf look oily and silvery, and when moisture content of the leaves are lower than 7 percent, Drying process is completed. The outcome of Drying procedure is named crude tea. Due to varied places of origin, seasons, levels of tenderness, and techniques, crude teas are significantly different with each other in terms of quality.



Photo 31 Wrapping-twisting (*bāoróu*)

G. Refinement Processing

Refinement Processing is performed to refine the quality and appearance of *Tieguanyin* Tea. After going through procedures of Screening (*shāifēn*), Winnowing (*fēngxuǎn*) and Stalk Extraction (*jiǎntī*), Blending (*pīnduī*), Roasting (*hōngbèi*), Spreading for Cooling (*tānliáng*), and Packaging (*bāozhuāng*), crude tea becomes refined tea, with its signature quality that is symbolized by natural “Orchid Fragrance” and particular “*Tieguanyin* Aroma” .

2.2.4 Culture, Value System, and Social Institutions

(1) Tea-related Culture

Anxi *Tieguanyin* tea culture has exerted significant influence on the evolution of the agricultural society in Anxi region, and further on the Fujian Business Culture, regional culture, religious belief, living custom, literature, and art. It brings about the cultural customs of tea country and the spirit of *chádào* (literally *The Tao of Tea*, or *Tea-ism*, referring to an artistic, ceremonial way of tea making, tea drinking, and relevant rituals) that are continuously innovative both in form and in content. In addition, as a carrier of Chinese culture, Anxi tea culture has been widely spread to the globe through the Maritime Silk Road, and witnessed the history of cultural exchange between China and the world, over the past 1,000 years. In 2009, Anxi County was designated as the “Hometown of Chinese Folk Culture and Art (Tea Culture)” by the Chinese Ministry of Culture.

A. Culture of Tea Customs

An ancient tea country, Anxi boasts a history of tea producing as long as over 1,000 years. Life experiences over this long history have been accumulated, evolved and developed. Instructed verbally and learnt empirically, these experiences have been passed on generation by generation, and have formed a unique series of tea customs. Tea ubiquitously exists in the work and life of Anxi people, including basic necessities of life, local rituals and festivals like wedding and funeral, hospitality routines, and day-

to-day social life, etc.

Culture of Tea Rituals. Tea is not only part of daily life, but also an important vehicle of guest courtesy, disputes resolution, and expression of good manners. Firstly, Anxi people serve tea for their guests. “Hospitable Anxi people welcome their guests with tea right upon their arrival”: Whenever there are guests visiting, Anxi people will bring out the best tea leaves that they treasure up for this occasion, fire up the stove, cook the tea, and drink with their guests, “Have a few cups of *Tieguanyin* before getting down to the business.”. Secondly, tea is always on the top of the list when Anxi people choose for gift-giving, and serves as an important bond that connects locals with each other. Famous-specialty tea is the most important gifts that are given by relatives and friends to each other. Thirdly, tea can turn hostility into friendship. Sitting over a nice cup of tea is a good way of resolving neighborhood disputes. Everyone, no matter what social status, will enjoy the tea, relax, and talk nicely. There is even a tea house in the local court, for the purpose of civil disputes mediation. In this sense, *Tieguanyin* works as a great social lubricant for a harmonious community.

Tea and Weddings and Funerals. Tea has been an integral part of weddings in Anxi. As far back as Ming Dynasty (1368~1644 A.D.) and Qing Dynasty (1644~1911 A.D.), with the development of Anxi tea industry, tea has been integrated into wedding ceremonies both with a special connotation and in a particular form. Before the engagement, young women and men sing Anxi tea ballads to each other to express love. Going further, boyfriend’s family gives tea (and money) as betrothal gifts. This protocol is known as “*Offering the Tea*” . If the tea is accepted by the girlfriend’s family, i.e., “*Accepting the Tea*” , it means a successful engagement. The money is usually called “*Tea Money*” . During the wedding ceremony, bride needs to serve tea to each and every guest, who returns with a few auspicious words. This is called “*Drinking the Bride’s Tea*” . After the wedding ceremony, the bride needs to serve tea to bridegroom’s family members, and starts to call her parents-in-law *ā’diē* (father) and *ā’niáng* (mother). It means the bride formally joins in her husband’s family. One month after the wedding ceremony, the newly-married couple needs to pay a visit to the wife’s parents. They will

return their own home with the biggest and strongest tea seedlings that are hand-picked by the wife's parents. The tea seedlings signify the best wishes that their daughter will settle down to her new life and have a baby soon. This ancient custom is known as *duìyuè* (a whole month). **Tea and Funeral and Burial.** In Anxi, tea also plays a role in funeral and burial ceremonies. Anxi people serve a cup of light tea to family members or relatives who participate in the funeral or burial, and to friends or colleagues who come and give their condolences. Those who accept the tea must drink it, for luck and to “wash away the ominous.” Every year on Tomb Sweeping Day (on April 4, or 5, or 6), younger generations are required to serve three cups of tea before sweeping the tomb and worship their ancestors.

B. Folk Activities That Are Related to Tea

There are many tea-related activities in Anxi, for example, *dòuchá* (Tea Battle) and Tea King Contest, etc.

Tea Battle. Also known as *míngzhàn*, *diǎnchá*, *diǎnshì* (different terms that means Tea Battle) in ancient time, Tea Battle can date back to late Tang Dynasty (618~907 A.D.). It was in full flourish in Song Dynasty (960~1279 A.D.). And it has been part of the custom during Yuan Dynasty (1206~1368 A.D.), Ming Dynasty (1368~1644 A.D.) and Qing Dynasty (1644~1911 A.D.) (see Photo 31). Emergence of Tea Battle implied that the custom of tea drinking was refined and purified artistically. In Anxi, with the development of Oolong tea and the creation of *Tieguanyin* Tea, tea farmers needed a way to communicate with, learn to, and even contest with each other about tea-making techniques. Thereby Tea Battle accessed social life (Photo 32, Photo 33). It has gradually evolved into the form of tea leave quality competition, a prototype of Anxi *Tieguanyin* Tea King Contest.



Photo 32 Ancient Tea Battle (painting), and A scene of *Princess e'nuo* (TV series)



Photo 33 Modern Tea Battle Conference in Anxi County

Tea King Contest. As a highlight of Anxi tea customs, Tea King Contest occurs twice every year, after spring and autumn harvest and tea making (see Photo 34). Contestants will have to go through preliminary contest and intermediary contest, before having being qualified to enter the final contest. Preliminary contests, held within each village, determine representatives of each village. During the intermediary contest, prominent tea masters will be invited to appraise hundreds of tea drinks submitted by the villages. Anonymously, winners (less than ten) go into final contest. The Tea King is finally decided by a judge panel that consists of national tea experts

and masters of provincial, city, and county levels. After awards are given, events and celebrating performance follow (see Photo 35). For example, tea art performance, Tea King Auction, and parade (*cǎijiē*, literally *treading the streets*), etc. Tea King Contest is highly valued by Anxi people. It's been proven to be an effective way of selecting famous, top tea, improving the quality of tea leaves, facilitating the development of tea techniques, promoting tea production, increasing the popularity of Anxi Oolong tea, and elevating the value of *Tieguanyin* tea.



Photo 34 Modern Anxi Tea King Contest



Photo 35 The First Batch of Anxi *Tieguanyin* Great Master Contest

C. Culture of Tea Art

Anxi tea art is the essence of “Anxi *Tieguanyin* Tea Culture System” . It is full of the life breath and artistic atmosphere of Southern Fujian. Anxi tea art embodies the philosophy of Anxi people: be grateful to the nature, respect tea farmers, treat tea-drinkers sincerely, and pass on the spirit of *chádào* (*the Tao of Tea*) “Pure, Elegant, Respectful, and Harmonious” . In Anxi, the art of tea drinking is particular about tea quality; it also sets the bar very high for the quality of water, cooker, fuel, degree of water boiling, brewing methods, how to pour tea, and tea appreciating ability, etc. The most important parts are requirements about tea set and brewing process.

Tea Set. As far back as Qing Dynasty (1644~1911), Anxi people have been quite particular about tea set for making and drinking Oolong tea. In the early years, a delicate and exquisite tea set must consist of four parts, which were known as the “Four Treasures of Tea Brewing”: *cháoshàn* stove—the charcoal stove produced in Chaozhou and Shantou region, Guangdong Province; *yùshūwēi* (literally *Jade-Book Cooker*)—reddish brown, flat-shaped porcelain water boiler; *mèngchénguàn* (literally *A Jar Invented by Hui-Mengchen the Crafter*), purple clay teapot produced in Yixing, Jiangsu

Province; and *ruòshēnōu* (literally *Teacup Manufactured by Ruoshen the Crafter*)—small porcelain tea cups produced in Jingdezhen, Jiangxi Province. At present, for *Tieguanyin* brewing, Anxi people commonly use the white porcelain tea-ware produced in Dehua County, Quanzhou City, Fujian Province.

Brewing Process. *Tieguanyin* tea requires a unique process of brewing and drinking, with a style of its own. Three key points are water, tea set, and brewing. This is a common sense about tea brewing in Anxi: “*The best combination is rock-spring water cooked by charcoal fire and brewed in smaller tea set.*”. Standard tea brewing consists of 8 steps (see Atlas 6):

Báihèmiùyù (literally *A white crane takes a bath, or xībēi*): wash the tea set;

Guānyīnrùgōng (literally *Guanyin Buddha entering her palace, or luòchá*): put *Tieguanyin* tea leaves into the tea set, fill half of the capacity of the tea set;

Xuánhúgāochōng (literally *Holding the boiler high and pour the water into the teapot, or chōngchá*): lift the water boiler high and pour the water into the teapot or teacup (the type of cup with a cover), let the lash make tea leaves twirl;

Chūnfēngfúmiàn (literally *Spring breeze caressing your face, or guāpàomò*): remove the white form from the surface of the tea infusion with pot cover or cup cover; make the tea infusion clear and clean;

Guāngōngxúchéng (literally *Lord Guan Yu is patrolling the city, or dàochá*): brew the tea for 1 to 2 minutes, then pour it into the tea cups that are arranged in a row, one by one, round by round;

Hánxìndiǎnbīng (literally *General Han Xin gather and inspect his troops, or diǎnchá*): pour the tea infusion, when there is a little left in the tea pot, drop by drop, one by one, into the tea cups;

Jiànshǎngtāngsè (literally *Appreciate the color of the tea infusion, or kànchá*): appreciate the color of tea infusion in the cup;

Pīnchùogānlín (literally *Sip and savor the sweet rain, or hēchá*): sip the tea when it is still hot, smell its fragrance first, then savor its taste, drink and smell alternatively, pour a little tea each time, and enjoy it leisurely.



Step 1. *Báihèmiùyù*

Step 2. *Guānyīnrùgōng*



Step 3. *Xuánhúgāochōng*

Step 4. *Chūnfēngfúmiàn*



Step 5. *Guāngōngxúchéng*

Step 6. *Hánxìndiǎnbīng.*



Step 7. Jiànshǎngtāngsè

Step 8. Pīnchūògānlín

Atlas 6 Anxi Tieguan Yin Tea Art Culture

D. Broadcasting of Tea Culture

Anxi Tea has been one of the most important cultural icons of the Maritime Silk Road. Since Song Dynasty (960~1279 A.D.), Anxi Tea has been largely exported to the European countries and the Southeast Asian countries (see Photo 36). Culture of Anxi Tea has been broadcast to the world along with the exports of this amazing product.



Photo 36 The Starting Point of Maritime Silk Road

It Spread to the Europe Through Maritime Silk Road. Located in the southeast Fujian Province, Quanzhou was one of the starting points of ancient Maritime Silk Road (see Photo 35). However, the role of Quanzhou Port was replaced by Xiamen Port due to the ban on maritime trade executed by the Ming Dynasty government, and due to the

silting up of the Port, when Oolong Tea was rising in Anxi. According to the historical materials of Xiamen Port, from 1858 (the eighth year of Emperor Xianfeng's reign, Qing Dynasty) to 1864 (the third year of Emperor Tongzhi's reign, Qing Dynasty), the British people imported more than 1,800 t of Oolong Tea from Xiamen Port every year, maximum over 3,000 t per year. Majority of these tea leaves were produced in Anxi. The pronunciation of tea, in the dialect of southern Fujian (Anxi included), sounds like "TAY". Dutch people, who were the first importer of Fujian tea, called it "THEE", a Latin word. It was imitated by other European countries. Thus, it was spelled "TEA" in English, "THÉ" in French, "TEE" in German, "TE" in Danish and Swedish, all derivatives of "TAY". What's more, the pronunciation of "thé" in French is exactly the same with "tea" in Hokkien (Southern Fujian dialect). In addition, Chinese tea brought the Great Britain the greatest impact. The well-known afternoon tea custom in the Great Britain took shape thanks to the continuous input of Chinese tea, especially the *Tieguanyin* tea shipped through Maritime Silk Road. It has affected the British tea drinking custom most profoundly.

***Tieguanyin* Varieties and Cultivating and Making Techniques Introduced to Taiwan.** Shortly after *Tieguanyin* was created in late Ming and early Qing dynasties, it was spread to Taiwan region. Around 1798 (the third year of Emperor Jiaqing's reign, Qing Dynasty), *Mr. Wang Yicheng*, an Anxi man, took the techniques of Oolong tea making to Taiwan, and further improved it. This was how the famous *Pouchong Tea* was created. Wang also actively promoted and taught people about *Pouchong Tea* in the extensive tea-cultivating region of northern Taiwan. Around 1885 (the eleventh year of Emperor Xianfeng's reign, Qing Dynasty), *Mr. Lin Fengchi*, an Anxi man, went to Taiwan with *Green-tip Oolong*, which was planted on the Tung-ting Mountain. Now, *Tung-ting Oolong* has become the variety with the largest plantation area in Taiwan. In 1896 (the twenty-second year of Emperor Guangxu's reign, Qing Dynasty), *Mr. Zhang Qiumiao*, another Anxi man, cultivated *Tieguanyin* on Zhanghu Mountain, Taiwan. It became *Mucha Tieguanyin*, and made this area the most representative producing region of *Tieguanyin* in Taiwan.

Tea Culture Passed to the Southeast Asian Area Through Tea Trade. As early as the time of Emperor Qianlong's reign (1735~1796 A.D.), Qing Dynasty, *Mr. Wang Dong*, a businessman from Yaoyang Village, Xiping Town, Anxi County, opened "Dong's Tea Shop" in Vietnam. Mr. Wang successively opened more shops in 12 provinces of Vietnam, selling "*Dong's Bright Red Tieguanyin*". During Emperor Xiangfeng's Reign (1851~1861 A.D.), Qing Dynasty, *Mr. Lin Hongde*, a businessman from Luoyan Village, Huqiu Town, Anxi County, created "*LimKimThye Tieguanyin*" and sold it in Singapore tea shops. In the 1930s, there were over 100 tea shops in **Southeast Asia** opened by Anxi people, including well-known brands like "*Lim Kim Thye*" in Singapore, "*Sanyang*" in Malaysia, "*Wangmeiji*" in Indonesia, etc. The Singapore Tea Importers' & Exporters' Association was established in 1928, and was chaired by *Mr. Lin Qingnian*, an Anxi man. Statistics show that, during this period, Anxi annually exported more than 800 t of tea leaves to Singapore, over 200 t to Malaysia, 160 t to Thailand, and 100 t to Philippine. Moreover, during Emperor Guangxu's reign (1875~1908 A.D.), Qing Dynasty, *Mr. Wang Cheng* and *Mr. Wang Liang*, brothers from Yaoyang Village, Xiping Town, Anxi County, established "*Zhenchun*" *Tieguanyin Tea Shop* in Jakarta, **Indonesia**. Tea culture was thus broadcast to Southeast Asian region through tea trade.

International Exchange of *Tieguanyin* Culture, by Art Troupe of Tea Culture. Established in 1994, Anxi Art Troupe of *Tieguanyin* Tea Culture produced "Anxi Tea Art" show, that combines Anxi's characteristics as a tea country, traditional tea rituals, and modern spirits. The show has been invited to Japan, France, Kuwait, Republic of Korea, Greece, Belgium, and Italy, for cultural exchange and *Tieguanyin* culture broadcasting (see Photo 37).



Photo 37 Inauguration of China-Europe Cultural Salon Sanhe Teahouse

Empowering Tea Diplomacy, State Present for Foreign Country Leaders. As Tea Diplomacy has been playing an increasingly important role in China's relations with other countries, Chinese tea, particularly Fujian Oolong tea that is symbolled by *Anxi Tieguanyin*, has been serving as a bridge for exchange, communications, peace, and friendship. In early September, 2017, during the Ninth Meeting of the Leaders of the BRIC Countries, in Xiamen, Fujian Province, cups of *Anxi Tieguanyin* tea were served to the leaders and their spouses, who sang high praise for it. As state guests' tea of China, *Tieguanyin* was given to the president of Russia as a state present (see Photos 38). On many other important occasions, for example, Beijing Summit Meeting of Sino-African Cooperation Forum, China-UK Tea Talk, China-Korea Tea Talk in Beijing (see Photos 39), China-Vietnam Tea Talk, etc., state leaders discussed national strategies over a cup of *Tieguanyin* tea. In addition, *Tieguanyin* entered the UN, as part of the performance for the Silk Road Investment Forum. It further broadens brand awareness and influences at the Olympic Expo, promoting the progress of China's the Belt and Road Initiative.



**Photo 38 China-UK Tea Talk between National Leaders and Their Spouses;
China-Korea Tea Talk between National Leaders and Their Spouses**



Photo 39 The President of Russia Drinks *Tieguanyin*, the State Guest Tea; China-Vietnam Leaders' Tea Talk

(2) Value System

Anxi people believe that tea stands for the virtues of faithfulness and purity. It also symbolizes prosperous offspring and blessings. It was clearly stated in the ancient classic *Cha-Shu* (Chinese: 茶疏, literally *Tea Report*) that, “Tea tree takes root. It always burgeons whenever planted. In ancient time, tea was a must-have wedding gift, implying that the newly-married couple would stay with each other for the rest of their lives.”

A. Religious Belief about Tea

Anxi people are polytheistic. Deities like the Kitchen God (*zàojūngōng*), the Earth God (*tǔdìgōng*), Chingshui Zushih (literally *the founder of clear water*), Guanyin Buddha, *bǎoshēngdàdì* (literally *Life Guardian God*, or *God of Medicine*), and Lord Guan Yu (*guāngōng*, literally *General. Guan Yu, the Saint*), etc. The most important deity in Anxi is Chingshui Zushih. Since Song Dynasty (960~1279 A.D.), Anxi people would have a grand parade around each village, carrying the statue of Chingshui Zushih, every year when spring begins. In doing so, Anxi people pray for a blessed, favorable weather and peaceful social environment in the forthcoming year. In Anxi, tea growers worship the Earth God (*tǔdìgōng*). Tea merchants worship Lord Guan (*guāngōng*). They wake up in the morning and offer incense to the Earth God or Lord Guan every day. Additionally, the second and the sixteenth day of each lunar month are days when tea farmers offer tea and fruits to the Earth God as tributes. Grand worship ceremonies with much heavier articles of tribute are held before and after each tea harvest season (see Photos 40). In Xiyuan Village, Xiping Town, the very birthplace of *Tieguanyin*, there is a place named San'an Village. It is literally a temple of Lord Guan, and it was established in the fourth year of Emperor Yongzheng's Reign (1726). The Temple of Chachan (literally *A Temple of Tea and Zen*) is located in Songyan Village, Xiping Town. The Temple has established the Hall of Guanyin, and the Hall of Tea God, for the purposes of worshipping, meditation, and tourism, etc. (see Photo 41).



Photo 40 Temple and Ceremony for Chingshui Zushih Worship



Photo 41 The Temple of Chachan, Xiping Town

B. Material and Spiritual Culture Values

Anxi has a well-established long history of tea. Tea has been an integral part of local life, both in the dimensions of material, emotion, culture, and the one of art. It embodies people's pursuit of and longing for fortune, love, and fashion; and it has been expressed and broadcast in forms of tea poetry, songs, antithetical couplets, and proverbs, etc.

Poetry That Records Tea Production and Life with Tea. History of tea poetry can be traced back to the Five Dynasties (907~960 A.D.), for example, “Flowers, floating in the teacups, Refreshing, the aroma lingers at the corner of lips; Moonlight, noon light, demons soon conquered without a fight.” (*Chinese: 泼乳浮花满盏倾，余香绕齿袭人清。宿醒未解惊窗午，战退降魔不用兵。*), by Mr. Zhan Dunren (the first mayor of Anxi County). It implied that drinking *Tieguanyin* is refreshing and spirit-lifting. Moreover, it can alleviate a hangover. Mr. Su Zhe, a poet in Song Dynasty (960~1279 A.D.) wrote: “Central Fujian has the best tea in the world; farmers devote themselves to cultivating tea, tirelessly.” (*Chinese: 闽中茶品天下高，倾身事茶不知*

劳。)。 In early Qing Dynasty (1644~1911 A.D.), poetry that narrated and praising tea-drinking was highly popular. For example, written during the period of Emperor Qianlong's Reign (1735~1796 A.D.), Qing Dynasty, "Snowwater is even better than flowing water for tea cooking; My heart has been lightened, even before tasting." (Chinese: 雪水盛如活水烹, 未须着口已心清。), (*Cooking Tea with Snow Water*, by Mr. Shang'guan Xianyao). Mr. Lin Henian, famous poet and tea merchant from Lutian Town, Anxi County, wrote a large number of tea poems, such as *A Mountaineer Woman*, *A Mountaineer Boy*, and *A Private School on the Mountain*, etc. He also kept the record of the longest tea poem ever written. For example, there are totally 64 lines, 320 Chinese characters in his *A Farmer's Confession*. Since the 1980s, numerous modern tea experts and scholars put Anxi tea in their poems, too. Plenty of fine pieces of work have been written as a result, for example, "Only for thee, *Tieguanyin* aroma can't be a waste; Heavenly, its color, fragrance, and taste." (Chinese: 为君寻得观音韵, 色香味行有神功。)

Vive L'Amour, Viva la Vida, Viva la Tea. Over the past thousand years, Anxi people have been growing tea, tasting tea, and praising tea. In Anxi, tea songs can be heard everywhere, in the same way of ubiquitous tea fragrance. During each tea harvest season, those girls, while picking tea leaves in the gardens, exchange tea songs with young men who work in the crop fields. Their singing turns the tea mountain into an open-air opera house. As long ago as early Qing Dynasty (1644~1911 A.D.), Mr. Ruan Manxi, a poet in Tong'an County, compiled *The Anxi Tea Songs*, that was included by *The Records of Quanzhou Government* (Official Archives of Local Government of Quanzhou City, Fujian Province). Written in southern Fujian dialect and in traditional melody of Anxi, ancient Anxi tea songs are popular because of colloquial language, beautiful melody, inclusive content, and distinctive figures. Tea songs are used to express feelings about life, for example, *Nanyin and Tieguanyin* (*Nanyin*, literally *South Sound*, referring to the traditional form of music that is popular in southern Fujian Province), and *Tieguanyin, the Famous Tea*. It goes like: "*Tieguanyin* in mouth, *Nanyin* in ears. I enjoy music with my best friends. Nonetheless, drinking the tea makes me

homesick.” Or “Hospitable Anxi tea ladies serve their guests tea and sing beautiful Oolong tea songs for them.”. Tea songs are also used to praise love. For example, the song named *Tea Leaves All Over the Mountain, Fragrance Everywhere*: “This is the birthplace of Great Oolong; The best Oolong is *Tieguanyin*.”.

Antithetical Couplets About the Pursuit of Tea Fashion. The earliest antithetical couplets about tea, in Anxi, can be traced back to the late Tang Dynasty (618 ~907 A.D.) and early Song Dynasty (960~1279 A.D.). Since the late Ming Dynasty (1368~1644 A.D.) and early Qing Dynasty (1644~1911 A.D.), Anxi Oolong tea has been rising rapidly. It has been a fashion for tea shops and tea farms to have antithetical couplets, which can be seen everywhere in Anxi (see Photo 42). For example, “Anxi County, looks like poem or picture; *Tieguanyin*, tastes like dew or spring.” (Chinese: 似诗似画安溪县, 如露如泉铁观音).



Photo 42 Antithetical Couplets for Anxi *Tieguanyin*

Proverbs About Being Materially Prosperous. From long-time farming practice

and living experience, Anxi tea farmers have summarized proverbs that are colloquial, concise and comprehensive. These proverbs are an important part of Anxi tea culture and a precious heritage. A large majority of Anxi tea proverbs are spoken in traditional south Fujian dialects. They perfectly preserve rich local characteristics and is full of local styles. There are many proverbs in Anxi about getting prosperous by cultivating tea, for example, “*The mountain is a cornucopia. What the tea trees bear is gold and silver.*” Or “*You will be loaded if you have 1,000 tea trees.*” Or “*If you want to get rich, go to the mountains and build tea gardens*”, etc.

(3) Local Social Institutions

A. Master-Apprentice Inheritance System

Driven by enthusiasm for *Tieguanyin*, many tea masters are openly teaching *Tieguanyin* making techniques, which they have learnt through family inheritance, in the tea culture training centers and exhibition houses. These masters have established and improved the mechanism of mentoring, for training the next generation of masters of *Tieguanyin* Oolong tea making techniques, which have been a Chinese intangible cultural heritage. Exerting their expertise, these tea masters mentor apprentices, connect with tea bases, and provide services to tea enterprises. They are both leaders and spokesmen of the tea industry; and they have trained a large number of able tea practitioners. Moreover, Anxi has established the management system for *Tieguanyin* Masters’ Studios, and for *Tieguanyin* Inheritance System from Master to Apprentice (see Fig.9, and Photo 43). In this way, what has been inherited is not merely *Tieguanyin* making techniques, but also the whole body of *Tieguanyin* culture.

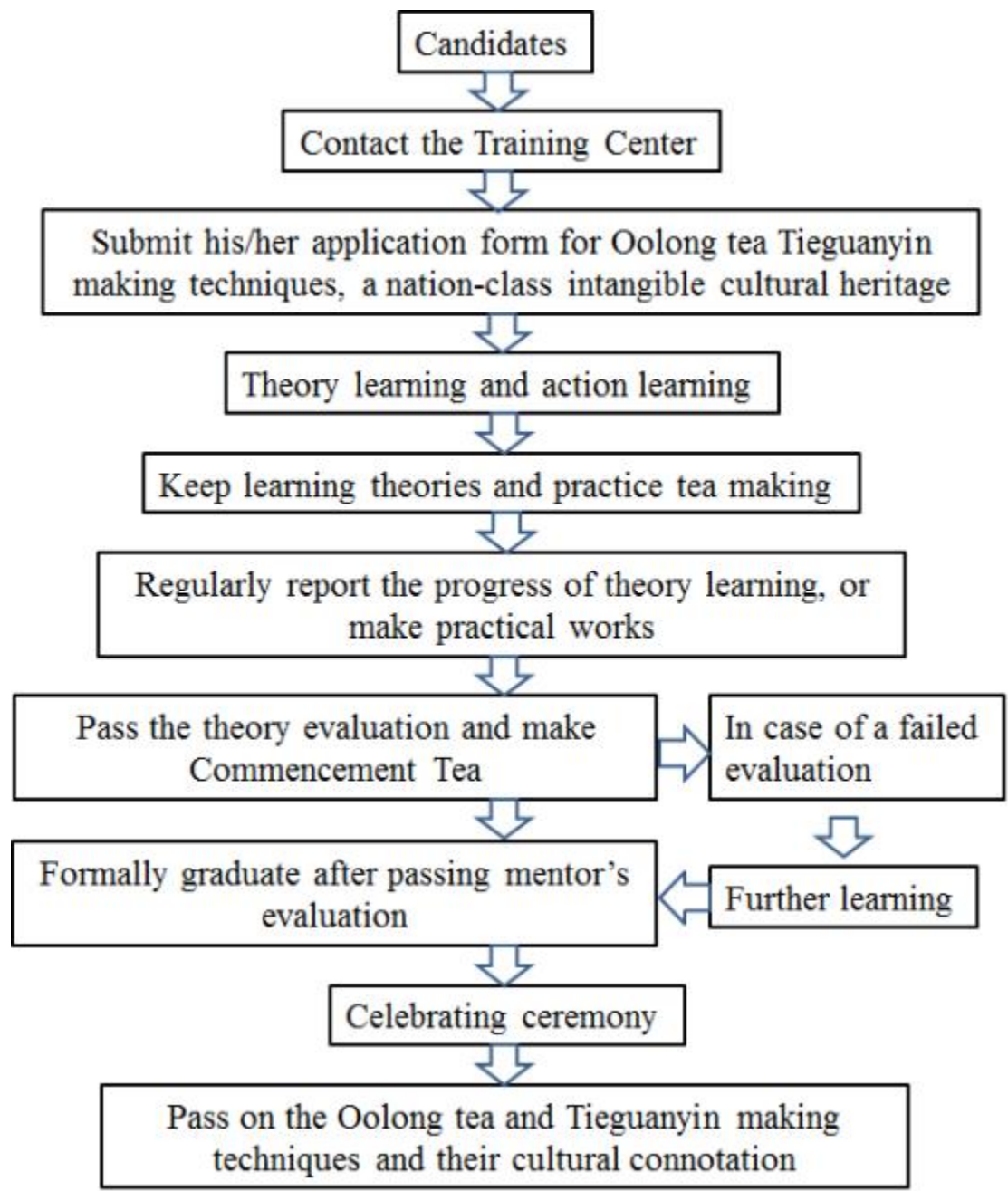


Fig.9 Specific Process of Master-Apprentice Inheritance Model



Photo 43 *Tieguanyin* Master Commencement Ceremony; A Scene of the Graduation Celebration

B. Tea Associations

Anxi has established more than 60 association chapters in over 30 large and medium-sized cities and counties in China. The network links up over 200,000 Anxi tea merchants and a large number of promoters for Anxi *Tieguanyin*, who actuate both the sales of *Tieguanyin* tea and the spreading of *Tieguanyin* culture. In 2014, Anxi *Tieguanyin* Tea Culture Promotion Center (AXTTCCPC) was founded (see Photos 44).

Missions of the Center are: to carry forward the traditional tea culture of Anxi *Tieguanyin*; to study the history and social impact of Anxi *Tieguanyin* tea culture; to extensively connect with *Tieguanyin* enthusiasts from culture circle, education area, and business world; and to carry out cultural exchange about *Tieguanyin* for making friends and accelerating collaborations.



Photo 44 The Registration Certificate and the LOGO of Anxi *Tieguanyin* Tea Culture Promotion Center

C. “Cooperative + Farmer” Model of Production and Operation

In 2006, the first tea cooperative was established in Anxi. From then on, the collaborative model of “tea farmers focus on tea growing, while cooperatives focus on tea making and sales” has been developing and progressing. As of now, there are over 1,000 tea cooperatives that completely, or partially, run for the producing, making, and selling of *Tieguanyin*. The tea cooperatives centralize the services and management, which include unified supply of agricultural means of production, integrated pest/disease control measures and guidance, uniform technical training (including innovation of tea cultivation models, scientific fertilization and pest control, etc.), unified brand image, standardized quality management, and centralized marketing and sales, etc. The farmers can sell green material tea to the cooperatives, or become a shareholder of the tea gardens, or work for the cooperatives (see Photo 45). Thanks to

this model, agricultural cost is saved, circulation costs of products are decreased, while price is elevated, green development level of tea and income of tea farmers are both improved. The mutual model of “Cooperative + Farmer” has driven the growth of local tea industry, leveraged tea farmers’ expertise, made mutual help and development possible; and it has helped the culture of *Tieguanyin* to survive and thrive.



Photo 45 Farmers Plucking Tea for Tea Cooperative

D. “Enterprise + Base + Farmer” Model of Tea Production and Operation

The development of Anxi *Tieguanyin* tea industry and its culture cannot be possible without the leading role of tea enterprises. Since the 1990s, many influential enterprises emerged in Anxi; and they have driven the growth of tea industry through the model of “enterprise + base + farmers” . Based on the joint tea production base management model, farmers in the same region team up voluntarily according to the principles “team up voluntarily, supervise each other, sign bundle contract”: 5 to 15 farmer households a group, a base representative elected within the group. In the name of the group, the representative signs collaboration agreement with the enterprise. Hence, the enterprise is able to record the full course of agricultural activities, on the one hand, and is able to realize the traceability of tea production process and quality

security by keep samples of the tea leaves it procures from the production base in this way, on the other hand. At the same time, the growth of the enterprise promotes the development and broadcasting of tea culture. For example, the tea company founded by the thirteenth-generation descendent of *Mr. Wang Shirang*, the Anxi man who discovered *Tieguanyin*, constructed *Tieguanyin* ecological tea gardens (see Photo 46), and initiated an 8-step Tea Art Chart of *Tieguanyin* which further broadens the spreading of *Tieguanyin* culture. Museums of tea culture and art have been built by various tea enterprises, too, for example, China Tea Capital Museum, and Sanhe Tea Culture Museum, etc. These museums serve as platforms where events of tea-themed literature, calligraphy and painting are held. They are accelerating the exposure of tea culture, carrying forward the culture of *Tieguanyin* and further improving it.



Photo 46 A *Tieguanyin* Ecological Tea Garden

E. Private Tea Schools and R&D Institutions

Anxi mobilized resources of the entire county and raised a fund of RMB 540 million (Appx. USD 76 million), and helped establish China's only undergraduate college that is related to the whole tea industry chain: *Anxi College of Tea Science, Fujian Agriculture and Forestry University* (see Photo 47). Started recruiting in 2012, the School currently has over 4,000 undergraduate students on campus. It strives to cultivate versatile and practical talents for future development of Anxi tea and its culture. Meanwhile, *Anxi Vocational and Technical School of Tea* (see Photo 48) founded China's only training base for Oolong tea (*Tieguanyin*) talents, the only high-skilled talent training and evaluating base in Fujian for tea tasters and tea art performers,

Quanzhou’s labor force transfer training base, Anxi County’s training center for tea industry and broadcasting of tea culture, “Sunshine Project” training, and fertility civilization education, etc. As a window for Anxi tea culture’s presenting and broadcasting, the School has been vigorously promoting the training of tea-related, applied techniques, and the cultivation of professional talents of tea leave and tea culture. Hence, the School is also known as “An Incubator of Tea Experts”, or the “West Point of *Tieguanyin*.”



Photo 47 Anxi College of Tea Science, Fujian Agriculture and Forestry University



Photo 48 Tea Technology Complex Building in Anxi Vocational and Technical School of Tea

2.2.5 Landscape Characteristics

(1) Tea Garden Landscape Diversity

Sequential change of landscapes : Anxi is located in south subtropical oceanic monsoon climate zone. With the change of time, tea gardens present diversified landscapes (see Atlas 7). Due to different agricultural practices and seasonal variation of plants, tea gardens in Anxi County show themselves with distinct landscapes in different seasons. Each season unfolds uniquely beautiful scenery in Anxi tea gardens.



Spring

Summer



Autumn

Winter

Atlas 7 Temporal Diversity of Tea Garden Landscape

Vertical differentiation of plantation landscape: Anxi tea gardens are located between 300 meters and 1000 meters above sea level. Along with the increase of elevation, tea trees show different landscape characteristics. In comparison with low-altitude tea trees, high-altitude tea trees are with smaller and thicker leaves, shorter internodes, and relatively lower height. At the same time, high-altitude tea gardens are usually cloud-enveloped. That in itself is an exquisite tea garden landscape hidden in clouds (see Atlas 8).



Atlas 8 Tea Garden Landscapes in Different Altitudes

Landscape structure and functions of tea gardens: Unlike sloped tea gardens in most other areas, Anxi has tea gardens on level terrace that are reclaimed and built according to contour lines. They are usually in a shape of strip and sometimes in small patches. A terrace tea garden normally consists of three parts: terrace wall, tableland, and ridges (see Fig. 10). Terrace walls are steep and more than 1 meter high. Grass planted or preserved on the walls enhances the anti-erosion capabilities of the soil,

prevents loss of soil and water, provides habitat for animals, and improves the biodiversity of the tea gardens. The platforms are flat grounds where tea trees grow. Usually, tea trees are planted in higher sections of the platforms. Grass that are reserved between sections functions as a buffer that can relieve disease and pest problems. Ridges locate on the outer edge of the platforms and above the terrace walls, with ditches on their inner sides. When it rains, the ditches can retain rain water and drain redundant water. Anxi has a large annual precipitation. The level terrace tea gardens can effectively reduce the direct scour of the rain water against the slopes, prolong the infiltration time, and greatly mitigate the loss of water and soil in tea gardens. Practices of grass reservation, on terrace walls and between thin-planed tea tress, have helped creating excellent ecological environment, improving biodiversity of tea gardens, and alleviating diseases and pest problems.



Fig.10 Structure of Terrace Tea Gardens

(2) Composite Landscape

Having lived in the mountainous natural environment for so long, Anxi people

have exerted themselves and created, with efforts made by generation after generation, a cyclic, three-dimensional production system that safeguards people's livelihood and a healthy, stable living environment. A spatial pattern embodies this system: headwater forest on hilltop, villages and tea gardens scattered on hillside, followed by mosaiclike villages and farmland on lower level, rivers running in the lowest altitude, i.e., a spatial pattern of, from top to bottom, headwater forest---tea garden/village complex---farmland/village complex---rivers (see Fig.11). This spatial pattern is provided with both important landscape value and diversified ecological functions. This pattern is in picturesque disorder; it shows harmonious environmental characteristics of *tea-trees-under-forest*, *villages-embeded-in-tea-trees*, and *farmland-scattered-in-villages*. It's also known as *hat-on-the-head* (hilltop forest), *belt-around-the-waist* (hillside tea garden), and *shoes-on-the-feet* (foothill farmland), demonstrating a rich and varied landscape spatial pattern (see Photo 49).



Fig.11 Anxi Composite Landscape Vertical Spatial Pattern



Photo 49 Mosaic Village Landscapes

Harmonious system landscape structure (Fig. 12) : Anxi enjoys abundant rainfall and mild climate. Mountains overlap, one above another. Forests of rocky peaks reveal themselves from clouds at times. Clear and blue, Lanxi (literally *Blue Creek*) and Qingxi (literally *Clear Creek*) are winding their ways up and down between mountains and valleys. Hilltop forests, which hold water and preserve soil and water, can guarantee not only sufficient water supply to tea gardens and villages on hillside, but also enough nutrients and a good habitat for the growth of tea trees. On hillside, temperature, humidity and soil environment at the altitude are perfect for tea tree growing, and conducive to excellent quality of tea leaves. Under local natural conditions, Anxi people draw on local resources and build stone walls for soil conservation and soil-water-loss prevention. Layers of terrace field and terraced tea gardens have taken shape there from. During tea garden cultivation, for convenience of dwelling and tea making, Anxi people build houses on hillside and foothill areas. This is how villages have been established. Mingling with tea gardens, these villages not only make tea-related activities easier, but also construct a harmonious ecological agriculture model between farmyard system and tea-garden system. In lower-altitude areas, farmland integrates with villages. Due to their requirements for higher temperature, farm crops, mainly fruits, vegetables and paddy, grow at lower-altitude region. From the perspective of vertical space, water and nutrients are transferred downstream from higher-altitude areas. Farmland carries on these water and nutrients, and feed the growth of field crops. At the same time, rivers at further lower altitude can provide water supply, for agricultural production and

farmers' domestic water use. In short, an efficient utilization model of illumination, heat, water and fertilizer has been established within Anxi agricultural production systems.



Fig.12 Harmonious System Landscape Structure

Ecological farming model landscape: Thanks to the implementation of interplanting model of “tea tree---forest-green manure”, “forest (fruit trees)---tea trees---herb (herbal medicine)”, “tea trees---shelter forest”, and “tea trees---herb” (see Atlas 9), “Anxi *Tieguanyin* Tea Culture System” optimizes landscapes, and, at the same time, realizes a three-dimensional agricultural model with an organic combination of trees, herb, fertilizer and water. On the one hand, through improving topsoil coverage, effectively conserving soil and water, and modifying ripe soil, the system brings a tea garden landscape with well-conserved soil and water, on the other hand, due to different nutrient demands from different plants with different root system depth, soil nutrients are evenly utilized with an enhanced efficiency. In addition, the multi-species and multi-tier, composite, and three-dimensional structure satisfies the demands of tea trees' ecological habits. The structure can improve the utilization rate of soil, solar energy and biological energy, and it can enrich biodiversity as well. Enriched biodiversity can resist plant diseases and insect pests, regulate microclimate of tea gardens, and protect ecological environment. It is able to improve tea trees' capacity of natural disaster

resistance, and to enhance the composite system's coping capability against agricultural economy fluctuations. As such, system stability, tea garden land utilization rate, and output efficiency are improved.



Atlas 9 Landscape of Ecological Farming Model

(3) Cultural Landscape

During a long history of tea cultivation, Anxi people have developed diverse cultural landscapes. Ancient tea trees and historic tea gardens, for example, are unique types of landscapes in Anxi (see Atlas 10). In harvest season, hardworking ladies, wearing costumes with much of local characteristics, with bamboo baskets and rattan baskets in hand, march towards tea gardens for tea leaves plucking. This in itself is a harmonious tea-plucking landscape, unfolding like a picture scroll (see Atlas 11). Besides, during its time-honored history, Anxi *Tieguanyin* tea culture system has formed landscapes with unique tea-making workshops and tea-culture-related ancient buildings. For example, Temple of Chachan (literally *A Temple of Tea and Zen*) in Xiping Town, and architecture landscape with old houses that have been closely related to tea trade, such as Rizhai (literally *Village of the Sun*) and Yuezhai (literally *Village of the Moon*) (see Atlas 12). All these have recorded the arduous journey of Anxi tea farmers in tea tree plantation, tea making and tea business over the past hundreds of years. And they constitute a complete human landscape of tea culture and ancient buildings in a mountainous area.



Atlas 10 Landscape of Ancient Tea Trees



Atlas 11 Landscape of Tea Leaf Plucking



Atlas 12 Cultural Landscape of Ancient Buildings

Built in 1372, the fifth year of Emperor Hongwu's reign, Ming Dynasty, the ancient Jusi Building (see Atlas 13) is located in the corner of Chishi Village, Xiping Town, Anxi County. (The name "Jusi" means "come together, right here"). This building has witnessed a long history of over 600 years. It is the *Tulou* (literally an Earthen Building) that was first discovered and has been best preserved in Fujian Province. This is a south-facing earth-and-wood complex. It consists of main structures, "tiger's teeth" (stairway), *Chiting Pavilion (Danchi)*, and Centipede Tentacle wings. It covers an area of 9,048 square meters, with a floor area of over 2,000 square meters. Main structure stands in its squareness, surrounded by exterior wall that are made of rammed raw earth. Protected by the 2.5-meter-thick earthen wall, there stands a three-storeyed, hollow-square shaped residential building with column and tie wooden construction, single-tiered eaves and hip-and-gable roofs. There are totally 72 rooms in this building. The third floor is framed structure, the walls are wide enough for people to pass through. Jusi Building was funded and owned by the Lin's four brothers in Chichi Village, after they made a great fortune out of tea business. The Building is featured with a simple and unsophisticated architectural style and original

craftsmanship. Stones used in the building are almost in natural state, without any elaboration. Bamboo nails and vine were used for connecting timbers, eave ridges and beams. It is hard to find a trace of sculpture on rafters and columns, either. It typically reflects the style of ancient building in southern Fujian Province. The courtyard of the Building is the place where tea-related public events are held, for example, tea battles. The hall on the ground floor serves as reception space, which can admit more than 20 people tasting tea at the same time. Additionally, as a great reminder of the more-than-one-thousand-year history of tea in Anxi, there are many historic sites of tea making in the complex.





Atlas 13 The Jusi Building

3 PROTECTION ACTIONS TAKEN AFTER BECOMING CHINA-NIAHS

Since 2014 when Anxi *Tieguanyin* Tea culture system was listed as an important agricultural heritage system in China, Anxi County has carried out a series of heritage protection and development actions, detailed as follows.

3.1 Protection and development system development

A sound protection and development system was established, which mainly includes:

A. Permanent agencies for the protection and development of agricultural heritage, namely the Anxi County Bureau of Agriculture and Rural Affairs and the Anxi County Agricultural Zoning Committee (*Tieguanyin* World Heritage Bidding Office) were established, for the protection of agricultural heritage and the implementation and management of tea projects.

B. China-NIAHS Anxi *Tieguanyin* Tea Culture System Protection and Development Plan was developed and implementation approved.

C. Interim Provisions on the Management of *Tieguanyin* Tea Culture System in Anxi of Fujian Province as China's Important Agricultural Heritage was developed.

D. Tea production and processing was standardized and the Four Standard Systems including Anxi *Tieguanyin* Production and Initial Processing Technical Standard (Trial) and Anxi *Tieguanyin* Refined Processing Technical Standard (Trial) were developed.

3.2 Protection of traditional tea tree germplasm resources

A. Tea tree germplasm resources protection and development plan was developed; ancient wild tea tree protection measures were issued; ancient wild tea tree protection activities and survey of ancient wild tea trees over 100 years of age in the heritage site were conducted; Anxi tea tree germplasm resources bank was established. Efforts were made to regularly manage and maintain the ancient wild tea trees, guide tea farmers to harvest ancient tea trees appropriately, and severely punish acts destroying ancient tea trees.

B. Regarding the protection of tea germplasm resources, Wei Yuede, inheritor of *Tieguanyin*'s traditional production skills, jointly with the Tea Department of the Fujian Agriculture and Forestry University, has set up a postdoctoral workstation and launched the scientific research plan of DNA Fingerprint Database of *Tieguanyin* Germplasm Resources and developed a 500 mu conservation garden and breeding base of parental stocks of *Tieguanyin* (with red heart and crooked tail).

3.3 Tea plantation ecosystem protection

A. Famous tea mountains competition was launched across the County. Famous tea mountains were selected based on the six criteria of natural landscape and historical culture, geographical environment and site conditions, ecological conditions of the tea mountains and plantations, tea processing technology in the region, economic benefits and spill-over effects, social influence or popularity, with an effort to guide the development of ecologically sound tea mountains and plantations.

B. Efforts were made to monitor the ecological environment of the tea plantations and establish observation points of tea plantation ecosystem. Anxi adopted scientific methods to improve soil of over 20,000 *mu* (1333 ha) per year to promote the development of ecologically sound and circular agriculture.

C. Anxi supported the development of environment friendly tea bases such as organic tea bases. In 2015, Anxi County was recognized as the first batch of national organic product certification and demonstration area. At present, the county has 31,090 *mu* (2073 ha) of certified area of Green Food tea and 11,319 *mu* of certified area of organic tea.

D. Anxi surveyed and checked the rare earth content in soil and fertilizers of tea plantations, removed from shelves 21 fertilizers (with rare earth content exceeding 150 ppm), and completely banned the sales and use of such fertilizers in the county.

E. Anxi tried to replace chemical fertilizers with organic manures and introduced technical models featuring Organic Fertilizer + Formula Fertilizer, Tea + Biogas + Livestock, Organic Fertilizer + Fertigation and Green Manure + Acidification Improvement in a site-specific manner and established 36 monitoring points for effect tracking and monitoring.

3.4 Various measures taken to protect and inherit traditional knowledge and technology

A. Anxi opened vocational and technical schools of tea industry, provided knowledge and skill trainings for specialized cooperatives and promoted the inheritance and innovation of tea making skills and technologies and tea culture.

B. Since 2017, Anxi has been organizing Anxi *Tieguanyin* Masters Competition every year to select famous tea makers, support the development of famous tea makers' workshops, and encourage the development of private tea culture inheritance and exhibition halls.

C. Anxi pooled the efforts of the whole County and raised 540 million *yuan* from the public to build the Tea Department of the Fujian Agriculture and Forestry University, which is the only undergraduate college involving the whole tea industrial chain in China, turning out talents with practical and composite skills for the tea industry. In addition, Anxi collaborated with the Chinese Academy of Sciences, the Chinese Academy of Agricultural Sciences, the Fujian Agriculture and Forestry University, etc. To carry out research on agricultural heritage protection mechanism, tea biodiversity protection, value of the tea ecosystem service function and its improvement to enhance the science and technology support capacity.

D. Anxi established the female-based training institute in China's tea industry: the Female Tea Master Training Institute to promote women's participation in the protection and inheritance of *Tieguanyin* tea culture. The institute recruits the wealth-made and promising women to participate in training courses in Anxi for improving their technical level of tea plant and production. It also helps technology promotion and development of the tea industry by holding tea garden management competition, tea-making competition, and tea culture innovation and creativity competition. It invited well-known tea experts, tea scientists and tea entrepreneurs at home and abroad to give lectures on tea culture, tea industry and tea technology so as to inherit the tea culture system in an easy and acceptable way.

3.5 Vigorous tea brand building

Anxi *Tieguanyin* has greatly raised its brand influence through vigorous promotional activities, which is mainly reflected in the following aspects:

A. Anxi *Tieguanyin* Tea culture system was promoted through various ways. Anxi published more than 100 books on the tea culture system such as the China *Tieguanyin* and produced over 50 singing and dancing performances, such as Tea Fragrance, Silk and Tea and Tea and Butterflies.

B. Tea culture exhibition activities were organized through the China Tea Capital Exhibition Hall in Anxi County and the Sanhe Tea Museum, etc.

C. Anxi organized a variety of tea events to promote the brand, facilitated tea enterprises to participate in the China-France Cultural Forum, China International Tea Expo and other activities, and created high-end brands such as Master Tea, Manor Tea, Tailor-made Tea and Famous Mountain Tea, etc.

D. Anxi promoted Anxi *Tieguanyin* to be used as national gifts and teas for national guests for the BRICS Summit in Xiamen, the Qingdao Summit of the Shanghai Cooperation Organization and leadership meetings between China and the UK, India and DPRK, to build international reputation.

E. Anxi *Tieguanyin* was successfully included in the China-Europe 100+100, a list of geographical indication products of mutual recognition and mutual protection and Anxi *Tieguanyin* has completed international trademark registration in 46 countries and regions such as the European Union, Russia and Japan.

F. Anxi *Tieguanyin* was recognized as China's top 10 public tea regional brands in 2017 and won the first place in terms of national tea regional brand value for four consecutive years (brand value was 142.543 billion yuan in 2019).

3.6 Moderate-scale tea plantation operation promoted to reduce businessrisks

Given the small scale and high risk of *Tieguanyin* Tea plantation operation in Anxi, Anxi County has taken various measures to promote moderate-scale operation of tea plantation. The measures mainly include the following:

A. Anxi has vigorously promoted the model of tea cooperatives such as Juyuan, Qingyun and Defeng and operated 1-2 cooperatives in each major tea producing township to make cooperatives the basic units of modern industrial organization.

B. Anxi encouraged large-scale operation and chose 1-2 villages and towns to pilot the operation of tea plantations.

C. Anxi pooled funds to support agriculture with focus on leading enterprises to build self-control bases or agreement bases. Efforts has been made to build a community of shared interests in producing areas featuring Leading Enterprises + Cooperatives + Bases + Tea Farmers and to promote the transformation of smallholder operation towards organized, large-scale and intensive management.

D. Anxi has established a tea planting insurance scheme. The County government invests more than 2 million yuan per year in tea plantation insurance to effectively improve the resilience of tea farmers to natural disasters.

E. Anxi has leveraged the financial function and role of land use right and granted farmers more property rights. Evaluated tea plantations can be used to apply bank loans.

4 ACTION PLAN FOR THE PROPOSED GIAHS SITE

4.1 Threatsand challenges

4.1.1 Soil erosion in some areas

In recent years, with the rising influence of Anxi *7jeguanyjn* brand and the expansion of its market, the enthusiasm of tea planting has been boosted. As some sloping fields in the heritage site were reclaimed into tea plantations, soil stability was destroyed and water holding capacity decreased. Projects for soil and water conservation and slope protection were not well implemented, soil erosion occurred to varying degrees in some areas during the rainy season (Hua and Chen, 2017), and even led to geological disasters such as landslides and mudslides.

4.1.2 Imbalanced soil nutrients and declining soil quality and function in some conventional tea plantations

Long term over fertilization and cultivation led to soil nutrient imbalance in some conventional tea plantations. In particular, the excessive application of nitrogen, phosphorus and potassium in agricultural production resulted in the imbalance of macro and micro nutrients in the soil of tea plantations, constraining the growth of tea trees

and the improvement of output and quality of tea leaves. At the same time, excessive application of fertilizers resulted in soil acidity of tea plantations, undermining soil quality and functions.

4.1.3 Small scale and not well organized operation and weak bargaining power of tea growers

More than 90% of tea plantations in Anxi County are still managed by scattered individual households. The average household in the county manages less than 3 *mu* (0.2 ha) of tea plantations, and the average size of tea plantations managed by individual households in the core zone is less than 4 *mu*. This results in fragmented management of tea plantations, constrains standardized production of tea and the promotion and extension of advanced technologies, and weakened the ability to withstand market risks. There are now more than 700 tea enterprises in Anxi, with limited spill-over effects. There are more than 1,000 specialized tea cooperatives in the county, which are generally not competitive and their ability to organize tea farmers in standardized production, scientific management and specialized services needs to be further improved.

4.1.4 The outflow of young laborers has left no successors to the knowledge and technology of traditional tea planting and preparation

Planted on terraced hillsides, *Tieguanyin*'s planting (such as cutting, seedling, transplanting, pruning, fertilization, etc.) is labor-intensive. Rural young laborers are reluctant to engage in the drudgery. According to survey, young people under the age of 35 in rural areas are generally incapable of tea planting and prefer to choose more decent jobs, such as tea selling or working in cities. Laborers above the age of 50 more often carry out jobs that require a lot of manual labor, such as tea planting, tea plantation management and primary tea production; even seniors above the age of 70 are planting and managing tea trees. The loss of young laborers has left no successors to the traditional knowledge and technologies that need to be continuously studied and honed in long-term practice (such as tea plantation site selection, tea tree cultivation, pruning, fertilization, pest control, ecological tea plantation development, particularly the initial preparation of *Tieguanyin*). In recent years, with surplus of *Tieguanyin* production,

sluggish industrial development and low profit of tea planting, many middle-aged people are unwilling to engage in the business. So the status quo in the heritage site is that young people are incapable of tea growing and the middle-aged are unwilling to grow teas. Anxi tea plantation and tea production face the threat of unsustainability.

4.1.5 High production cost, higher price and limited potential for market competition of Anxi Tieguanyin Tea

Operations from planting, picking to tea preparation involve less machine but more manual work. In particular, *Tieguanyin*, an oolong, has fairly complicated production processes and requires more labor costs per unit weight of finished tea. As labor costs rise, the price per unit weight of Anxi *Tieguanyin* Tea is higher than other teas in the market.

According to survey, the average management cost of tea plantation in Anxi County is 3,500-4,000 yuan/mu, the average cost of initial tea preparation is about 40 yuan/kg, and the tea production cost is 70-80 yuan/kg, accounting for 70-80% of the sales revenue. At present, rising uncertainties in the tea market render accelerated fluctuation of tea price. The selling price of semi-finished tea is generally 40- 100 yuan/kg, and the business risk for tea farmers is high. In addition, *Tieguanyin's* brewing and drinking methods are complicated, the amount of tea required for a single brewing and drinking is more than that of other teas, and the cost of tea drinking is higher. Therefore, the elasticity of demand price of conventional *Tieguanyin* Tea on the ordinary consumption market is little and the potential for market competition is limited.

4.1.6 Frequent extreme weather events with big impact on the tea industry

The production of *Tieguanyin* in Anxi is greatly affected by weather, and the tea picking season is short. The process from picking to making unfinished tea needs to be completed within one day. If it rains during the tea picking season, the quality of fresh leaves will decline. Anxi County has a flood season from April to October every year, of which May to June is the plum rains season and July to September is the main flood season, when typhoons hit in a concentrated manner; 3-5 tropical cyclones generally land or affect Anxi directly. In recent years, extreme weather has gradually emerged

(Tab. 12), such as extreme low or high temperature, drought, super typhoon, local short-term strong thunderstorms, and is showing a trend of gradual intensification. Anxi tea plantation has relatively weak infrastructure and poor water and fertilizer conservation capacity. Extreme weather events exert a big impact, causing disaster or reducing output and the risk to tea growers is increasing.

Tab.12 Extreme weather conditions in Anxi since 2000

| Date | Type | Disaster impact |
|---------------------|------------------|--|
| July 2001 | Typhoon | Affected by the periphery of Typhoon Utor No.4, heavy rain (91.2 mm on 6 July) hit the County and triggered floods in mountain areas. |
| February-March 2002 | Drought | Severe drought for 46 consecutive days |
| 5-8 August 2002 | Typhoon | Affected by Severe Tropical Storm Kammuri and the northward lifting of Intertropical Convergence Zone (ITCZ), there were 3 days of continuous torrential rain across the County, resulting in serious floods and waterlogging. |
| August 2004 | Typhoon | Affected by Typhoon Aere No. 18, Gande town was hit by strong winds and torrential rain, and 10 villages in the town were flooded. |
| July 2006 | Typhoon | Anxi County was continuously affected by Typhoon Bilis No.4 and Typhoon Kaemi No.5, resulting in continuous torrential rain; Daping village had a rainfall of 1269 mm, causing the worst flood in a thousand years. |
| July-August 2007 | High temperature | Anxi County has experienced 21 consecutive days of high temperature and 29 consecutive days of severe weather with temperature above 35°C . Rainfall dropped severely and drought worsened, affecting crop growth significantly. |

4.1.7 The awareness of the concept, connotation, value and significance of protection of the China/globally important agricultural heritage sites to be improved

Anxi *Tieguanyin* Tea culture system was listed as the second batch of China's important agricultural heritage by the Ministry of Agriculture of China (now the

Ministry of Agriculture and Rural Affairs) in 2014. However, according to field interviews and questionnaires, part of people do not know that Anxi *Tieguanyin* Tea culture system is an important agricultural heritage in China, and the officials of competent departments are not clear about the concept, connotation and protection requirements of China's/globally important agricultural heritage sites. Because of this, some development policies and measures of tea industries run counter to the requirements of heritage protection. Therefore, the low awareness of China's/globally important agricultural heritage sites is a major challenge for the protection and development of Anxi *Tieguanyin* Tea culture system.

4.2 Actionsto betaken

In view of the current threats and challenges facing the *Tieguanyin* Tea culture system in Anxi, five comprehensive action plans, four actions of ecological protection of tea plantations, four actions of traditional culture protection, three actions of agricultural landscape protection, three actions of the development of ecological agricultural products, four actions of ecotourism development and six actions of capacity-building have been developed.

4.2.1 Comprehensive action plans

(1) Design and use LOGO of important agricultural heritage of Anxi *Tieguanyin*

Tea culture system

Action plan: Call LOGO of Anxi *Tieguanyin* Tea culture system that is meaningful, highly distinguishable, strongly symbolic, artistically appealing from the people of the whole country, so as to enhance the popularity of Anxi *Tieguanyin* Tea culture system, promote the development of tea industry and the protection of tea plantation ecology and related culture.

Time and place of implementation: 2019-2020, heritage site

Target: People across the county know the brand of Anxi *Tieguanyin* Tea agricultural heritage

Participants: Anxi County Bureau of Agriculture and Rural Affairs and Agricultural Zoning Committee Office

Budget fund: 300,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(2) Vigorously promote GIAHS protection

Action plan: Promote the knowledge of GIAHS and the significance to protect Anxi *Tieguanyin* Tea culture system through television, portals, self-media social softwares (wechat, microblog, Tik Tok, etc.) And print media (billboards, posters, etc.), so as to improve the public awareness and willingness to protect GIAHS, as well as the enthusiasm and sense of ownership of all sectors of society for GIAHS protection.

Time and place of implementation: 2019-2024, heritage sites, TV stations at all levels and Internet

Target: 95% of people in heritage sites have knowledge of GIAHS.

Participants: Publicity Department of Anxi County Committee of the Communist Party of China, Culture, Sports and Tourism Bureau of Anxi County, Bureau of Agriculture and Rural Affairs

Budget fund: 500,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(3) Continue with the Anxi Tieguanyin Tea Masters Competition and improve the competition system

Action plan: In accordance with the principles and objectives of GIAHS protection and on the basis of the current selection criteria of Anxi *Tieguanyin* Tea Masters Competition, Anxi will continue improving the evaluation index to cover all key links from tea planting to tea refining, so as to drive the whole society to care about and carry forward heritage protection.

Time and place of implementation: 2019-2024, heritage site

Target: Encourage workers involved in the tea industry to study traditional tea production and processing technologies, and to lead young and middle-aged people to learn, inherit knowledge and technology of tea planting, production and tea culture.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Press and Publication Bureau, Organization Department of The County Party Committee, Tea Management Council, Anxi College of Tea Science, Fujian Agriculture and Forestry University

Budget fund: 3,000,000 *yuan* RMB per year

Source of funds: Anxi County's annual budget funds

(4) Strengthen the training of farmers on traditional tea planting techniques

Action plan: Develop and print the Manual on *Tieguanyin* Planting and Management and distribute it to tea farmers in the heritage site. Implement the 10,000 people training program to train over 20,000 person/times of tea farmers and merchants each year.

Time and place of implementation: 2019-2024, heritage site

Target: 80% of tea farmers master traditional planting and management techniques of *Tieguanyin*

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Tea Management Council, Towns affiliated to Anxi County, Lutian Town, Xiping Town, and Huqiu Town

Budget fund: 1,000,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(5) Strengthen exchanges among agricultural heritage sites on protection and development

Action plan: Actively participate in the National Symposium on Agricultural Heritage of the China Association of Agricultural Science Societies, China's Globally Important Agricultural Heritage Work Exchange Meeting, Regional Symposium on Agricultural Heritage in East Asia; organize heritage managers, enterprises, farmers to similar agricultural heritage sites to exchange experience in protection and development.

Time and place of implementation: 2019-2024, heritage site

Target: Managers, representative enterprises and model farmers fully understand the protection elements of Anxi *Tieguanyin* Tea culture system and the main path of heritage protection and development.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Agricultural Zoning Committee Office, Association for the Development and Promotion of Tea Industry, tea enterprises, tea farmers in the Core Zone

Budget fund: 300,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

4.2.2 Tea plantation ecological protection

(1) Carry out survey and scientific research of Anxi ancient tea tree germplasm resources, and strengthen the protection of parent stocks of ancient tea trees

Action plan: Carry out a survey of tea tree germplasm resources across the County, record ancient tea trees above 100 years of age and protect them by tagging, and specify the responsible person, roles and rights; set up postdoctoral work stations, launch the scientific research plan of *Tieguanyin* Germplasm Resources DNA Fingerprint Database and developed a 500 mu conservation garden and breeding base of parental stocks of *Tieguanyin* (with red heart and crooked tail).

Time and place of implementation: 2019-2020, heritage site

Target: The distribution of ancient tea germplasm resources is clear, and the ancient tea germplasm resources over 100 years are tagged for protection.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Tea Science Research Institute, relevant enterprises and farmers, Lutian Town, Xiping Town, and Huqiu Town

Budget fund: 500,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(2) Implement tea plantation ecological development project

Action plan: Plant trees in the mountain area above tea plantations; green up the open spaces, mountain valleys and roadsides around tea plantations, increase the

vegetation of tea mountains and optimize the ecology of tea plantations; keep grass on the terraced wall, remove weed from the terraced wall and incorporate them back to spaces between rows and keep the terraced wall covered with green grass all year round.

Time and place of implementation: 2019-2024, heritage site

Target: Over 80% of tea plantations realize ecological protection and basically address the problem of soil erosion.

Participants: Anxi County Forestry Bureau, Bureau of Agriculture, Rural Affairs and Agricultural Zoning Committee Office, Soil and Water Conservation Office, Bureau of Ecological Environment, Towns affiliated to Anxi County, Lutian Town, Xiping Town, and Huqiu Town

Budget fund: 15,000,000 *yuan* RMB per year

Source of funds: Special fund from Anxi County fiscal budget

(3) Extend traditional ecological tea planting methods to improve the stability of tea plantation ecosystem

Action plan: Realize the comprehensive management of nutrient resources by planting green manure and adopting formula fertilization; appropriately plan the planting density of tea trees and improve the use efficiency of nutrients in deep soil; encourage the use of traditional methods such as pepper spray, plant ash, lime water, culling, removal of diseased branches, bait trapping or killing to control pests and diseases; plant leguminous trees in tea plantations to attract pests with blooms and reduce the impact of pests on tea trees.

Time and place of implementation: 2019-2024, heritage site

Target: Organic matter in the soil of tea plantation is obviously improved and soil fertility effectively improved.

Participants: Anxi County Bureau of Agriculture and Rural Affairs and Anxi County Tea Science Research Institute, Tea enterprises, Farmers, Lutian Town, Xiping Town, and Huqiu Town

Budget fund: 10,000,000 *yuan* RMB per year

Source of funds: Special fund from Anxi County and superior departments' fiscal budget

(4) Expand the area of green and organic certification in tea plantations

Action plan: Develop and apply special organic fertilizer for tea plantations and implement the plan to replace chemical fertilizer with organic fertilizer; promote green and organic tea certification according to Chinese and international green and organic certification standards.

Time and place of implementation: 2019-2024, heritage site

Target: Over half of the tea plantations in GIAHS Core Zone be certified green or organic.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Tea Science Research Institute, relevant enterprises and farmers in the Core Zone

Budget fund: 250,000 *yuan* RMB per year

Source of funds: Self-raised funds of enterprise and special fund from Anxi County fiscal budget

4.2.3 Protection of traditional culture

(1) Carry out a survey of *Tieguanyin* Tea culture in Anxi and collate relevant data

Action Plan: Carry out a survey of cultural elements such as folklore, stories of famous persons, tea poems, tea couplets, tea-related customs and rituals, festival culture, ancient buildings and other cultural elements across the county, establish tea culture archives and prepare tea culture books.

Time and place of implementation: 2019-2020, heritage site, around the county

Participants: Anxi County Culture, Sports and Tourism Bureau and Culture Center, The Federation of Literary and Art Circles

Targets: Tea-related cultural elements in Anxi County is systematically sorted out and compiled into books.

Budget fund: 250,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(2) *Tieguanyin* Literary Prize

Action plan: *Tieguanyin* Literary Prize, biennially

Time and place of implementation: 2019~2024, the central city of Anxi County

Participants: The Federation of Literary and Art Circles, Anxi people

Targets: To further explore and broadcast the culture of Tieguanyin tea, to cultivate a “tea party” within Chinese writers.

Budget fund: 250,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(3) Encourage the establishment of tea culture institutes and exhibition halls by the private sector

Action plan: Based on the current model of Anxi County folk tea culture institute, Anxi will further support tea masters to establish tea culture institutes by granting them more responsibilities and obligations of traditional culture inheritance.

Time and place of implementation: 2019-2024, the Core Zone

Participants: Anxi County People's Government, Bureau of Agriculture and Rural Affairs, Culture, Sports and Tourism Bureau, Bureau of Human Resources and Social Security, Organization Department, Anxi County Party Committee, Lutian Town, Xiping Town, and Huqiu Town

Target: Number of students in the tea culture institutes doubles and the number of young people who understand traditional Anxi tea culture triples.

Budget fund: 500,000 *yuan* RMB per year

Sources of funds: Anxi County's annual budget funds, special fund for the protection and development of agricultural heritage

(4) Encourage private investment in the construction of public tea culture facilities

Action plan: Encourage the private sector to build folk cultural buildings such as the Tea King Temple, Tea Promoter Temple and Tea Museum by streamlining land use approval procedures and preferential policies to promote traditional tea culture.

Time and place of implementation: 2019-2024, around the county

Participants: Anxi County Natural Resources Bureau, Culture, Sports and Tourism Bureau

Target: Traditional tea culture widely spreads among the people.

Source of funds: Private donations

(5) Communicate and spread the Anxi *Tieguanyin* Tea culture through various channels

Action plan: The government supports or organizes enterprises and farmers to participate in world expositions, national/international agricultural products expositions, tea expositions, tea culture exchanges and other activities, to communicate, showcase and promote Anxi tea culture.

Time and place of implementation: 2019-2024

Participants: Publicity Department of The County Party Committee, Tea Industry Association, Tea Management Council, Anxi County Bureau of Agriculture and Rural Affairs, Culture, Sports and Tourism Bureau, tea enterprises

Target: Anxi *Tieguanyin* Tea culture and its visibility be significantly enhanced in China and abroad.

Budget fund: 5,000,000 *yuan* RMB per year

Sources of funds: Anxi County's budget funds, financial aid from international agencies, and self-financing by enterprises

4.2.4 Agricultural landscape protection

(1) Continue to implement the ecological compensation mechanism to encourage returning tea for forests and grass

Action plan: Return tea for forests and grass for seriously eroded or recently claimed tea plantations, and provide ecological compensation of no less than 1000 *yuan*/mu.

Time and place of implementation: 2019-2024, the Core Zone

Participants: Anxi County Bureau of Agriculture and Rural Affairs and farmers in the Core Zone

Target: All tea plantations with serious soil erosion in Anxi County be returned for forests and grass.

Budget fund: 5,000,000 *yuan* RMB in the planning period

Source of funds: Anxi County's budget funds

(2) Introduce models of composite ecological landscapes

Action plan: Demonstrate and promote traditional models of composite ecological landscape across the County such as grass growing on terraced walls and terraced banks, tea-forest-fruit and tea-grass-fruit.

Time and place of implementation: 2019-2024

Participants: Anxi County Bureau of Agriculture and Rural Affairs and farmers

Target: Ecological tea plantation landscape accounts for 70% of the tea plantation landscape in the heritage site in the county.

Budget fund: 2,000,000 *yuan* RMB per year

Source of funds: Anxi County's budget funds, enterprise investment

(3) Strengthen the infrastructure construction of terraced tea plantations

Action plan: Through the insurance system for tea planting, reinforce the terraced wall of the ancient tea plantations, tea plantations on both sides of roads and tea plantations with unstable geological conditions in the County to improve their resilience to geological disaster risks triggered by extreme weather events.

Time and place of implementation: 2019-2024

Participants: Anxi County Bureau of Agriculture and Rural Affairs and farmers in the Core Zone

Target: Probability of landslide and collapse of tea plantations in the heritage site during extreme weather events will be reduced by 60%.

Budget fund: 2,000,000 *yuan* RMB per year

Source of funds: Anxi County's budget funds

4.2.5 Development of ecological agricultural products

(1) Develop *Tieguanyin* Tea deep processing

Main elements: Strengthen the deep processing and secondary processing of *Tieguanyin* Tea in the heritage site, study the application of *Tieguanyin* Tea extract in

food, daily necessities, cosmetics and health products, develop series of products, extend the industrial chain and improve the added value of *Tieguanyin*.

Time and place of implementation: 2019-2024, the central city of Anxi County, and the Core Zone

Target: Establish a long-term and stable cooperative relationship with universities, scientific research institutions and related leading enterprises, to double the diversity of processed *Tieguanyin* Tea products and to significantly increase the added value.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Science and Technology Bureau, Bureau of Industry, Information Technology and Commerce, relevant township governments, leading enterprises and scientific research institutions

Budget fund: 3,000,000 *yuan* RMB per year

Sources of funds: Anxi County special project funds and business investment

(2) Deep processing and brand-building of system-related agricultural products

Main elements: Strengthen the research and development of deep processing products of potato, citrus and persimmon in the heritage site, develop a series of special foods and non-staple foods such as Hutou rice noodles and Guanqiao dried beancurd, and improve the added value of agricultural products.

Time and place of implementation: 2019-2024, the central city of Anxi County and the Core Zone

Target: Increase the diversity of deep processing agricultural products by 50%, and significantly increase the added value.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, relevant township governments and leading enterprises

Budget fund: 2,000,000 *yuan* RMB per year

Sources of funds: Anxi County special project funds and business investment

(3) Expand the sales channels of *Tieguanyin* and related processed products in the heritage site

Main elements: Intensify efforts to promote and sell *Tieguanyin* Tea and related deep processing products in the heritage site, and expand the off-line sales network;

develop on-line sales platform APP and build traceability systems for organic, green tea and tea products in APP to ensure quality and price.

Time and place of implementation: 2019-2020, the central city of Anxi County and the Core Zone

Target: A stable on-line and off-line sales network of *Tieguanyin* Tea and related products will take shape, product sales channels and sales volume will increase steadily.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Supply and Marketing Cooperatives, relevant villages and tea enterprises

Budget fund: 300,000 *yuan* RMB per year

Sources of funds: Fiscal budget and private enterprise investment

4.2.6 Eco-tourism development

(1) Develop tourism routes of *Tieguanyin* Tea agricultural heritage

Main elements: Introduce and leverage private capital to appropriately develop tourism resources of agricultural heritage of *Tieguanyin* Tea culture system in Anxi, Fujian, and plan and develop tourism routes related to the heritage site; compile manuals of site introduction to introduce projects of sustainable tourism of the heritage site.

Time and place of implementation: 2019-2020, around Anxi county

Target: Introduce private capital to plan and develop 1-2 special tourism lines; complete a set of systematic site introduction manuals.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Culture, Sports and Tourism Bureau, relevant scientific research institutes and relevant enterprises

Budget fund: 1,000,000 *yuan* RMB per year

Source of funds: Special fund from Anxi County fiscal budget and private enterprise investment

(2) Develop various forms of eco-tourism with tea manor as the mainstay

Main elements: Build tea manors in the core villages of the heritage site and develop leisure eco-tourism; promote participatory tourism projects such as tea picking and making, and sell related tea products; cooperate with relevant travel agencies to

develop short-to medium-term and long-term *Tieguanyin* Tea culture tourism lines according to the needs of different groups of tourists and promote the tourism lines to the public.

Time and place of implementation: 2019-2024, the Core Zone

Target: The tea manors eco-tourism model of the heritage site will basically take shape; the tea tourism will develop rapidly and become an engine of growth of economy.

Participants: Anxi County Culture, Sports and Tourism Bureau, Bureau of Agriculture and Rural Affairs, relevant towns, villages and travel agencies

Budget fund: 2,000,000 *yuan* RMB per year

Source of funds: Private enterprise investment, Anxi County rural development fund

(3) Build education and research centers and organize study tours of Anxi *Tieguanyin* Tea culture system regularly

Main elements: Organize research activities of *Tieguanyin* Tea culture system in Anxi, Fujian for primary and secondary schools, universities and scientific research institutions, build research bases and cooperation centers, recruit college students to participate in volunteer protection activities, organize knowledge lectures, outdoor activities, participatory projects, etc., and strengthen the inheritance and protection of *Tieguanyin* Tea culture system in Anxi.

Time and place of implementation: 2019-2024, the Core Zone

Target: The education and research base and the cooperation center in the heritage site will operate in an orderly manner, and the research and study activities of *Tieguanyin* Tea culture in Anxi will become an important form of tea professional training.

Participants: Anxi County Bureau of Agriculture and Rural Affairs, Culture, Sports and Tourism Bureau, Education Bureau, relevant towns, villages, research institutes, teachers and students of primary and secondary schools in Anxi County

Budget fund: 300,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

(4) Develop tourism souvenirs of Anxi *Tieguanyin* Tea culture system

Main elements: Explore the traditional cultural connotation and agricultural landscape of *Tieguanyin* Tea culture system, combine it with the current market consumption trends and habits and develop tourism souvenirs of Anxi *Tieguanyin* Tea culture system, such as clothing, tea sets, stationery, special foods, tourism souvenir books; open tourist souvenir shops at the heritage site.

Time and place of implementation: 2019-2024, the Core Zone

Target: Tourism souvenirs of Anxi *Tieguanyin* Tea culture system will become an important business format of Anxi tourism

Participants: Anxi County Bureau of Agriculture and Rural Affairs and related enterprises

Source of funds: Private enterprise investment

4.2.7 Capacity building

(1) Offer special lectures on agricultural heritage to heritage managers

Action plan: Organize conferences on agricultural heritage protection and management at least twice a year for relevant departments of the County with the participation of county leadership to improve administrators' awareness and ability to manage agricultural heritage.

Time and place of implementation: 2019-2024, heritage site

Participants: Leaders of Anxi County People's Government and leaders of relevant departments, Leaders of Lutian Town, Xiping Town, and Huqiu Town

Target: Managers could basically master the main methods and measures of the connotation of agricultural heritage and their protection and development.

Budget fund: 250,000 *yuan* RMB per year

Source of funds: Special fund for the protection of agricultural heritage

(2) Invite agricultural heritage experts to provide training courses for enterprises and farmers

Action plan: Offer 2-3 training courses on agricultural heritage protection and industrial development for enterprises and farmers every year to provide guidance on heritage protection and the development of new products on the basis of resources in the heritage site.

Time and place of implementation: 2019-2024, the Core Zone

Participants: Tea enterprise managers and tea farmers in the Core Zone

Target: Obviously improve the awareness of enterprises and farmers on the protection and development of agricultural heritage.

Budget fund: 50,000 *yuan* RMB per year

Source of funds: Special fund for the protection of agricultural heritage

(3) Compile popular science books on *Tieguanyin* Tea culture system in Anxi,

Fujian Province

Action plan: Compile and publish a series of books on China's important agricultural heritage, the *Tieguanyin* Tea culture system in Anxi County, Fujian Province, and distribute them to managers and protectors of agricultural heritage to enhance their understanding of *Tieguanyin* Tea culture system in Anxi County.

Time and place of implementation: 2019-2024, the Core Zone

Participants: Tea enterprise managers and tea farmers in the Core Zone

Target: Heritage managers and enterprises have a systematic understanding of the agricultural heritage system.

Budget fund: 100,000 *yuan* RMB per year

Source of funds: Special fund for the protection of agricultural heritage

(4) Build a platform of cooperation among the industry, academia and the research institutes for the protection and use of agricultural heritage

Action plan: Cooperate with the Institute of Agricultural Economics and Development of the Chinese Academy of Agricultural Sciences, Fujian Agriculture and Forestry University, Fujian Normal University, etc. To build a platform for the research of the protection and use of heritage that integrates the industry, academia and the research institutes, and provide technical support for the protection of Anxi *Tieguanyin* Tea culture system and industrial development.

Time and place of implementation: 2019-2024, heritage site

Participants: Anxi County Bureau of Agriculture and Rural Affairs, relevant universities and research institutes

Target: Protectors of the Anxi *Tieguanyin* Tea culture system can integrate the protection and appropriate use of heritage and enhance the effect of heritage protection and significantly increase the added value of the industry.

Budget fund: 200,000 *yuan* RMB per year

Source of funds: Special fund for the protection and development of agricultural heritage

4.3 Safeguards

4.3.1 Organizational guarantee

On the basis of the existing important agricultural heritage management institutions in Anxi, efforts will be made to improve the institutional setup, personnel structure and leadership organization for the application, protection and development of agricultural heritage.

A. On the basis of the existing GIAHS application leading group headed by the County mayor, a permanent GIAHS protection and development organization headed by the deputy County mayor will be established to be responsible for the organization, leadership and decision-making of major and urgent events related to GIAHS.

B. Expand the staffing of important agricultural heritage management institutions, increase the number of full-time heritage management personnel, and form a staff echelon combining the old, middle-aged and young to ensure the stability and sustainability of heritage management.

C. Township people's governments establish full-time posts for the protection and development of important agricultural heritage, and implement training, guidance, inspection and supervision related to heritage protection and management.

4.3.2 Institution guarantee

Establish and improve relevant systems for the protection and development of important agricultural heritage, and ensure that the protection and development of GIAHS is law-based and system-guaranteed. Development of the following systems will be strengthened:

A. According to FAO's GIAHS selection principle and protection requirements, on the basis of the current Interim Provisions on the Management of *Tieguanyin* Tea

Culture System in Anxi of Fujian Province as China's Important Agricultural Heritage, Anxi will issue Measures on the Management of *Tieguanyin* Tea Culture System in Anxi of Fujian Province as China's Important Agricultural Heritage.

B. On the basis of completing the call of LOGO for agricultural heritage of Anxi *Tieguanyin* Tea culture system, Anxi will issue detailed rules for the management of the use of LOGO of agricultural heritage of Anxi *Tieguanyin* Tea culture system to ensure the rights and interests of users.

C. Anxi will include the China's/global important agricultural heritages into the outline of Anxi County's 14th Five-Year Plan and set up a special fund for the protection and development of important agricultural heritage.

4.3.3 Multi-channel fund raising and guarantee

In order to successfully implement the plan of action for GIAHS protection and development of Anxi *Tieguanyin* Tea culture system, sufficient funds are needed. Efforts can be made to obtain financial support from international, national and local projects, set up private foundations and solicit private donations to provide financial guarantee for the protection of agricultural heritage. Specific measures are as follows:

A. Set up a special fund for the protection and development of Anxi *Tieguanyin* Tea culture system heritage, with an annual budget of 20 million yuan as the financial guarantee for the implementation of various protection action plans for Anxi *Tieguanyin* Tea culture system.

B. Actively apply for special fund support for Fujian provincial agricultural projects (such as Fujian comprehensive agricultural development and industrialized development project and provincial farm-garden complex) to support relevant protection and development action plans of Anxi *Tieguanyin* Tea culture system.

C. Actively apply for national agricultural and rural development projects (such as demonstration parks for integrated development of rural industries and pilot area for integrated development of primary, secondary and tertiary industries in rural areas), obtain relevant financial support and implement action plans of agricultural heritage protection related to the projects.

D. Apply for relevant projects of international organizations (such as the Global Environment Fund, the GIAHS Foundation, and the Food and Agriculture Organization of the United Nations) and seek international financial support.

E. Mobilize private resources and raise funds from enterprises and individuals to support the development of public welfare activities and projects of Anxi *Tieguanyin* Tea culture.

F. Apply for and build National Green Pest Control Demonstration County, promote governments at all levels to attach importance to green pest control, enhance the understanding of all sectors of society and farmers on the ecological and social benefits of green prevention and control, promote the establishment of a mechanism of High Price for High Quality agricultural products, and continuously and effectively promote green prevention and control.

4.3.4 Multi-stakeholder participation

Establish a mechanism for the participation of all stakeholders in the Anxi *Tieguanyin* Tea culture system, so as to allow governments, enterprises, communities, tea farmers, non-governmental organizations, scientific research institutions and other actors to participate in the protection and development of agricultural heritage, and to provide guarantee for the effective implementation of heritage protection actions.

A. Government level. China's Ministry of Agriculture and Rural Affairs is continuously improving the GIAHS management methods, striving to establish a national GIAHS protection fund and a GIAHS monitoring and evaluation system to promote GIAHS protection through a system. Provincial, municipal and county governments set up special agricultural heritage management departments and full-time personnel to implement relevant national GIAHS management measures, organize the application, protection, development, supervision and management of GIAHS, and provide special fund and policy support for special GIAHS projects.

B. Enterprise level. On the premise of complying with the GIAHS protection and management measures and relevant regulations, tap the potential of agricultural heritage resources, develop related products, carry out GIAHS brand promotion and marketing, boost the economic development of the heritage site, increase the income of tea farmers, and shape an enterprise+farmer model of sustainable development of tea culture system.

C. Community level. Community managers organize and coordinate the production and operation of residents, plan and develop the community collective economy, strive for interests on behalf of tea farmers from governments and enterprises,

explore a model of sustainable livelihood for farmers. Supervise and manage the production and operation of tea farmers, and implement the GIAHS protection and management measures and relevant regulations.

D. Farmer level. In accordance with the GIAHS protection and management measures, carry out tea production and operation activities, maintain the ecological landscape of tea plantations, carry forward the traditional knowledge and technology of tea cultivation and production and enjoy the benefits brought by agricultural heritage and related policy subsidies.

E. Civil society organizations. Tea associations and other non governmental organizations carry out relevant discussions and knowledge popularization of GIAHS, and train tea farmers in the heritage site on professional skills and modern information technology to enhance their ability of heritage protection. Scientific research institutions and universities participate in the research on economic, ecological, cultural and social aspects of agricultural heritage to provide technical support for agricultural heritage.

4.3.5 Monitoring and evaluation mechanism

In the past few years, the Ministry of Agriculture and Rural Affairs of China has established a dynamic monitoring system for GIAHS in China and organized members of the GIAHS expert committee to carry out monitoring and evaluation of GIAHS heritage sites. At the same time, commissioned scientific research institutions are exploring the quantitative monitoring and evaluation index system and evaluation method, which provides institutional mechanism guarantee and data platform and method support for the implementation of the action plan for the protection of Anxi *Tieguanyin* Tea culture system.

The protection and development action plan of Anxi *Tieguanyin* Tea culture system will also be monitored and evaluated according to the following framework:

A. According to the regulations of the Measures for the Management of Agricultural Heritage in Anxi *Tieguanyin* Tea Culture System, Anxi County Bureau of Agriculture and Rural Affairs monitors the ecology of tea plantations, infrastructure construction, tea farmers' production and management behaviors in real time.

B. During the implementation period of the action plan, evaluate the completion progress of the protection action plan at the end of each year, write a self-evaluation

report, and propose amendments and suggestions to the protection action plan in view of the actual problems;

C. Collect and enter the annual data of the dynamic monitoring system of the globally important agricultural heritage of the Ministry of Agriculture and Rural Affairs, and accept the inspection, monitoring and evaluation of the Ministry;

D. Accept on-the-spot monitoring and evaluation by the committee of experts organized by the Ministry of Agriculture and Rural Affairs from time to time, listen to the evaluation opinions of the committee of experts on agricultural heritage, and effectively implement the protection action plan.

4. Appendix

Annex 1 Tea Tree Dictionary of the System

| Family | Genus | Species |
|-----------|-------------|--|
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Tieguanyin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Benshan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangdan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Maoxie |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Daye Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Meizhan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Foshou |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xingrencha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fengyuanchun |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Anxi Baicha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Anxi Rougui |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Baiguanyin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Baimaohou |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Baiqilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Caicong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Chaotianshan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Chiye |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Chiye Qilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Dahong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Daping 1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Daping 2 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Daping Manzhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fuding Caicha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fuqian 1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fuqian 2 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fuqian Kucha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Heidan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Hejizi |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Honggu Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Hongying |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Houyezhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangjingcha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangqilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangmaohou |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jiandou 1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jiandou 2 |

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| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jiandou 3 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Cv. Jindan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinmian Guanyin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinmian Qilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jintian Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Kedan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Keshanzhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Keyin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Lantian Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Lizhi Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Manqilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Moxiang |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Mugua |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Penglai Kucha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qiyang Caicha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qizhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qigaixian |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qingxinha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qingxin Qilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qingxin Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qingxinzi |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qingmingcha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Ruanzhi Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Shaoqi |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Taoren |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xiping 1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xiping 2 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xiping Mudan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xiangzizhong |

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| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xianghua 1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xianghua 2 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xianghua 3 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xianghua Qizhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xiaoye Qilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Xueli |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Yinping Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Yuanye Huangdan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Yuanyezhong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zaoguan Yin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zaoqilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhili Benshan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhoumianji |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhuli Wulong |

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| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhuli Wulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Manwulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Baxiancha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Shuixian |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Mingke1 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Mingke2 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zimeigui |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangmeigui |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zimudan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Ziguan Yin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Huangguiguanyin |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinmeigui |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Ruixiang |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Chunlan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jiulongpao |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinxuan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Yuemingxiang |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Baiyaqilan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Hanmudan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fenghuangdanzong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Wuyirougui |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Dangu |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Cuiyu |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Taiwanqingxincha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Ruanzhiwulong |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhenong117 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zhenong139 |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Maolv |

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| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Leguan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Mingguan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Fudingdabaicha |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Zijuan |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Pingyangteza |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Ruicao |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Qiannianxue |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Nongkangzao |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinyaoshi |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Quqi |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Queshe |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jinfeng |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Jiutianbai |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Yusun |
| Theaceae. | Camellia L. | Camellia sinensis (L.) O. Kuntze cv. Anjibaicha |

Annex 2 Plant Directory of the System (Excluding Tea)

| Family | Genus | Species |
|-------------------|---------------------------|-------------------------------|
| Funariaceae. | Funaria | Funaria hygrometrica. |
| Mniaceae. | Plagiomnium. | Plagiomnium cuspidatum. |
| Hypnaceae | Brassica | Hypnum plumaeforme. |
| Sphagnaceae. | Sphagnum. | Herba Sphagni. |
| Rosaceae. | Carex L. | Scale leaf moss. |
| Bryaceae. | Rhodobryum. | Rhodobryum roseum. |
| Dicksoniaceae. | Cibotium. | Cibotium barometz. |
| Pottiaceae | Tortula Hedw | Tortula muralis |
| Pteridaceae. | Pteris L. | Pteris semipinnata. |
| Pteridaceae. | Pteris L. | Pteris multifida. |
| Pteridaceae. | Pteris L. | Pteris ensiformisburm. |
| Davalliaceae. | Nephrolepis. | Nephrolepiscordifolia L. |
| Davalliaceae. | Humata. | Humata tyermannii. |
| Lygodiaceae. | Lygodium Sw. | Lygodium japonicum T. |
| Drynariaceae. | Drynaria. | Drynaria fortune. |
| Thelypteridaceae. | Parathelypteris. | Parathelypteris glanduligera. |
| Selaginellaceae. | Selaginella. | Moellendorf's Spikemoss H. |
| Selaginellaceae. | Selaginella. | Selaginella uncinata. |
| Selaginellaceae. | Selaginella. | Selaginella kransiana. |
| Selaginellaceae. | Selaginella. | Selaginella doederleinii. |
| Selaginellaceae. | Selaginella. | Selaginella nipponica F. |
| Gleicheniaceae. | Hicriopteris. | Hicriopteris glauca. |
| Gleicheniaceae. | Hicriopteris. | Diplopterygium chinense. |
| Gleicheniaceae. | Dicranopteris Bernh. | Dicranopteris dichotoma. |
| Polypodiaceae. | Microsorium. | Microsorium fortunei T. |
| Polypodiaceae. | Pyrrhosia Mirbel. | Pyrrhosia lingua T. |
| Polypodiaceae. | Colysis C. Presl. | Colysis elliptica T. |
| Polypodiaceae. | Lepisorus (J. Sm.) Ching. | Lepisorus thunbergianus. |
| Aspleniaceae. | Asplenium. | Asplenium trichomanes L. |
| Adiantaceae. | Adiantum L. | Adiantum capillusveneris L. |
| Angiopteridaceae. | Angiopteris. | Angiopteris fokiensis H. |
| Dryopteridaceae . | Cyrtomium Presl. | Cyrtomium balansae C. |
| Blechnaceae. | Blechnum L. | Blechnum orientale L. |
| Lycopodiaceae. | Lycopodiastrium Holub. | Lycopodium casuarinoides. |
| Cycas revolute. | Cycas Linn. | Cycas revoluta Thunb. |
| Ginkgoaceae. | Ginkgo. | Ginkgo biloba L. |
| Combretaceae | Combretum | Combretum wallichii |
| Pinaceae. | Keteleeria. | Keteleeria fortunei. |
| Pinaceae. | Cryptomeria | Cryptomeria fortunei |
| Pinaceae. | Keteleeria. | Keteleeria cyclolepis Flous. |

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| Pinaceae. | Pinus Linn. | Pinus massoniana Lamb. |
| Pinaceae. | Pinus Linn. | Pinus taiwanensis Hayata. |
| Pinaceae. | Pinus Linn. | Pinus palustris Mill. |
| Pinaceae. | Pinus Linn. | Pinus taeda L. |
| Pinaceae. | Pinus Linn. | Pinus elliottii. |
| Pinaceae. | Pinus Linn. | Pinus pinaster Ait. |
| Podocarpaceae | Podocarpus | Podocarpus macrophyllus |
| Meliaceae | Toona | Toona sinensis |
| Meliaceae | Melia | Melia azedarach L. |
| Taxodiaceae. | Cryptomeria. | Cryptomeria fortune. |
| Taxodiaceae. | Taxodium. | Taxodium ascendens. |
| Taxodiaceae. | Cunninghamia. | Cunninghamia lanceolata. |
| Cupressaceae. | Cupressus. | Cupressus funebris Endl. |
| Cupressaceae. | Sabina. | Sabina chinensis. |
| Cupressaceae. | Juniperus | Juniperus formosana. |
| Cupressaceae. | Fokienia. | Fokienia hodginsii. |
| Cupressaceae. | Platyladus. | Platycladus orientalis. |
| Cephalotaxaceae. | Cephalotaxus | Cephalotaxus fortunei Hook. |
| Taxaceae. | Taxus Linn. | Taxus chinensis. |
| Taxaceae. | Taxus Linn. | Taxus mairei S. |
| Taxaceae. | Torreya Arn. | Torreya grandis. |
| Gnetaceae Lind L. | Gnetum L. | Gnetum parvifolium W. |
| Magnoliaceae. | Magnolia. | Magnolia officinalis R. |
| Magnoliaceae. | Magnolia. | Magnolia officinalis. |
| Magnoliaceae. | Magnolia. | Magnolia grandiflora L. |
| Magnoliaceae. | Magnolia. | Magnolia liliiflora Desr. |
| Magnoliaceae. | Magnolia. | Magnolia soulangeana S. |
| Magnoliaceae. | Tsoongiodendron Chun. | Michelia odora. |
| Magnoliaceae. | Michelia Linn. | Michelia velutina. |
| Magnoliaceae. | Michelia Linn. | Michelia figo. |
| Magnoliaceae. | Michelia Linn. | Michelia chapensis Dandy. |
| Magnoliaceae. | Michelia Linn. | Michelia fujianensis. |
| Magnoliaceae. | Michelia Linn. | Michelia maudiae Dunn. |
| Magnoliaceae. | Michelia Linn. | Manglietia fordiana. |
| Bombacaceae | Bombax | Bombax malabaricum |
| Magnoliaceae. | Illicium Linn. | Illicium verum Hook.f. |
| Magnoliaceae. | Illicium Linn. | Illicium henryi. |
| Magnoliaceae. | Illicium Linn. | Illicium lanceolatum. |
| Schisandraceae. | Schisandra Michx. | Kadsura longipedunculata Finet. |
| Annonaceae. | Fissistigma Griff. | Fissistigma uonicum. |
| Annonaceae. | Fissistigma Griff. | Fissistigma glaucescens. |
| Annonaceae. | Fissistigma Griff. | Fissistigma oldhamii. |
| Lauraceae. | Cinnamomum. | Cinnamomum japonicum Sieb. |
| Lauraceae. | Cinnamomum. | Cinnamomum camphora. |

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| Lauraceae. | Cinnamomum. | Cinnamomum burmanni. |
| Lauraceae. | Cinnamomum. | Cinnamomum subaveniummiq. |
| Lauraceae. | Cinnamomum. | Cinnamomum austrosinense. |
| Lauraceae. | Machilus. | Machilus thunbergii sieb. |
| Lauraceae. | Phoebe Nees. | Phoebe bournei. |
| Lauraceae. | Neolitsea Merr. | Neolitsea aurata. |
| Lauraceae. | Neolitsea Merr. | Neolitsea aurata. |
| Lauraceae. | Litsea. | Litsea cubeba. |
| Lauraceae. | Litsea. | Lisrea subcoriacea Yang. |
| Lauraceae. | Litsea. | Litsea greenmaniana. |
| Lauraceae. | Litsea. | Litsea elongata. |
| Lauraceae. | Lindera Thunb. | Lindera megaphylla Hemsl. |
| Lauraceae. | Lindera Thunb. | Lindera glauca. |
| Lauraceae. | Lindera Thunb. | Lindera angustifolia Cheng. |
| Lauraceae. | Lindera Thunb. | Lindera nacusua. |
| Lauraceae. | Lindera Thunb. | Lindera communishemsl. |
| Lauraceae. | Lindera Thunb. | Lindera aggregata. |
| Lauraceae. | Lindera Thunb. | Lindera megaphylla Hemsl. |
| Lauraceae. | Machilus | Machilus thunbergii |
| Rosaceae. | Spiraea. | Spiraea japonical. F. |
| Rosaceae. | Spiraea. | Spiraea prunifolia Sieb. |
| Rosaceae. | Rosa L. | Rosa laevigatamichx. |
| Rosaceae. | Rosa L. | Rosa chinensis Jacq. |
| Rosaceae. | Rubus L. | Rubus innominatus S . Moors. |
| Rosaceae. | Rubus L. | Rubus rosaefolius Smith. |
| Rosaceae. | Rubus L. | Rubus coreanus Miq. |
| Rosaceae. | Rubus L. | Rubus parvifolius L. |
| Rosaceae. | Rubus L. | Rubus columellaris Tutcher. |
| Rosaceae. | Rubus L. | Rubus corchorifolius L. |
| Rosaceae. | Rubus L. | Fructus Rubi. |
| Rosaceae. | Rubus L. | Rubus chroosepalus Focke. |
| Rosaceae. | Rubus L. | Rubus hanceanus Ktze. |
| Rosaceae. | Rubus L. | Rubus lambertianus. |
| Rosaceae. | Rubus L. | Rubus irenaeus. |
| Rosaceae. | Rubus L. | Rubus idaeus. |
| Rosaceae. | Rubus L. | Rubus buergeri Miq. |
| Rosaceae. | Cerasus. | Prunus phaeosticta maxim. |
| Rosaceae. | Cerasus. | Prunus spinulosa S. |
| Rosaceae. | Cerasus. | Cerasuspogonostyla (Maxim.) Yüetli. |
| Rosaceae. | Cerasus. | Prunus campanulata. |
| Rosaceae. | Prunus. | Prunus salicina Lindl. |
| Rosaceae. | Prunus. | Prunus Cerasifera Ehrhar Rehd. |
| Rosaceae. | Laurocerasus. | Laurocerasus zippeliana. |
| Rosaceae. | Armeniaca. | Armeniaca mume S. |

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| Rosaceae. | Photinia Lindl. | Photinia davidsoniae. |
| Rosaceae. | Amygdalus L. | Amygdalus persica L. |
| Rosaceae. | Photinia Lindl. | Photinia prunifolia L. |
| Rosaceae. | Photinia Lindl. | Photinia serrulata L. |
| Rosaceae. | Photinia Lindl. | Photinia glabra. |
| Rosaceae. | Photinia Lindl. | Photinia parvifolia S. |
| Rosaceae. | Eriobotrya Lindl. | Eriobotrya japonica L. |
| Rosaceae. | Rhaphiolepis. | Rhaphiolepis ferruginea M. |
| Rosaceae. | Rhaphiolepis. | Rhaphiolepis indica L. |
| Rosaceae. | Pygeum L. | Pygeum topengii . |
| Rosaceae. | Pyrus. | Pyrus serotina. |
| Rosaceae. | Pyrus. | Pyrus calleryana D. |
| Rosaceae. | Malus. | Malus hupehensis R. |
| Rosaceae. | Chimonanthus . | Chimonanthus praecox L. |
| Rosaceae. | Cydonia. | Cydonia oblonga. |
| Nyctaginaceae | Bougainvillea | Bougainvillea glabra |
| Leguminosae. | Cassia. | Senna surattensis. |
| Leguminosae | Erythrina | Erythrina variegata |
| Leguminosae. | Cassia. | Cassia obtusifolia. |
| Leguminosae. | Bauhinia. | Bauhinia championii. |
| Leguminosae. | Acacia Mill. | Acacia confuse. |
| Leguminosae | Acacia Mill. | Acacia confusa Merr. |
| Leguminosae. | Mimosa Linn. | Mimosa pudica Linn. |
| Leguminosae. | Albizia Durazz. | Albizia kalkora. |
| Leguminosae. | Crotalaria Linn. | Crotalaria pallida Ait. |
| Leguminosae. | Mucuna Adans. | Evergreen Mucuna. |
| Leguminosae. | Desmodium Desv. | Desmodium heterocarpon. |
| Leguminosae. | Desmodium Desv. | Desmodium racemosum Thunb. |
| Leguminosae. | Lespedeza Michx. | Lespedeza bicolor Turcz. |
| Leguminosae. | Lespedeza Michx. | Lespedeza ormosa. |
| Leguminosae. | Dalbergia Linn. | Dalbergiahancai Benth. |
| Leguminosae. | Dalbergia Linn. | Dalbergia hupeana Hance. |
| Leguminosae. | Pueraria. | Pueraria lobata. |
| Leguminosae. | Derris. | Derris fordii Oliv. |
| Leguminosae. | Millettia. | Millettia dielsiana Harms. |
| Leguminosae. | Vigna Savi. | Vigna unguiculata |
| Leguminosae. | Vigna Savi. | Vigna radiata. |
| Leguminosae. | Pisum. | Pisum sativum. |
| Leguminosae. | Pisum. | Pisum sativum L. |
| Leguminosae. | Vicia. | Vicia faba L |
| Leguminosae. | Vicia. | Vicia sepium Linn. |
| Leguminosae. | Glycine Willd. | Glycine max. |
| Leguminosae. | Glycine Willd. | Glycine max. |

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| Leguminosae. | Lablab. | Lablab purpureus. |
| Leguminosae. | Adenanthera. | Adenanthera pavonina. |
| Leguminosae. | Arachis. | Arachis duranensis. |
| Leguminosae. | Arachis. | Arachis hypogaea Linn. |
| Leguminosae. | Phaseolus L. | Phaseolus vulgaris L. |
| Leguminosae. | Astragalus. | Astragalussinicus. |
| Leguminosae. | Sophora | Sophora xanthantha |
| Papilionoideae. | Ormosia G. | Ormosia henryi Prain. |
| Symplocaceae. | Symplocos. | Symplocos sumuntia. |
| Symplocaceae. | Symplocos. | Symplocos tetragona Chen. |
| Symplocaceae. | Symplocos. | Symplocos setchuensis Brand. |
| Symplocaceae. | Symplocos. | Symplocos chinensis. |
| Symplocaceae. | Symplocos. | Symplocos paniculata (Thunb.) Miq. |
| Symplocaceae. | Symplocos. | Symplocos stellaris Brand. |
| Symplocaceae. | Symplocos. | Symplocos wikstroemiifolia Hayata. |
| Symplocaceae. | Symplocos. | Symplocos mollifolia Dunn. |
| Symplocaceae. | Symplocos. | Symplocos lancifolia Sieb. |
| Altingiaceae Lindl. | Semiliquidambar. | Emiliquidambar caudata Chang. |
| Altingiaceae Lindl. | Semiliquidambar. | Liquidambar formosana Hance. |
| Alangiaceae. | Alangium. | Alangium platanifolium Sieb. |
| Alangiaceae. | Alangium. | Alangium chinense. |
| Alangiaceae. | Alangium. | Alangium kurzii Craib |
| Araliaceae. | Aralia Linn. | Aralia spinifolia Merr. |
| Araliaceae. | Aralia Linn. | Aralia decaisneana Hance. |
| Araliaceae. | Aralia Linn. | Aralia dasyphylla Miq. |
| Araliaceae. | Schefflera. | Schefflera octophylla (Lour.) Harms. |
| Araliaceae. | Heteropanax Seem. | Heteropanax fragrans. |
| Caprifoliaceae. | Lonicera Linn. | Lonicera japonica Thunb. |
| Caprifoliaceae. | Lonicera Linn. | Lonicera hypoglauca Miq. |
| Caprifoliaceae. | Lonicera Linn. | Lonicera rhytidophylla. |
| Caprifoliaceae. | Viburnum Linn. | Viburnum sempervirens K. |
| Caprifoliaceae. | Viburnum Linn. | Viburnum erosum Thunb. |
| Caprifoliaceae. | Viburnum Linn. | Viburnum luzonicum Rolfe. |
| Caprifoliaceae. | Viburnum Linn. | Viburnum fordiae Hance. |
| Hamamelidaceae. | Loropetalum. | Loropetalum chinensis (R. Br.) Oliv. |
| Hamamelidaceae. | Loropetalum. | Loropetalum chinense. |
| Hamamelidaceae. | Altingia. | Altingia chinensis. |
| Hamamelidaceae. | Distylium Sieb. | Distylium myricoides Hemsl. |
| Platanaceae. | Platanus. | Platanus acerifolia Willd. |
| Myricaceae. | Myrica L. | Myrica rubra (Lour.) S. |

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| Betulaceae. | Betula. | Betula luminifera H. |
| Fagaceae. | Cyclobalanopsis Oerst. | Cyclobalanopsis glauca (Thunb.) Oerst. |
| Fagaceae. | Cyclobalanopsis Oerst. | Fagus longipetiolata. |
| Fagaceae. | Cyclobalanopsis Oerst. | Cyclobalanopsis gracilis Rehd. |

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| Fagaceae. | Cyclobalanopsis Oerst. | Cyclobalanopsis chungii Metc. |
| Fagaceae. | Cyclobalanopsis Oerst. | Cyclobalanopsis myrsinifolia (Blume) Oersted. |
| Fagaceae. | Castanea. | Castanea mollissima. |
| Fagaceae. | Castanea. | Castanea henryi (Skam) Rehd. |
| Fagaceae. | Castanopsis. | Castanopsis carlesii (Hemsl.) Hay. |
| Fagaceae. | Castanopsis. | Castanopsis sclerophylla (Lindl.) Schott. |
| Fagaceae. | Castanea. | Castanea seguinii Dode. |
| Fagaceae. | Castanopsis. | Castanopsis faberi Hance. |
| Fagaceae. | Castanopsis. | Castanopsis fordii Hanc. |
| Fagaceae. | Castanopsis. | Castanopsis kawakamii Hay. |
| Fagaceae. | Castanopsis. | Castanopsis eyrei (Champ.) Tutch. |
| Fagaceae. | Castanopsis. | Castanopsis megaphylla Hu. |
| Fagaceae. | Quercus. | Lithocarpus uvarifolius (Hance) Rehd. |
| Fagaceae. | Quercus. | Lithocarpus amygdalifolius (Skan) Hayata. |
| Fagaceae. | Quercus. | Lithocarpus oleaefolius A. |
| Fagaceae. | Quercus. | Lithocarpus glaber (Thunb.) Nakai. |
| Fagaceae. | Quercus. | Lithocarpus harlandii Rehd. |
| Fagaceae. | Quercus. | Quercus acutissima Carruth. |
| Fagaceae. | Quercus. | Quercus chenii Nakai. |
| Fagaceae. | Quercus. | Quercus phillyraeoides A.Gary. |
| Juglandaceae. | Platycarya. | Platycarya strobilacea Sieb. |
| Casuarinaceae. | Casuarina. | Casuarina glauca Sieber. |
| Ulmaceae. | Ulmus L. | Ulmus parvifolia Jacq. |
| Ulmaceae. | Trema Lour. | Trema angustifolia (Planch.) Bl. |
| Ulmaceae. | Trema Lour. | Trema cannabina Lour. |
| Ulmaceae. | Trema cannabina Lour. | Trema dielsiana Hand. |
| Ulmaceae. | Celtis L. | Celtis julianae Schneid. |
| Moraceae. | Morus Linn. | Morus alba L. |
| Moraceae. | Morus Linn. | Morus australis Poir. |
| Moraceae. | Broussonetia L. | Broussonetia papyrifera Linn. |
| Moraceae. | Broussonetia L. | Broussonetia kaempferi Sieb. |
| Moraceae. | A rtocarpus Forst. | A rtocarpus hypargyreus Hance. |
| Moraceae. | Ficus Linn. | Ficus concinna Miq. |
| Moraceae. | Ficus Linn. | Ficus microcarpa Linn. |
| Moraceae. | Ficus Linn. | Ficus erecta Thunb. |
| Moraceae. | Ficus Linn. | Ficus variolosa Lindl. |
| Moraceae. | Ficus Linn. | Ficus heteromorpha Hemsl. |
| Moraceae. | Ficus Linn. | Ficus hirta Vahl. |
| Moraceae. | Ficus Linn. | Ficus pumila Linn. |
| Moraceae. | Ficus Linn. | Ficus sarmentosa. |
| Moraceae. | Cudrania Trec. | Cudrania tricuspidata Carr. |
| Urticaceae. | Boehmeria. | Boehmeria nivea (L.) Gaudich. |
| Urticaceae. | Boehmeria. | Boehmeria gracilis C. |
| Urticaceae. | Oreocnide. | Oreocnide frutescenssp. Frutescens. |

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| Urticaceae. | Elatostema. | Elatostema umbellatum. |
| Urticaceae. | Pouzolzia. | Pouzolzia zeylanica. |
| Urticaceae. | Pilea Lindl. | Pileapumila. |
| Urticaceae. | Pilea Lindl. | Pilea sinofasciata. |
| Polygalaceae. | Polygala L. | P. fallax Hemsl. |
| Polygalaceae. | Polygala L. | Polygala fallax Hemsl. |
| Elaeocarpaceae. | Elaeocarpus. | Elaeocarpus decipiens Hemsl. |
| Elaeocarpaceae. | Sloanea Linn. | Sloanea sinensis. |
| Sterculiaceae. | Reevesia. | Reevesia pycnantha Linn. |
| Boraginaceae. | Cordia L. | Cordia dichotoma. |
| Boraginaceae. | Carmona. | Carmona microphylla. |
| Malvaceae. | Gossypium | Gossypium spp |
| Malvaceae. | Hibiscus Zhu. | Hibiscus syriacus Linn. |
| Malvaceae. | Urena Linn. | Urena procumbens Linn. |
| Malvaceae. | Urena Linn. | Urena lobata Linn. |
| Euphorbiaceae. | Manihot | Manihot esculenta Crantz |
| Euphorbiaceae. | Glochidion T. | Glochidion puberum L. |
| Euphorbiaceae. | Vernicia Lour. | Vernicia fordii. |
| Euphorbiaceae. | Mallotus Lour. | Mallotus repandus. |
| Euphorbiaceae. | Mallotus Lour. | Mallotus philippensis. |
| Euphorbiaceae. | Mallotus Lour. | Mallotus lianus Croiz. |
| Euphorbiaceae. | Euphorbia L. | Mallotus japonicas. |
| Euphorbiaceae. | Euphorbia L. | Endospermum chinense |
| Euphorbiaceae. | Euphorbia L. | Euphorbia hirta. |
| Euphorbiaceae. | Euphorbia L. | Euphorbia pulcherrima Willd. |
| Euphorbiaceae. | Sapium. | Sapium sebiferum (L.) Roxb. |
| Euphorbiaceae. | Sapium. | Sapium atrobadiomaculatum Metc. |
| Euphorbiaceae. | Bischofia | Bischofia polycarpa. |
| Euphorbiaceae. | Bischofia | Bischofia javanica |
| Euphorbiaceae. | Breynia. | Breynia fruticosa. |
| Euphorbiaceae. | Acalypha L. | Acalypha minima H. Keng. |
| Theaceae. | Camellia L. | C. octopetala Hu. |
| Theaceae. | Camellia L. | Camlligrijsii Hamce. |
| Theaceae. | Camellia L. | Camellia edithae Hance. |
| Theaceae. | Camellia L. | Camellia japonica L. |
| Theaceae. | Camellia L. | Camellia oleifera Abel. |
| Theaceae. | Tutcheria. | Tutcheria symplocifolia Merr. |
| Theaceae. | Adinandra. | Adinandra millettii Hook. |
| Theaceae. | Schima | Schima superba |
| Actinidiaceae. | Actinidia. | Actinidia lanceolata Dunn. |
| Actinidiaceae. | Actinidia. | Actinidia hemsleyana. |
| Ericaceae | Rhododendron L. | Rhododendron championiae Hook. |
| Ericaceae | Rhododendron L. | Rhododendron latoucheae Franch. |
| Ericaceae | Rhododendron L. | Rhododendron mariesii Hemsl. |

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| Ericaceae | Rhododendron L. | Rhododendron seniavinii Maxim. |
| Ericaceae | Lyonia Nutt. | Lyonia ovalifolia. |
| Vacciniaceae. | Vaccinium. | Vaccinium carlesii Dunn. |
| Vacciniaceae. | Vaccinium. | Vaccinium trichocladum Merr. |
| Guttiferae. | Hypericum Linn. | Hypericum japonicum. |
| Guttiferae. | Garcinia. | Garcinia oblongifolia Champ. |
| Myrtaceae. | Eucalyptus | Eucalyptus citriodora Hook. F. |
| Myrtaceae. | Melaleuca L. | Melaleuca leucadendron L. |
| Myrtaceae. | Rhodomyrtus. | Rhodomyrtus tomentosa. |
| Myrtaceae. | Syzygium. | Syzygium buxifolium Hook. |
| Myrtaceae. | Syzygium. | Syzygium austrosinense Chang. |
| Myrtaceae. | Psidium Linn. | Psidium guajava Linn. |
| Melastomataceae. | Melastoma L. | Melastoma dodecandrum Lour. |
| Melastomataceae. | Melastoma L. | Melastoma intermedium Dunn. |
| Melastomataceae. | Bredia. | Bredia sinensis. |
| Melastomataceae. | Phyllagathis Bl. | Phyllagathis fordii Hance. |
| Melastomataceae. | Blastus Lour. | Blastus apricus Hand. |
| Melastomataceae. | Blastus Lour. | Blastus cochinchinensis Lour. |
| Aquifoliaceae. | Ilex L. | Ilex chinensis Sims. |
| Aquifoliaceae. | Ilex L. | Ilex kwangtungensis Merr. |
| Aquifoliaceae. | Ilex L. | Ilex pedunculosa Miq. |
| Aquifoliaceae. | Ilex L. | Ilex formosana. |
| Aquifoliaceae. | Ilex L. | Ilex elmerrilliana S. |
| Aquifoliaceae. | Ilex L. | Ilex ficoidea Hemsl. |
| Aquifoliaceae. | Ilex L. | Chinese holly. |
| Aquifoliaceae. | Ilex L. | Ilex hylonoma Hu. |
| Celastraceae. | Euonymus. | Euonymus hederaceus Champ. |
| Celastraceae. | Celastrus L. | Celastrus gemmatus Loes. |
| Celastraceae. | Celastrus L. | Celastrus oblanceifolius Wang. |
| Celastraceae. | Celastrus L. | Celastrus paniculatus Willd. |
| Rhamnaceae. | Rhamnus L. | Rhamnus crenata Sieb. |
| Rhamnaceae. | Rhamnus L. | Rhamnus napalensis Wall. |
| Rhamnaceae. | Hovenia Thunb. | Hovenia acerba Lindl. |
| Vitaceae. | Vitis L . | Vitis chungii Metc. |
| Vitaceae. | Vitis L . | Vitis heyneana Roem. |
| Vitaceae. | Vitis L . | Vitis angustifolia Benth. |
| Vitaceae. | Vitis L . | Vitis vinifera. |
| Vitaceae. | Parthenocissus Planch. | Parthenocissus heterophylla (Bl.) Merr. |
| Vitaceae. | Parthenocissus Planch. | Parthenocissus laetevirens Rehd. |
| Vitaceae. | Ampelopsis Michx. | Ampelopsis brevipedunculata (Maxim.) Trautv. |
| Vitaceae. | Ampelopsis Michx. | Ampelopsis delavayana (Franch.) Planch. |
| Bignoniaceae | Pyrostegia | Pyrostegia venusta |
| Myrsinaceae. | Ardisia. | Ardisia japonica (Thunb) Blume. |
| Myrsinaceae. | Ardisia. | Ardisia quinquegona Bl. |

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| Myrsinaceae. | Maesa Forsk. | Maesa montana A. |
| Ebenaceae. | Diospyros Linn. | Diospyros cathayensis Steward. |
| Ebenaceae. | Diospyros Linn. | Diospyros rhombifolia Hemsl. |
| Ebenaceae. | Diospyros Linn. | Diospyros morrisiana Hance. |
| Ebenaceae. | Diospyros Linn. | Diospyros kakisilvestris. |
| Styracaceae. | Styrax Linn. | Styrax odoratissimus Champ. |
| Styracaceae. | Styrax Linn. | Styrax confuses. |
| Styracaceae. | Styrax Linn. | Styrax dasyanthus Perk. |
| Styracaceae. | Styrax Linn. | Styrax faberi. |
| Styracaceae. | Styrax Linn. | Styrax tonkinensis. |
| Styracaceae. | Styrax Linn. | Styrax suberifolius Hook. |
| Rutaceae. | Citrus L. | Medicinal Citron. |
| Rutaceae. | Randia. | Clausena excavate Burm. |
| Rutaceae. | Evodia J. | Evodia lepta Spreng. |
| Rutaceae. | Toddalia A. Juss. | Toddalia asiatica (L.) Lam. |
| Rutaceae. | Zanthoxylum. | Zanthoxylum armatum. |
| Rutaceae. | Zanthoxylum L. | Zanthorulum nitidum Roxb. |
| Rutaceae. | Poncirus Raf. | Fructusaurantii. |
| Rutaceae. | Citrus L. | Citrus sinensis Osbeck. |
| Rutaceae. | Citrus L. | Citrus reticulata. |
| Rutaceae. | Citrus L. | Citrus maxima. |
| Caesalpinioideae | Cercis | Cercis chinensis |
| Burseraceae. | Canarium. | Canarium album. |
| Oxalidaceae. | Oxalis. | Oxalis corniculata L. |
| Meliaceae. | Melia Linn. | Melia azedarach Linn. |
| Meliaceae. | Swietenia | Swietenia mahagoni |
| Sapindaceae. | Dimocarpus. | Dimocarpus longan. |
| Sapindaceae. | Litchi. | Litchi chinensis Sonn. |
| Sapindaceae. | Meliosma spp. | Meliosma rhoifolia Maxim. |
| Sapindaceae. | Meliosma spp. | Meliosma rigida. |
| Begoniaceae. | Begonia. | Cut-leaved Begonia. |
| Anacardiaceae | Rhus | Rhus chinensis Mill. |
| Anacardiaceae. | Mangifera L. | Mangifera indica L. |
| Aceraceae. | Acer Linn. | Acer palmatum Thunb. |
| Aceraceae. | Acer Linn. | Acer confertifolium Merr. |
| Aceraceae. | Acer Linn. | Acer oliverianum. |

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| Aceraceae. | Acer Linn. | Acer cordatum Pax. |
| Aceraceae. | Toxicodendron | Toxicodendron sylvestre Sieb. |
| Aceraceae. | Spondias L. | Spondias lakonensis Pierre. |
| Staphyleaceae. | Euscaphis Sieb. | Euscaphis japonica. |
| Buddlejaceae. | Buddleja Linn. | Buddleja lindleyana. |
| Oleaceae. | Laurus L. | Laurus nobilis. |
| Oleaceae. | Jasminum Linn. | Jasminum yunnanense Jien. |
| Oleaceae. | Ligustrum Linn. | Ligustrum lucidum. |

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| Oleaceae. | Ligustrum Linn. | Ligustrum sinense Lour. |
| Oleaceae. | Jasminum Linn. | Jasminum sambac (L.) Ait. |
| Apocynaceae. | Ecdysanthera. | Ecdysanthera rosea. |
| Apocynaceae. | Trachelospermum Lem. | Trachelospermum axillare. |
| Apocynaceae. | Trachelospermum Lem. | Trachelospermum jasminoides. |
| Apocynaceae. | Nerium. | Nerium indicum. |
| Rubiaceae. | Rubia Linn. | Galium bungei Steud. |
| Rubiaceae. | Galium Linn. | Galium aparine Linn. |
| Rubiaceae. | Adina Salisb. | Adina pilulifera. |
| Rubiaceae. | Uncaria Schreber. | Uncaria tomentosa. |
| Rubiaceae. | Mussaenda Linn. | Mussaenda esquirolli Levl. |
| Rubiaceae. | Psychotria Linn. | Psychotria rubra. |
| Rubiaceae. | Lasianthus. | Lasianthus wallichii. |
| Rubiaceae. | Paederia Linn. | Paederia scandens. |
| Rubiaceae. | Hedyotis Linn. | Hedyotis Chrysotricha. |
| Verbenaceae. | Vitex. | Vitex negundo Linn. |
| Verbenaceae. | Lantana montevidensis Briq. | Lantana camara L. |
| Verbenaceae. | Callicarpa L. | Callicarpa bodinieri Levl. |
| Verbenaceae. | Callicarpa L. | Callicarpa longissima |
| Verbenaceae. | Premna. | Premna microphylla. |
| Verbenaceae. | Vitex. | Vitex quinata. |
| Verbenaceae. | Clerodendrum. | Clerodendrum canescens. |
| Verbenaceae. | Clerodendrum. | Clerodendrum bungei. |
| Verbenaceae. | Clerodendrum. | Clerodendrum cyrtophyllum Turcz. |
| Verbenaceae. | Clerodendrum. | Clerodendrum japonicum. |
| Ranunculaceae. | Clematis L. | Clematis uncinata. |
| Ranunculaceae. | Clematis L. | Clematis armandii. |
| Ranunculaceae. | Coptis Salisb. | Coptis chinensis Franch. |
| Ranunculaceae. | Clematis L. | Clematis chinensis. |
| Ranunculaceae. | Ranunculus L. | Ranunculus japonicus Thunb. |
| Ranunculaceae. | Ranunculus L. | Ranunculus sceleratus L. |
| Droseraceae. | Drosera L. | Drosera. |
| Droseraceae. | Drosera L. | Drosera pelata. |
| Lardizabalaceae. | Akebia Decne. | Akebia quinata . |
| Lardizabalaceae. | Akebia Decne. | Akebia quinata. |

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| Menispermaceae. | Cocculus. | Cocculus orbiculatus. |
| Menispermaceae. | Stephania. | Stephania cepharantha. |
| Menispermaceae. | Stephania. | Stephania tetrandra. |
| Berberidaceae. | Mahonia Nuttall. | Mahonia fortunei. |
| Berberidaceae. | Epimedium Linn. | Epimedium brevicornu Maxim. |
| Polygonaceae. | Polygonum L. | Polygonum hydropiper. |
| Polygonaceae. | Polygonum L. | Polygonum maackianum Regel. |
| Polygonaceae. | Polygonum L. | Polygonum chinensis. |
| Polygonaceae. | Reynoutria Hoult. | Reynoutria japonica Hoult. |

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| Polygonaceae. | Fallopia Adans. | Fallopia multiflora. |
| Polygonaceae. | Polygonum L. | Polygonum perfoliatum L. |
| Elaeocarpaceae | Elaeocarpus | Elaeocarpus chinensis |
| Lythraceae. | Lagerstroemia L. | Lagerstroemia limii Merr. |
| Lythraceae. | Lagerstroemia L. | Lagerstroemia speciosa Pers. |
| Lythraceae. | Cuphea P. | Cuphea hyssopifolia. |
| Lythraceae. | Lagerstroemia L. | Lagerstroemia indica L. |
| Lythraceae. | Rotala Linn. | Rotala indices. |
| Asteraceae. | Adenostemma | Adenostemma lavenia (L.) O.Kuntze |
| Asteraceae. | Bidens. | Bidens pilosa L. |
| Asteraceae. | Senecio L. | Senecio scandens Buch. |
| Asteraceae. | Artemisia Linn. | Artemisia argyi H. |
| Asteraceae. | Xanthium L. | Xanthium sibiricum. |
| Asteraceae. | Lactuca sativa L. | Lactuca sativa. |
| Asteraceae. | Lactuca sativa L. | Lactuca sativa L. |
| Asteraceae. | Sonchus. | Sonchus brachyotus. |
| Asteraceae. | Zinnia. | Zinnia elegans Jacq. |
| Asteraceae. | Helianthus | Helianthus annuus. |
| Asteraceae. | Youngia. | Youngia japonica. |
| Asteraceae. | Emilia Cass. | Emilia sonchifolia. |
| Asteraceae. | Taraxacum F. | Taraxacum mongolicum Hand. |
| Asteraceae. | Crassocephalum. | Crassocephalum crepidioides. |
| Asteraceae. | Erigeron. | Erigeron annuus. |
| Asteraceae. | Conyza. | Conyza canadensis. |
| Asteraceae. | Hemistepta. | Hemistepta lyrata. |
| Asteraceae. | Eupatorium. | Chromolaena odorata. |
| Asteraceae. | Gnaphalium. | Gnaphalium affine D. Don. |
| Asteraceae. | Lactuca | Lactuca sativa |
| Solanaceae. | Solanum L. | Solanum melongena. |
| Solanaceae. | Lycianthes. | Lycianthes biflora. |
| Solanaceae. | Datura Linn. | Datura stramonium Linn. |
| Solanaceae. | Capsicum L. | Capsicum annum L. |
| Solanaceae. | Solanum L. | Solanum tuberosum. |
| Solanaceae. | Capsicum L. | Capsicum frutescens L. |
| Solanaceae. | Solanum L. | Lycopersicon esculentum Mill. |
| Solanaceae. | Petunia Juss. | Petunia hybrida Vilm. |
| Solanaceae. | Solanum L. | Solanum nigrum L. |
| Solanaceae. | Solanum L. | Solallum nigrum L. |
| Solanaceae. | Atropa L. | Atropa belladonna L. |
| Solanaceae. | Nicotiana. | Nicotianatabacum. |
| Convolvulaceae. | Cuscuta europaea. | Cuscuta chinensis. |
| Convolvulaceae. | Ipomoea Linn. | Sweet potato. |
| Convolvulaceae. | Pomoea Linn. | Ipomoea aquatic Forsk. |
| Convolvulaceae. | Pharbitis Choisy. | Pharbitis nil (L.) Choisy. |

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| Convolvulaceae. | Calystegia. | Calystegia hederacea. |
| Convolvulaceae. | Convolvulus. | Convolvulus arvensis L. |
| Convolvulaceae. | Calystegia. | Calystegia sepium. |
| Convolvulaceae. | Ipomoea Linn. | Ipomoea quamoclit. |
| Convolvulaceae. | Ipomoea Linn. | Ipomoea fistulosa Mart. |
| Scrophulariaceae. | Mazus miguelii. | Mazus japonicus T. |
| Scrophulariaceae. | Paulownia Sieb. | Paulownia fortunei. |
| Scrophulariaceae. | Paulownia Sieb. | Paulownia kawakamii. |
| Scrophulariaceae. | Paulownia Sieb. | Paulownia kawakamii. |
| Acanthaceae. | Peristrophe. | Peristrophe japonica Thunb. |
| Acanthaceae. | Gendarussa. | Grendarussa vulgaris. |
| Acanthaceae. | Andrographis. | Andrographis paniculata Burm. |
| Acanthaceae. | Peristrophe. | Peristrophe baphica. |
| Musaceae. | Musa. | Musa balbisiana Colla. |
| Musaceae. | Musa. | Musa nana Lour. |
| Stemonaceae. | Angiospermae. | Stemona sessilifolia. |
| Liliaceae. | Smilax L. | Smilax china L. |
| Liliaceae. | Polygonatum. | Polygonatum sibiricum. |
| Liliaceae. | Smilax L. | S.glabra Roxb. |
| Liliaceae. | Lilium L. | Lilium brownii. |
| Liliaceae. | Paris Linn. | Paris polyphylla. |
| Liliaceae. | Allium. | Allium fistulosum. |
| Liliaceae. | Allium. | Allium cepa. |
| Liliaceae. | Allium. | Allium sativum L. |
| Liliaceae. | Allium. | Allium chrysanthum. |
| Primulaceae. | Lysimachia. | Lysimachia christinae. |
| Primulaceae. | Lysimachia. | Lysimachia fukienensis. |
| Plantaginaceae. | Plantago L. | Plantago asiatica. |
| Lamiaceae. | Clinopodium. | Clinopodium chinense B. |
| Lamiaceae. | Prunella. | Prunella vulgaris L. |
| Lamiaceae. | Mentha. | Mentha haplocalyx Briq. |
| Lamiaceae. | Agastache C. | Agastache rugosa F. |
| Lamiaceae. | Leonurus Linn. | Leonurus artemisia L. |
| Lamiaceae. | Perilla L. | Perilla frutescens L. |
| Lamiaceae. | Ajuga. | Ajuga reptans. |
| Lamiaceae. | Lamium. | Lamium amplexicaule L. |
| Lamiaceae. | Glechoma Linn. | Glechoma longituba. |
| Lamiaceae. | Scutellaria. | Scutellaria Linn. |
| Lamiaceae. | Cinnamomum | Rabdosia serra. |
| Lamiaceae. | Salvia Linn. | Salvia splendens. |
| Juncaceae. | Juncus L. | Mat grass. |
| Gramineae | Saccharum | Saccharum officinarum Linn. |
| Gramineae. | Bambusa Retz. | Bambusa ventricosa. |
| Gramineae. | Bambusa Retz. | Bambusa rigida. |

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| Gramineae. | Bambusa Retz. | Bambusa vulgaris. |
| Gramineae. | Bambusa Retz. | Bambusa pervariabilis. |
| Gramineae. | Bambusa Retz. | Bambusa longispiculata. |
| Gramineae. | Bambusa Retz. | Bambusa multiplex. |
| Gramineae. | Bambusa Retz. | Bambusa multiplex. |
| Gramineae. | Bambusa Retz. | Bambusa multiplex. |
| Gramineae. | Bambusa Retz. | Bambusa pachinensis. |
| Gramineae. | Bambusa Retz. | Bambusa remotiflora. |
| Gramineae. | Bambusa Retz. | Bambusa surrecta. |
| Gramineae. | Bambusa Retz. | Bambusa cerosissima. |
| Gramineae. | Bambusa Retz. | Bambusa chungii. |
| Gramineae. | Bambusa Retz. | Bambusa textilis. |
| Gramineae. | Bambusa Retz. | Bambusa textilis. |
| Gramineae. | Bambusa Retz. | Bambusa guangxiensis. |
| Gramineae. | Bambusa Retz. | Bambusa papillata. |
| Gramineae. | Thyrsostachys Gamble. | Thyrsostachys siamensis. |
| Gramineae. | Dendrocalamopsis. | Dendrocalamopsis oldhami. |
| Gramineae. | Dendrocalamopsis. | Dendrocalamopsis basihirsuta. |
| Gramineae. | Dendrocalamopsis. | Dendrocalamopsis beecheyana. |
| Gramineae. | Dendrocalamopsis. | Dendrocalamus latiflorus. |
| Gramineae. | Dendrocalamopsis. | D.minor. |
| Gramineae. | Indocalamus Nakai. | Indocalamus tessellatus. |
| Gramineae. | Indocalamus Nakai. | Indocalamus decorus. |
| Gramineae. | Indocalamus Nakai. | Indocalamus latifolius. |
| Gramineae. | Indocalamus Nakai. | I.victoralis. |
| Gramineae. | Phyllostachys. | Phyllostachys Viridis. |
| Gramineae. | Phyllostachys. | Phyllostachys makinoui. |
| Gramineae. | Phyllostachys. | Phyllostachys aurea. |
| Gramineae. | Phyllostachys. | Phyllostachys meyeri. |
| Gramineae. | Phyllostachys. | Phyllostachys nuda. |
| Gramineae. | Phyllostachys. | Phyllostachys glauca. |
| Gramineae. | Phyllostachys. | Phyllostachys iridescens. |
| Gramineae. | Phyllostachys. | Phyllostachys vivax. |
| Gramineae. | Phyllostachys. | Phyllostachys heterocycla. |
| Gramineae. | Phyllostachys. | Phyllostachys heterocycla. |
| Gramineae. | Phyllostachys. | Phyllostachys heterocycla. |
| Gramineae. | Phyllostachys. | Phyllostachys kwangsiensis. |
| Gramineae. | Phyllostachys. | Phyllostachys makinoui. |
| Gramineae. | Phyllostachys. | Phyllostachys incarnate. |
| Gramineae. | Phyllostachys. | Phyllostachys platyglossa. |
| Gramineae. | Phyllostachys. | Phyllostachys bambussoides. |
| Gramineae. | Phyllostachys. | Phyllostachys viridiglaucescens. |
| Gramineae. | Phyllostachys. | Phyllostachys aureosulcata. |
| Gramineae. | Phyllostachys. | Phyllostachys varioauriculata. |

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| Gramineae. | Phyllostachys. | Phyllostachys nigra. |
| Gramineae. | Phyllostachys. | Phyllostachys rubicunda. |
| Gramineae. | Phyllostachys. | Phyllostachys rivalis. |
| Gramineae. | Gelidocalamus Wen. | G. stellatus. |
| Gramineae. | Chimonobambusa Makino. | Chimonobambusa marmorata. |
| Gramineae. | Pleioblastus. | P. maculatus. |
| Gramineae. | Pleioblastus. | Pleioblastus amarus. |
| Gramineae. | Pleioblastus. | Pleioblastus altiligulatus. |
| Gramineae. | Pleioblastus. | P. Maculosoides. |
| Gramineae. | Pleioblastus. | P. solidus. |
| Gramineae. | Pleioblastus. | Pleioblastus sanmingensis. |
| Gramineae. | Pseudosasa. | P. cantori. |
| Gramineae. | Pseudosasa. | P. orthotropa. |
| Gramineae. | Pseudosasa. | P. amabilis. |
| Gramineae. | Pseudosasa. | Pseudosasa guanxianensis. |
| Gramineae. | Sinobambusa Makino. | Sinobambusa seminuda. |
| Gramineae. | Sinobambusa Makino. | Sinobambusa tootsik. |
| Gramineae. | Sinobambusa Makino. | Sinobambusa tootsik. |
| Gramineae. | Sinobambusa Makino. | Sinobambusa intermedia. |
| Gramineae. | Acidosasa C. | Acidosasa edulis. |
| Gramineae. | Oligostachyum. | Oligostachyum scabriflorum. |
| Gramineae. | Sinobambusa Makino. | Sinobambusa tootsik. |
| Gramineae. | Alopecurus L. | Alopecurus aequalis Sobol. |
| Gramineae. | Cynodon. | Cynodon dactylon. |
| Gramineae. | Pennisetum. | Pennisetum alopecuroides. |
| Gramineae. | Eleusine. | Eleusine indica. |
| Gramineae. | Setaria Beauv. | Setaria viridis. |
| Gramineae. | Avena. | Avena fatua L. |
| Gramineae. | Digitaria. | Digitaria sanguinalis. |
| Gramineae. | Arthraxon. | Arthraxon hispidus. |
| Gramineae. | Miscanthus. | Miscanthus floridulus. |
| Gramineae. | Lophatherum. | Herba Lophatheri. |
| Gramineae. | Setaria Beauv. | Setaria plicata. |
| Gramineae. | Setaria Beauv. | Setaria palmifolia. |
| Gramineae. | Imperata Cyr. | Imperata cylindrica. |
| Gramineae. | Phragmites Adans. | Phragmites australis. |
| Gramineae. | Coix Linn. | Coix lacrymajobi L. |
| Gramineae. | Zea. | Zea mays. |
| Gramineae. | Paspalum. | Paspalum scrobiculatum Linn. |
| Gramineae. | Panicum l. | Panicum repens L. |
| Gramineae. | Poa. | Poa annua L. |
| Gramineae. | Zizania. | Zizania latifolia. |
| Gramineae. | Oryza. | Oryza sativa. |
| Gramineae. | Oryza. | Oryza I 66 |
| Gramineae. | Oryza. | Xinxiangyou80 |



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| Gramineae. | Oryza. | Tyou5537 |
| Gramineae. | Oryza. | Il you129 |
| Gramineae. | Oryza. | Teyou009 |
| Gramineae. | Oryza. | Jinyou07 |
| Gramineae. | Oryza. | Jingfu I you150 |
| Gramineae. | Oryza. | Teyou716 |
| Gramineae. | Oryza. | Jinyou1398 |
| Gramineae. | Oryza. | You I 028 |
| Gramineae. | Oryza. | Zhongyou2155 |
| Gramineae. | Oryza. | Minfengyou3301 |
| Gramineae. | Oryza. | Shanyou161 |
| Gramineae. | Oryza. | Xinxiangyou80 |
| Gramineae. | Oryza. | Jinliangyou4hao |
| Gramineae. | Oryza. | Quanzhen10hao |
| Gramineae. | Oryza. | Jiafuzhan |
| Gramineae. | Oryza. | Jiazao1hao |
| Gramineae. | Oryza. | Dongnan201 |
| Gramineae. | Oryza. | Zhangjiazao1hao |
| Gramineae. | Oryza. | Dyouduoxi1hao |
| Gramineae. | Oryza. | Dyou527 |
| Gramineae. | Oryza. | Teyouhang1hao |
| Gramineae. | Oryza. | Il youfu819 |
| Gramineae. | Oryza. | Il youhang1hao |
| Gramineae. | Oryza. | Il you183 |
| Gramineae. | Oryza. | Il you1273 |
| Gramineae. | Oryza. | Teyou671 |
| Gramineae. | Oryza. | Dqibaoyou527 |
| Gramineae. | Oryza. | Il youhang148 |
| Gramineae. | Oryza. | Il you936 |
| Gramineae. | Oryza. | Dyou6hao |
| Gramineae. | Oryza. | Il you536 |
| Gramineae. | Oryza. | Teyou627 |
| Gramineae. | Oryza. | Gangyou527 |
| Gramineae. | Oryza. | Il you3229 |
| Gramineae. | Oryza. | Luxiangyou1256 |
| Gramineae. | Oryza. | Il you339 |
| Gramineae. | Oryza. | Dyou368 |
| Gramineae. | Oryza. | Il youming118 |
| Gramineae. | Oryza. | Teyou103 |
| Gramineae. | Oryza. | Chuanyou12hao |
| Gramineae. | Oryza. | T55you627 |
| Gramineae. | Oryza. | Gangyou16 |
| Gramineae. | Oryza. | Il you3301 |
| Gramineae. | Oryza. | Neiyouhang148 |



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| Gramineae. | Oryza. | Il you673 |
| Gramineae. | Oryza. | E Il you315 |
| Gramineae. | Oryza. | Il you516 |
| Gramineae. | Oryza. | Tianyou3301 |
| Gramineae. | Oryza. | Il you6019 |
| Gramineae. | Oryza. | Tianyou10hao |
| Gramineae. | Oryza. | Il youming118 |
| Gramineae. | Oryza. | Teyou103 |
| Gramineae. | Oryza. | Il youshun98 |
| Gramineae. | Oryza. | Liangyou3773 |
| Gramineae. | Oryza. | Liangyouhang2hao |
| Gramineae. | Oryza. | Liangyou1019 |
| Gramineae. | Oryza. | Donglian5hao |
| Gramineae. | Oryza. | Il you356 |
| Gramineae. | Oryza. | Teyou180 |
| Gramineae. | Oryza. | Guyou5138 |
| Gramineae. | Oryza. | Tianyou3229 |
| Gramineae. | Oryza. | Guangyouming118 |
| Gramineae. | Oryza. | Il you039 |
| Gramineae. | Oryza. | Guyou3301 |
| Gramineae. | Oryza. | Jinnong2you3 |
| Gramineae. | Oryza. | Qiyou125 |
| Gramineae. | Oryza. | Guyou769 |
| Gramineae. | Oryza. | Jiangmingyou62 |
| Gramineae. | Oryza. | Teyou923 |
| Gramineae. | Oryza. | Dyou68 |
| Gramineae. | Oryza. | Guyou527 |
| Gramineae. | Oryza. | Il you131 |
| Gramineae. | Oryza. | Yueyou9113 |

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| Gramineae. | Oryza. | Leyou94 |
| Cucurbitaceae. | Momordica | Momordica charantia L. |
| Cucurbitaceae. | Trichosanthes Linn. | Trichosanthes kirilowii Maxim. |
| Cucurbitaceae. | Cucumis. | Cucumis sativus Linn. |
| Cucurbitaceae. | Cucumis. | Cucumis melo L. |
| Cucurbitaceae. | Citrullus. | Citrullus lanatus. |
| Cucurbitaceae. | Luffa Mill. | Luffa cylindrical. |
| Cucurbitaceae. | Benincasa. | Benincasa hispida Thunb. |
| Cucurbitaceae. | Cucurbita Linn. | Cucurbita moschata. |
| Cucurbitaceae. | Lagenaria Ser. | Lagenaria siceraria. |
| Cucurbitaceae. | Sechium. | Sechium edule. |
| Saxifragaceae. | Hydrangea L. | Hydrangea chungii Rehd. |
| Saxifragaceae. | Hydrangea L. | Hydrangea macrophylla (Thunb.) Ser. |
| Saxifragaceae. | Hydrangea L. | H.lingii Hoo. |
| Saxifragaceae. | Hydrangea L. | Hydrangea paniculata S. |

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| Saxifragaceae. | Itea. | Itea chinensis Hook. |
| Daphniphyllaceae | Daphniphyllum. | Daphniphyllum macropodum Miq. |
| Pedaliaceae. | Sesamum L. | Sesamum indicum. |
| Zingiberaceae. | Alpinia | Alpinia zerumbet. |
| Zingiberaceae. | Alpinia | Alpinia japonica Thunb. |
| Violaceae. | Viola L. | Viola philippica Car. |
| Campanulaceae. | Codonopsis Wall. | Codonopsis pilosula. |
| Chenopodiaceae. | Spinacia L. | Spinacia oleracea L. |
| Chenopodiaceae. | Kochia. | Kochia scoparia. |
| Nelumbonaceae. | Nelumbo. | Nelumbo nucifera G. |
| Trapaceae. | Trapa L. | Trapa bicornis |
| Gentianaceae. | Gentiana (Tourn.) L. | Gentiana scabra B. |
| Gentianaceae. | Gentiana (Tourn.) L. | Gentiana davidii F. |
| Asclepiadaceae. | Cynanchum Linn. | Cynanchum glaucescens. |
| Azollaceae. | Azolla Lam. | Azolla imbricata(Roxb .)Nakai. |
| Cannaceae. | Canna L. | Canna indica L. |
| Equisetaceae. | Equisetum est a. | Hippochaete hiemale L. |
| Pink. | Marsilea L. | Marsilea quadrifolia L. |
| Begoniaceae. | Begonia. | Begonia fimbriatipula Hance. |
| Saururaceae. | Houttuynia Thunb. | Heartleaf Houttuynia Herb. |
| Umbelliferae. | Daucus L. | Daucus carota. |
| Umbelliferae. | Coriandrum L. | Apium graveolens Linn. |
| Umbelliferae. | Coriandrum L. | Coriandrum sativum L. |
| Umbelliferae. | Angelica L. | Angelica pubescens Maxim. |
| Umbelliferae. | Torilis Adans. | Torilis scabra. |
| Cyperaceae. | Cyperus Linn. | Cyperus rotundus. |
| Cyperaceae. | Kyllinga Rottb. | Kyllinga monocephala Rottb. |
| Cyperaceae. | Cyperus Linn. | Cyperus difformis L . |
| Cyperaceae. | Cyperus Linn. | Cyperus iria. |
| Cyperaceae. | Juncellus Griseb. | Juncellus serotinus. |
| Cyperaceae. | Kyllinga Rottb. | Kyllinga brevifolia Rottb. |
| Cyperaceae. | Pycreus. | Pycreus polystachyus Rottb. |
| Cyperaceae. | Scirpus Linn. | Scirpus validus Vahl. |
| Capparaceae. | Capparis. | C.acutifolia Sweet. |
| Brassicaceae. | Brassica. | Brassica pekinensis. |
| Brassicaceae. | Brassica. | Brassica chinensis. |
| Brassicaceae. | Capsella. | Capsella bursa-pastoris. |
| Brassicaceae. | Brassica. | Brassica oleracea L. |
| Brassicaceae. | Brassica. | Brassica oleracea L. |
| Brassicaceae. | Brassica. | Brassica campestris L. |
| Brassicaceae. | Raphanus. | White Radish. |
| Brassicaceae. | Lepidium L. | Lepidium apetalum. |
| Brassicaceae. | Rorippa. | Rorippa indica. |
| Brassicaceae. | Rorippa. | Rorippa indica. |
| Amaryllidaceae. | Lycoris Herb. | Shorttube Lycoris. |
| Caryophyllaceae. | Endarachne. | Malachium aquaticum L . |

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|--------------------------|----------------------|------------------------------|
| Dioscoreaceae. | Dioscorea. | Dioscorea opposita. |
| Araceae. | Amorphophallus. | Amorphophallus konjac. |
| Araceae. | Arisaema Mart. | Pinellia pedatisecta Schott. |
| Araceae. | Arisaema Mart. | Arisaema erubescens W. |
| Araceae. | Alocasia. | Alocasiamacrorrhiza. |
| Araceae. | Pinellia Ten. | Pinellia ternate. |
| Araceae. | Colocasia. | Colocasia esculenta L. |
| Araceae. | Colocasia | Pistia stratiotes. |
| Amaranthaceae. | Achyranthes L. | Achyranthes longifolia. |
| Amaranthaceae. | Achyranthes L. | Achyranthes bidentata Blume. |
| Amaranthaceae. | Celosia L. | Celosia argentea L. |
| Amaranthaceae. | Celosia L. | Celosia cristata L. |
| Amaranthaceae. | Portulaca L. | Portulaca oleracea L. |
| Amaranthaceae. | Amaranthus. | Amaranthus retroflexus. |
| Amaranthaceae. | Amaranthus. | Amaranthus tricolor L. |
| Amaranthaceae. | Amaranthus. | Amaranthus spinosus. |
| Amaranthaceae. | Portulaca L. | Portulaca grandiflora. |
| Amaranthaceae. | Alternanthera Forsk. | Alternanthera Philoxeroides. |
| Zingiberaceae | Zingiber | Zingiber confine |
| Haloragidaceae. | Myriophyllum. | Myriophyllum verticillatum. |
| Commelinaceae. | Pollia. | Pollia japonica Thunb. |
| Potamogetonaceae. | Potamogeton. | Potamogeton franchetii. |
| Pontederiaceae Kunth. | Eichhornia. | Eichhorniacrassipes. |
| Pontederiaceae Kunth. | Monochoria. | Monochoria korsakowii. |
| Alismataceae. | Alisma Linn. | Alisma plantago-aquatica. |
| Alismataceae. | Sagittaria L. | Sagittaria sagittifolia. |
| Alismataceae. | Sagittaria L. | Sagittaria trifolia. |
| Alismataceae. | Heleocharis. | Eleocharis dulcis. |
| Palmae. | Livistona R. | Livistona chinensis. |
| Palmae. | Rhapis Linn. | Rhapis excelsa. |
| Palmae. | Washingtonia. | Washingtonia filifera. |

Annex 3 Mushroom Directory of the System

| Family | Genus | Species |
|-------------------|-------------------------|-----------------------------|
| Phallaceae. | Dictyophora. | Dictyophora indusiata. |
| Hericiaceae | Hericium | Hericium erinaceus. |
| Tricholomataceae. | Tricholoma. | Tricholoma matsutake. |
| Auriculariales. | Auricularia. | Auricularia auricular. |
| Omphalotaceae. | Lentinus. | Lentinus edodes. |
| Pluteaceae. | Volvariella. | Volvariella volvacea. |
| Tremellaceae. | Tremella. | Tremella. |
| Russulaceae. | Russula. | Russula cyanoxantha. |
| Russulaceae. | Russula. | Russula foetida Peders .Fr. |
| Russulaceae. | Russula. | Russula vinosa Lin. |
| Bolbitiaceae. | Russula. | Agrocybe aegirit. |
| Russulaceae. | Russula. | Russula cyanoxantha. |
| Russulaceae. | Lactarius. | Lactarius deliciosus. |
| Agaricaceae. | Agaricus. | Agaricus campestris. |
| Marasmiaceae. | Flammulina. | Flammulina velutipes. |
| Marasmiaceae. | Marasmius. | Marasmius oreades. |
| Pleurotaceae. | Agaricochaete. | Pleurotus sajorcaju. |
| Tricholomataceae. | Isoptericola. | Termitomyces albuminosus. |
| Boletaceae. | Boletus | Boletus. Chalciporus |
| Pleurotaceae. | Agaricochaete. | Pleurotus ostreatus. |
| Auriculariaceae. | Auricularia. | Auricularia polytricha. |
| Polyporaceae. | Ganoderma. | Ganoderma Lucidum Karst. |
| Ganodermataceae. | Ganoderma. | Ganodermasinensis. |
| Geastraceae. | Lycoperdon polymorphum. | Pisolithus tinctorius. |
| Tricholomataceae. | Oudemansiella. | Collybiaradicata. |
| Polyporaceae. | Antrodia | Antrodia camphorata. |

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| Family | Species |
|-----------------|----------------------------------|
| Palaemonidae. | Freshwater shrimps. |
| Palaemonidae. | E.carinicauda. |
| Penaeidae. | Fenneropenaeus chinensis. |
| Unionidae. | A. Woodiana woodiana. |
| Unionidae. | Plicata. |
| Unionidae. | Anodonta woodianawoodiana. |
| Potamidae. | Freshwater crab. |
| Limacidae. | Agriolimax agrestis Linn. |
| Viviparidae. | Auriculata. |
| Viviparidae. | Cipangopaludina cahayensis. |
| Aillpullaridae. | Pomacea canaliculata. |
| Pomatiopsidae. | Oncomelania hupensis Gredler. |
| Bradybaenidae. | Bradybaena kiangsinensis. |
| Achatinidae. | Achatina fulica. |
| Lumbricidae. | Lumbricus terrestris Linn. |
| Haplotaxidae. | Haplotaxis gordioides. |
| Nipponica. | Whitmania pigra Whitman. |
| Araneidae. | Nephila clavata L. |
| Gerridae. | Aquarius elongates. |
| Apidae. | Apis cerana cerana Fabricius. |
| Apidae. | Apis melliferaligustica Spinola. |
| Apidae. | Vespa. |
| Vespidae. | Paper wasp. |
| Papilionidae. | Troides Helena. |
| Papilionidae. | Atrophaneura horishana. |
| Papilionidae. | Byasa alcinous. |

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| Papilionidae. | Byasa Menciuss. |
| Papilionidae. | Graphium doson. |

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|--------------------------|---------------------------------|
| Papilionidae. | Ehana elwesi. |
| Papilionidae. | Paranticopsis macareus. |
| Pieridae. | Catopsilia Pomona. |
| Pieridae. | Colias croceu. |
| Psychodidae. | Psychodidae. |
| Staphylinidae. | Rove beetle. |
| Chrysopidae. | Sympetrum Croceolum. |
| Cordulegasteridae. | Chlorogomphus papilio Ris. |
| Cordulegasteridae. | Anotogaster sieboldii. |
| Aeshnoidea. | Aeshna mixt. |
| Macromiidae. | Epophthalmia elegans. |
| Coenagrionidae. | Agriocnemis femina. |
| Coenagrionidae. | Cercion plagiosum. |
| Cicadidae. | Oncotumpana maculicollis. |
| Cicadidae. | Cryptotympana atrata Fabricius. |
| Cicadidae. | Platypleura kaempferi. |
| Cicadidae. | Cryptotympana atrata Fabricius. |
| Gryllidae. | Acheta domesticus. |
| Gryllidae. | Gryllus chinensis. |
| Gryllidae. | Loxoblemmus doenitzi. |
| Gryllidae. | Gryllodes sigillatus. |
| Acrididae. | Locustamigratora. |
| Acrididae. | Epacromiusspp. |
| Acrididae. | Oedaleusspp. |
| Acrididae. | Omocestusspp. |
| Acrididae. | Atractomorpha sinensis Bol. |
| Lucanidae. | Stag beetle. |
| Scolopendridae. | Scolopendra subspinipes. |
| Kronopolites Svenhedini. | Spirobolus bungii. |

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|--------------------------|------------------------------|
| Kronopolites Svenhedini. | Spirobolus bungii Brandt. |
| Paratenosera. | Mantis. |
| Phasmatidae. | Gongylopus adyposus Brunner. |
| Cerambycidae. | Cerambycidae. |
| Tettigoniidae. | Longhorned grasshoppers. |
| Coccinellidae. | Rodolia rufopilosa Muls. |
| Coccinellidae. | Coccinella septempunctata. |
| Pyrrhocoridae. | Pantatomidae. |
| Curculionidae. | Cyrtotrachelus longimanus. |
| Siluridae. | Silurus asotus. |
| Bagridae. | Pelteobagrus fulvidraco. |
| Channidae. | Channa argus. |
| Cyprinidae. | Carassius auratus. |
| Cyprinidae. | Mylopharyngodon piceus. |
| Cyprinidae. | Carassius auratus. |
| Cyprinidae. | Ctenopharyngodon idellus. |
| Nemipteridae. | Sinocyclocheilus grahami. |
| Cobitidae. | Misgurnus anguillicaudatus. |
| Clariidae. | Clarias fuscus. |
| Synbranchidae. | Monopterus albus. |
| Anguilla japonica. | Anguilla japonica. |
| Cyprinidae. | Hypophthalmichthys nobilis |
| Sciaenidae. | Nibeaalbeflora |
| Trichiuridae. | Trichiurus haemela. |
| Trionychidae | Pelochelys cantorii Gray |
| Channidae. | Channa asiatica. |
| Cichlidae. | Tilapia. |
| Ranidae. | Rana catesbeiana. |
| Ranidae. | Rana schmackeri. |
| Ranidae. | Quasipaa spinosa. |
| Ranidae. | Rana limnocharis Boie. |

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| Ranidae. | <i>Rana guentheri</i> . |
| Ranidae. | <i>Rana rugulosa</i> . |
| <hr/> | |
| Ranidae. | <i>Rana plancyi</i> . |
| Bufonidae. | <i>Bufo Melanostictus</i> Schneider. |
| Bufonidae. | <i>Bufo gargarizans</i> . |
| Bufonidae. | Toad. |
| Microhylids. | <i>Microhyla onata</i> . |
| Microhylids. | <i>Microhyla pulchra</i> Hallowell |
| Rhacophoridae. | <i>Dennysi</i> . |
| Hylidae. | <i>Hylachinensis</i> . |
| Salamandridae | <i>Cynops orientalis</i> |
| Viperidae. | <i>Gloydius brevicaudus</i> . |
| Viperidae. | <i>Medoggreenpitviper</i> . |
| Viperidae. | <i>Deinagkistrodon</i> . |
| Boidae. | <i>Python molurus</i> . |
| Boidae. | <i>Python molurus molurus</i> . |
| Boidae. | <i>Eryx</i> . |
| Colubridae. | <i>Sinonatrix annularis</i> . |
| Colubridae | <i>Xenochrophis piscator</i> Schneider |
| Elapidae | <i>Naja naja</i> Linnaeus |
| Colubridae | <i>Elaphe carinata</i> Gunther |
| Colubridae | <i>Elaphe taeniura</i> Cope |
| Colubridae. | <i>Enhydris plumbea</i> . |
| Colubridae. | Red-backed rat-snake. |
| Scincidae | <i>Eumeces chinensis</i> J. E. Gray |
| Colubridae | <i>Elaphe taeniura</i> Cope |
| Colubridae. | <i>Elaphe carinata</i> . |
| Elapidae. | <i>Bungarus multicinctus</i> . |
| Elapidae. | <i>Kelloggi</i> . |
| Elapidae. | <i>Ophiophagus Hannah</i> . |
| Elapidae. | <i>Naja atra</i> . |

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|---------------|-----------------------------|
| Gekkonidae. | Ko japonicus Dumeril. |
| Gekkonidae. | Pogona vitticeps. |
| <hr/> | |
| Trionychidae. | Trionyx sinensis. |
| Emydidae. | Chinemys reevesii. |
| Ploceidae | Passer domesticus |
| Alaudidae | Alauda arvensis Hume |
| Corvidae. | Pica pica. |
| Columbidae | Oenopopelia tranquebarica |
| Corvidae. | Corvus macrorhynchos. |
| Muscicapidae. | Leucodiotron canorus. |
| Sturnidae. | Acridotheres cristatellus. |
| Hirundinidae. | Hirundo rustica Linnaeus |
| Hirundinidae. | Hirundo rustica. |
| Hirundinidae. | Hirundo daurica Linnaeus |
| Oriolidae. | Oriolus chinensis. |
| Phasianidae. | Francolinus pintadeanus. |
| Phasianidae. | Tragopan caboti |
| Phasianidae. | Phasianus colchicus. |
| Columbidae. | Oena capensis. |
| Columbidae. | Columba. |
| Columbidae. | Streptopelia turtur. |
| Columbidae. | Streptopelia orientalis. |
| Alcedinidae. | Alcedo atthis. |
| Picidae. | Piculus. |
| Anatidae. | Anatinae. |
| Anatidae. | Anser cygnoides orientalis. |
| Anatidae. | Aix galericulata |
| Anatidae. | Anser anser. |
| Strigidae. | Bubo bubo. |
| Strigidae. | Glaucidium. |
| Strigidae. | Asio flammeus. |

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|----------------|------------------------------|
| Strigidae. | Asio otus. |
| Laniidae | Lanius excubitor Linnaeus |
| Accipitridae. | Aquila fasciata. |
| Accipitridae. | Buteo buteo |
| Accipitridae. | Accipiter virgatus |
| Accipitridae. | Spilornis cheela. |
| Accipitridae. | Accipiter nisus. |
| Accipitridae. | Accipiter. |
| Accipitridae. | Ictinaetus malayensis. |
| Centropodidae. | Centropus sinensis Stephens. |
| Ardeidae. | Ardea purpurea. |
| Ardeidae. | Little Egret. |
| Ardeidae. | Ardea cinerea. |
| Falconidae. | Falco tinnunculus. |
| Tytonidae | Tyto capensis |
| Hystricidae. | Hystrix hodgsoni. |
| Suidae. | Sus scrofa. |
| Suidae. | Sus scrofa domestica. |
| Mustelidae. | Mustela sibirica. |
| Mustelidae. | Lutra lutra. |
| Mustelidae | Viverricula indica |
| Mustelidae | Melogale moschata |
| Mustelidae | Paguma larvata |
| Mustelidae | Mustela kathiah Hodgson |
| Sciuridae | Tamiops swinhoei |
| Herpestidae | Herpestes urva |
| Rhizomyidae | Rhizomys sinensis Gray |
| Hylidae | Hyla chinensis Günther |
| Trionychidae | Pelodiscus sinensis Wiegmann |
| Felidae. | Felinae. |
| Felidae. | Catopuma temminckii |

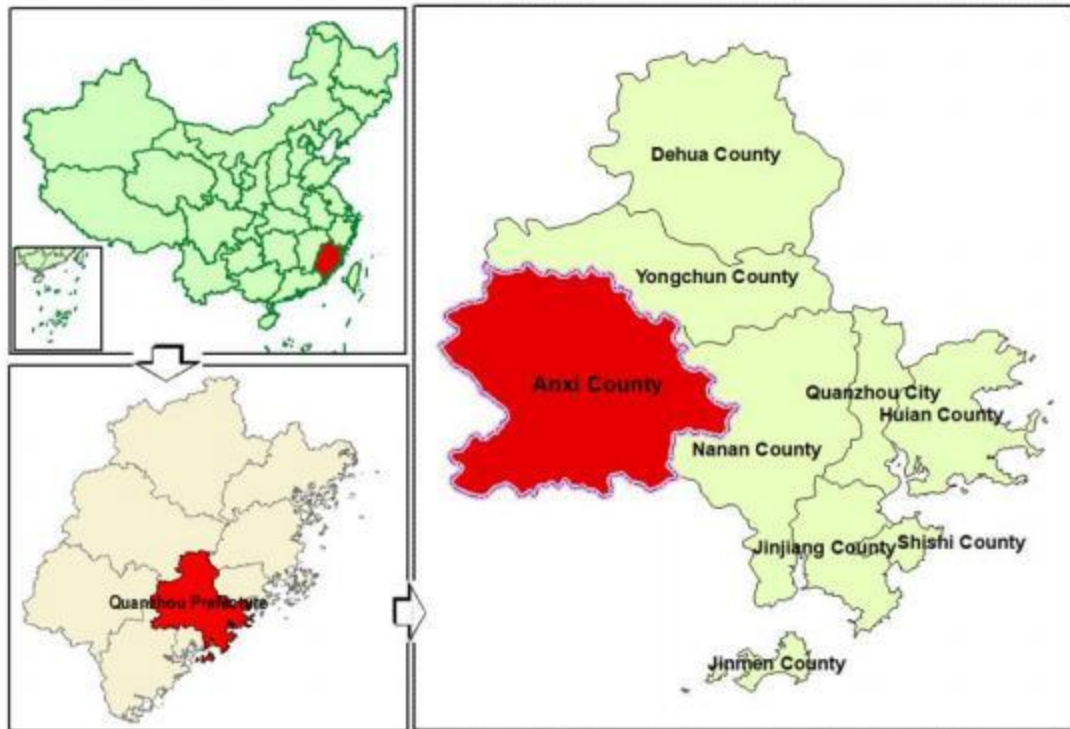
| | |
|--------------------|--|
| Felidae. | <i>Prionailurus bengalensis</i> |
| Cervidae. | <i>Muntiacus crinifrons.</i> |
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| Cervidae. | <i>Muntiacus reevesi.</i> |
| Cervidae. | <i>Elaphodus cephalophus</i> Milne-Edwards |
| Bovidae | <i>Capra sibirica</i> Pallas |
| Ursidae | <i>Ursus thibetanus</i> G. |
| Erinaceidae. | Heterothermic. |
| Sciuridae. | <i>Callosciurus erythraeus.</i> |
| Sciuridae. | <i>Dremomys perny.</i> |
| Circetidae. | <i>Nesokia.</i> |
| Leporidae. | <i>L.sinensis.</i> |
| Cercopithecidae. | <i>Macaca mulatta.</i> |
| Ranidae. | <i>Rana nigromaculata.</i> |
| Ranidae. | <i>Quasipaa spinosa.</i> |
| Emydidae. | <i>Mauremys mutica.</i> |
| Viperidae. | Green bamboo snake. |
| Phalacrocoracidae. | <i>Phalacrocorax carbo.</i> |
| Felidae. | <i>Neofelis nebulosa.</i> |
| Canidae. | <i>Cuon alpinus.</i> |
| Canidae. | <i>Canis lupus familiaris.</i> |
| Limacidae. | <i>Agriolimax agrestis.</i> |
| Manidae. | <i>Manis.</i> |
| Phasianidae. | <i>Coturnix coturnix.</i> |
| Phasianidae. | <i>Gallus domesticaus.</i> |
| Circetidae. | Microtinae. |
| Bovidae. | <i>Bubalus bubalus.</i> |

Annex 5 Soil Dominant Microbe Directory of the System

| Type | Phylum | Type | Genus |
|-----------|-----------------------|-----------|-------------------------------|
| Bacterial | Proteobacteria | Bacterial | Stenotrophomonas |
| Bacterial | Bacteroidetes | Bacterial | Catenulispora |
| Bacterial | Actinobacteria | Bacterial | Candidatus_Solibacter |
| Bacterial | Acidobacteria | Bacterial | Acidothermus |
| Bacterial | Chloroflexi | Bacterial | Acidibacter |
| Bacterial | Firmicutes | Bacterial | Unidentified_Burkholderiaceae |
| Bacterial | Gemmatimonadetes | Bacterial | Bryobacter |
| Bacterial | Verrucomicrobia | Bacterial | Occallatibacter |
| Bacterial | Unidentified_Bacteria | Bacterial | Unidentified_Acidimicrobiia |
| Bacterial | Thaumarchaeota | Bacterial | Sphingomonas |
| Fungi | Ascomycota | Fungi | Mortierella |
| Fungi | Mortierellomycota | Fungi | Chaetomium |
| Fungi | Basidiomycota | Fungi | Saitozyma |
| Fungi | Glomeromycota | Fungi | Talaromyces |
| Fungi | Mucoromycota | Fungi | Penicillium |
| Fungi | Chytridiomycota | Fungi | Geminibasidium |
| Fungi | Entomophthoromycota | Fungi | Unidentified_Glomeromycota |
| Fungi | Rozellomycota | Fungi | Trichoderma |
| Fungi | Kickxellomycota | Fungi | Unidentified_Mucoromycota |
| Fungi | Monoblepharomycota | Fungi | Fusarium |

Annexed Maps

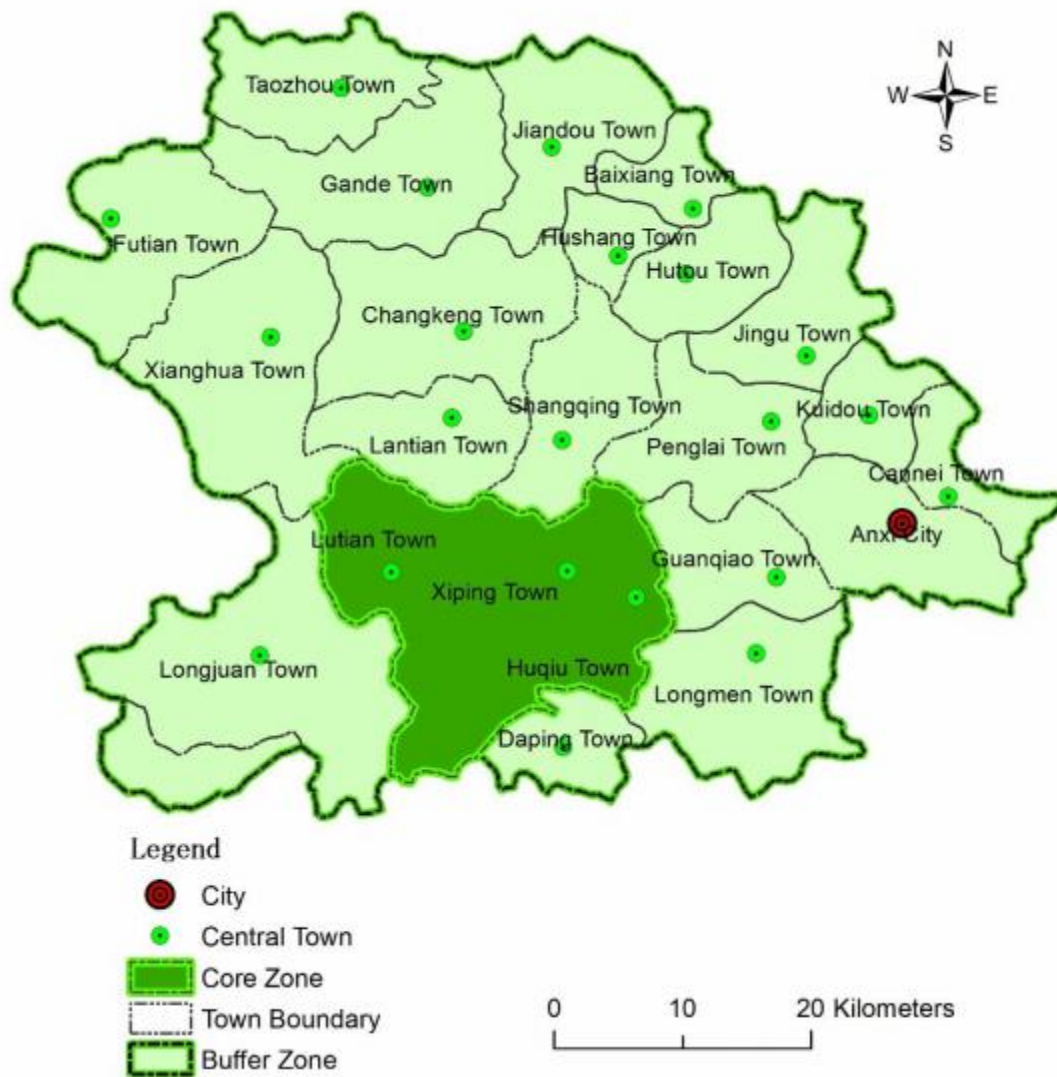
1 Location of Anxi County



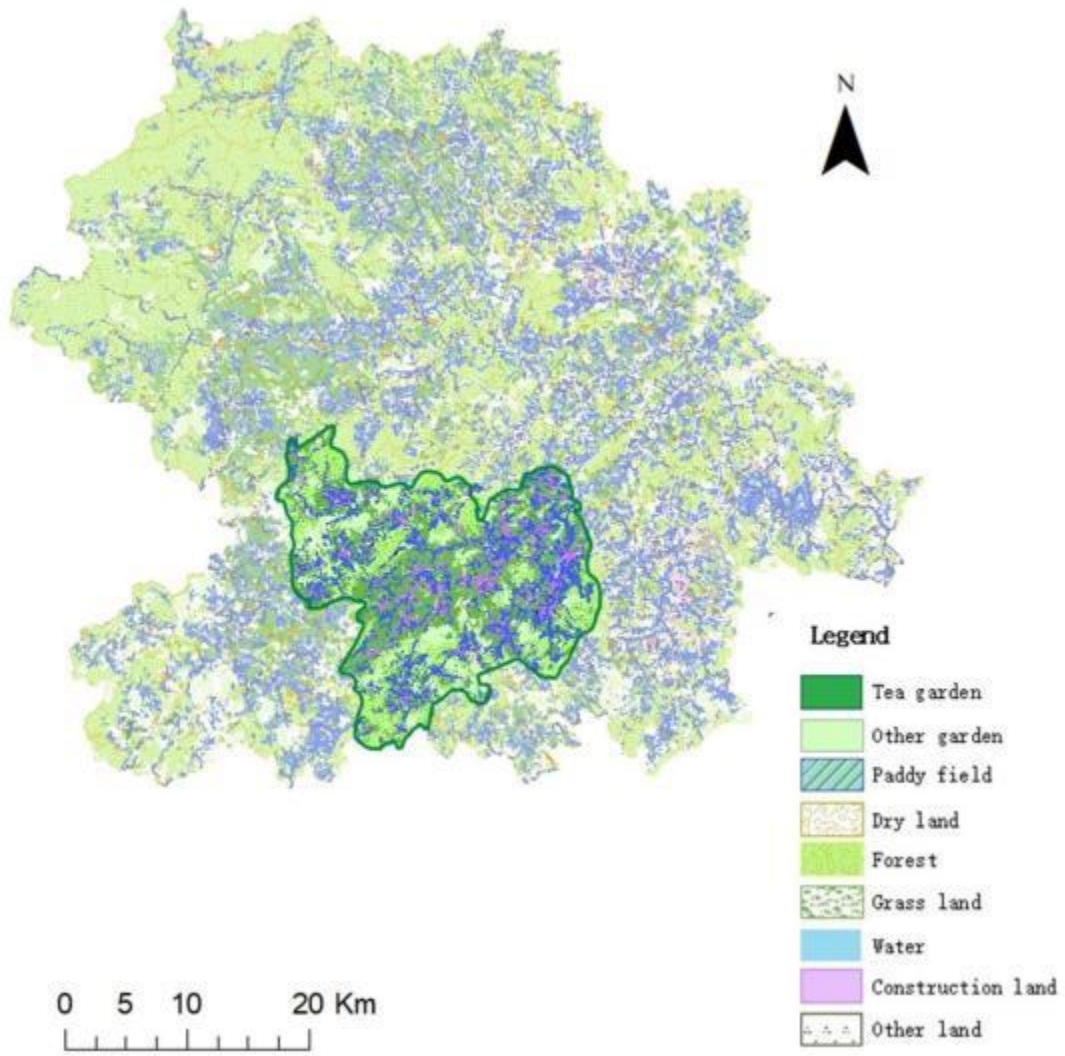
2 Transportation Accessibility of Anxi County



3 Core zones of Anxi Tieguanyin Tea Culture System



4 Land use map of Anxi Tieguanyin Tea Culture System



References

- Anxi County Bureau of Statistics in 2018. Anxi Statistical Yearbook. *China Statistics Press*, 2018. (in Chinese)
- Cai Jianming. Cai Jianming's essay collection: Study an Anxi Tieguaanyin tea. *Daquan Literary Press*, 2009. (in Chinese)
- Huang Dongfang. 2008. Natural environment of Anxi county and health care function of Anxi Tieguaanyin tea. *Science and Technology of Tea*, (3), 45-46. (in Chinese)
- Li Hailin, Cheng Hao, Wang Liyuan, Wei Kang, 2014. Research advances in medicinal ingredients, pharmacologic effects, development and application of tea. *Journal of Anhui Agriculture Science*, 42(31), 10833- 10835, 10838. (in Chinese)
- Li Yuxiang, Hai Fang, Xie Wenzhe, Luo Yangxiu. 2010. Anxi Tieguaanyin tea: The legend of a great plant. *World Publishing Press*, 2010. (in Chinese)
- Liu Minghou. Tea soup of dandelion and Tieguaanyin tea can be used to treat chronic prostatitis. *China's Naturopathy*, 2019, 27(8), 85. (in Chinese)
- Wang Lili, Yang Junyuan, Lin Qingxia, Xiang Lihui, Chen Li. Chemicals in stems and leaves of Tieguaanyin tea. *Acta Tea Sinica*, 2019, 60(1), 1-8. (in Chinese)
- HUA Zhi-qin , CHEN Ling-wen. A study on factors of disparity between ecological willingness to pay and willingness to accept— Based on the survey of Anxi Tieguaanyin producing areas. *Journal of Anhui Agriculture Science*, (2017, 20(2): 62—66. (in Chinese)
- Zhang, X. Q., 2016. Cultivation Technology of Anxi Tieguaanyin Tea. *Journal of Anhui Agriculture Science*, (14), 41,45.
- Yang W.L., 2006. Tea production and processing technology (edition for household reader). Printed by Tea technology promotion station, Bureau of Agriculture and Tea Fruit, Anxi county, 2006. (in Chinese)
- Ling, W.B., Li, Q.H., Wang, W.L., 2002. Comprehensive Introduction to Tieguaanyin Tea. *Journal of Anhui Agriculture Science*, Xiamen, China, 2002.

-
- Lin, R.X., Chen, D.J., 2019. China Tieguanyin Tea: Deep interpretation of the magic tea inside and outside the world. *Huazhong University of Science and Technology Press*, Wuhan, China, 2019.
- Chen S.C., 2004. Anthology of Anxi Tea Papers. *Fujian People Press*, Fuzhou, China, 2004.
- Tang Xiaoyun, Yu Xiaohui , Zhang Dongming. A Study of Agri-Cultural Heritage Tourism Impacts Based on Residents' Perception: Taking the Longji Terrace Site in Guilin as an Example. *Journal of Resources and Ecology*, 2013,4(03), 267-274.
- Parviz Koochafkan , Mary Jane dela CRUZ. 2011. Conservation and Adaptive Management of Globally Important Agricultural Heritage Systems (GIAHS). *Journal of Resources and Ecology*, 2(1), 22-28.
- Zhao, L.J., Xu W.S., Sun, Y. H., Min, Q.W., He, L., 2012. On the conservation of China's Agri-cultural Heritage Systems. *Chinese Journal of Eco-Agriculture*, 20(6), 688-692.
- Choi, Jai-Ung, Yoon, Soon-Duck, Youn, Kyung-Sik, Kim, Kyung-Hee, Kawk, Min-Jeong. A Comparative Study on the Perception of Value of Agricultural Heritage by Local People and Visitors. *Northeast Asia Tourism Research*, 2017,13(4), 1-24.
- Su, B.C., Chen, W.S., Lin, J.B., 2017. Tea farmers' understanding and willingness to pay for ecological functions of tea garden—Taking the main tea-producing areas in Fujian Province as a case. *Journal of Fujian Agriculture and Forestry University(Philosophy and Social Sciences)*, 2017, 20(1), 28—32.
- Wu, S.Q., Xie, S.J., 2017. China Nationally Important Agricultural Heritage Systems: Conservation, Management and Utilization. *Fujian Agriculture*, (8), 11- 15.
- Zhuang, J. W., Zeng, F.F., 2016. Research on development strategy of leisure agriculture in Tieguanyin agricultural cultural heritage site in Anxi. *Agricultural Science-technology and Information*, (35), 6-8.
- Li, W.F., 2016., Strategic study on the protection and development of important agricultural cultural heritage in China. Science Press, Beijing, China, 2016.

Min, Q., W.,2006. GIAHS: A New Kind of World Heritage. *Resources Science*, 4, 206-208.

Zhang, Y.X., Li, X.D., Min, Q.W., 2018. How to balance the relationship between conservation of Important Agricultural Heritage Systems (IAHS) and socio-economic development? A theoretical framework of sustainable industrial integration development. *Journal of Cleaner Production*, 204, 553-563.