

# Industrial Development Status of Gardenia, an Authentic Medicinal Herb in Jiangxi Province

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**Abstract:** Gardenia is a dried fruit of *Gardenia jasminoides* Ellis, a Rubiaceae plant, which has the effect of treating angina, diuresis, anti-inflammatory, choleric, hemostatic, anti-cancer, etc. Yellow pigment is the main active ingredient in gardenia fruit, with a content of about 10%. Gardenia Yellow effectively mimics the natural tint of lemon yellow, enabling vivid, natural coloration. It has strong coloring ability and stable properties, and has the advantages of nutrition and health, without any toxic side effects. It has been approved by China for use as a general food raw material and food additive, and it is extensively used in pastry, beverage, ice cream, wine and other food industries as a natural food colorant.

**Keywords:** Jiangxi Province, authentic medicinal materials, mast, research status, mast industry

## 1. Introduction

Gardenia (Fig. 1) is one of the national bulk medicinal and edible medicinal materials, divided into wild varieties and planted varieties. Gardenia, a traditional Chinese medicine, has bitter taste and cold nature, has the effect of relieving irritability, cooling blood and detoxification, reducing swelling and relieving pain, mainly used for jaundice hepatitis, sprains, high blood pressure, diabetes and other symptoms. Gardenia can not only be used as medicinal herbs, but also the main raw material for ingredients, food coloring extraction and industrial dyes<sup>[1,2,3]</sup>. Its demand elasticity space is large, the annual consumption of the country is between 6000-6500 tons, and some of it is also used for export. Medicinal production and consumption focus on the selection of its dry goods. Its domestic and foreign demand markets will also increase year by year, showing a good momentum of production and sales.



Figure 1: Illustration of different forms of gardenia

## 2. Analysis of the Research Status of Gardenia Industry and Gardenia Yellow Pigment at Home and Abroad

Gardenia yellow pigment content in gardenia fruit is as high as about 10%, the world's rare water-soluble carotenoid xanthoid, its chemical properties are stable, without any toxic side effects. It has been approved by China for use as a common food raw material and food additive. It is widely used in the coloring of pastries, beverages, ice cream, wine and other foods. At present, its demand is increasing rapidly in the domestic and international markets, and there is a huge market space.

Some scholars have optimized the extraction process of gardenia xanthin by homogenizing extraction technology. Yang et al.<sup>[4]</sup> optimized the extraction process of gardenia yellow pigment by using water bath oscillation technology combined with response surface method. Xu et al.<sup>[2]</sup> optimized the extraction process of gardenia yellow pigment by combining mechanical processing and chemical reaction.

However, the yield and extraction efficiency of all these technologies for gardenia yellow pigment still need to be improved.

Chen et al.<sup>[3]</sup> has significantly increased the plain price of gardenia yellow with macroporous resin, but it can only increase the color price to more than 300, and it is difficult to further improve the purity. Specifically, it obtains a special purified resin to remove most of the impurities by screening with yellow pigment as the target in a wide range to obtain primary yellow pigment products. Then, it continues to screen the main impurities in the primary yellow pigment products - gardeniside and chlorogenic acid, specifically adsorbs the specific resins of these two main impurities, and optimizes the purification conditions to obtain high-purity natural yellow pigment products for food with a color value of more than 450, which solves the key challenges that limit its industrial development and promotion and application.

### 3. Analysis of the Development Status of Gardenia Industry in Jiangxi

China announced on March 11, 2002 that gardenia is a medicinal and edible dual-use article, and on April 21, 2014, it was stipulated that gardenia and other medicinal and edible dual-use articles can be used to produce ordinary food<sup>[5]</sup>. Therefore, it is necessary to greatly improve the purity of gardenia yellow pigment and solve the key problem that limits its use as a natural yellow pigment, because it has important economic and social significance for expanding the sales channels of gardenia products, extending the industrial chain, promoting farmers' income, and achieving precise poverty alleviation.

Gardenia is widely distributed, the main production areas are concentrated in Jiangxi, Fujian and Sichuan, and it is also planted in Zhejiang, Hunan, Hubei, Guizhou, Henan and other places. Jiangxi production areas are distributed in Jiujiang Hukou, Yichun Fengcheng, Zhangshu, Fuzhou Jinxi, Ji'an Taihe, Ganzhou, mainly producing red gardenia; Fujian's production areas are distributed in Fuding Guanling, Fenshuiguan, Mingyang and other places, mainly producing yellow gardenia; Sichuan production areas are distributed in Yibin, Leshan and Ya'an, mainly producing Sichuan gardenia<sup>[6]</sup>.

Jiangxi gardenia is of high quality and is an important real estate area for gardenia in China, with huge output. Its production areas are mainly distributed in Zhangshu, Jiujiang, Fuzhou, Fengcheng and other areas in Jiangxi. In Hukou County, under the jurisdiction of Jiujiang City, there are more than 10,000 mu of planting bases, but there is a lack of deep processing, which limits the extension of the industrial chain and directly affects the increase of farmers' income. The actual planting scale of yellow gardenia in Zhangshu City is more than 10,000 mu, of which the largest yellow gardenia planting base is located in Luogang Village, Yicheng Town, with a total of about 2,100 mu. The base produces about 1,000 jin of yellow gardenia fresh fruit per acre. According to news reports from Jiujiang Radio and Television, the output of more than 10,000 mu of gardenia planted in Hukou County, Jiujiang City, Jiangxi Province was only 3,000 tons due to the dry weather in 2022. The Hukou County Party Committee and the county government are focusing on building the county into the largest yellow gardenia planting base in Jiangnan(Fig. 2)<sup>[7,8]</sup>.



Figure 2: Gardenia planting map of Jiangxi gardenia planting base

The planting area of gardenia in Fuzhou City has reached more than 100,000 mu, and the planting scale of yellow gardenia in Jinxi County alone is close to 10,000 mu. Unfortunately, harvesting is not efficient because of problems such as reduced yields due to pests and diseases, and an aging workforce. The planting scale of yellow gardenia in Linchuan District is about 12,000 mu. Due to the low market conditions in recent years, the gardenia planting industry in the region has been neglected, resulting in generally low yield and efficiency, and the mu yield is only about 600 jin. The high cost of labor picking has also become one of the factors restricting the development of the industry.



Figure 3: Gardenia processing diagram of Jiangxi gardenia processing ground

Gardenia production in Jiangxi and other places is huge, of which Fengcheng Jiaohu Village is the famous yellow gardenia processing area in the country, is the "first village"(Fig. 3) of gardenia processing in Jiangxi, accounting for 40%-45% of the national gardenia production. However, the vast majority of gardenia fruits, including Fengcheng and Hukou County, are sold as raw materials or Chinese medicine pieces, and lack corresponding intensive processing. This restricts the extension of the industrial chain and the further increase of product added value, which is vulnerable to overcapacity, affecting farmers' income increase and planting enthusiasm.

#### 4. Development Trend of Jiangxi Gardenia Industry

Growers are basically in a loss-making state, because the market price is low, the growers in the production area are lax in management, the output has dropped significantly, and the mu output can only reach more than a dozen kilograms of dry goods. As shown in Figure 4, the last high price of gardenia was 27-28 yuan (Jiangxi unified goods) at the end of 2016 and early 2017, and since then it has been declining, falling to 12 yuan in 2018 and only about 10 yuan in 2019. Low prices dampen farmers' enthusiasm for production. In 2020, its market began to rebound, but the increase that year was limited. In the first half of 2021, the market of gardenia was relatively stable, at 12-13 yuan. From the second half of the year, its market began to rise again with the clarity of production reduction, the increase of merchants' attention, and the acceleration of the movement of goods, and the price of Fujian goods also rose to 19-20 yuan (9-10 yuan in January), which was double the beginning of the year. It became one of the bright varieties in the medicinal herb market at that time<sup>[9]</sup>.

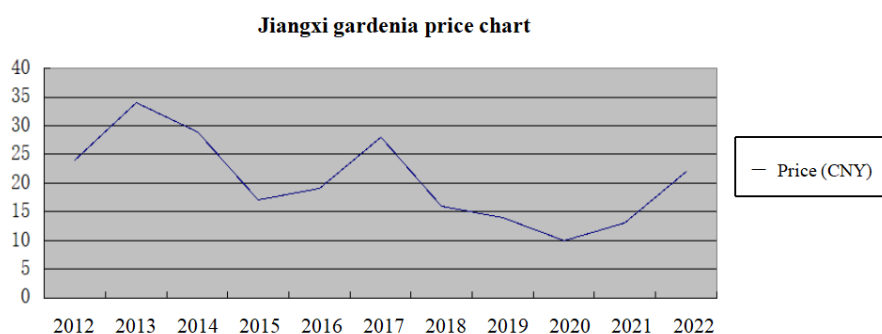


Figure 4: Jiangxi gardenia price chart

##### **(1) Factors such as high production costs and low market prices have led to the gradual decline of Jiangxi gardenia's market position**

Due to the low management enthusiasm of growers in recent years, some production areas have even cut down trees, resulting in further obvious yield reduction. At the same time, the government encourages



grain cultivation and implements subsidies for grain cultivation. Some local governments discourage the cultivation of Chinese medicinal herbs, resulting in many gardenia trees being cut down and farmers planting other cash crops. With the decrease of processors, low market prices, and unprofitable growers, gardenia processors have changed their careers due to lower profits, and the processing volume of this variety has also decreased significantly. In summary, the price of gardenia in the early stage was depressed due to disorderly development. In the context of the general rise in the price of Chinese medicinal materials, the overall production capacity is still huge and the inventory is not small, although the production has been reduced in recent years, the market has risen, but the continuous upward momentum is insufficient.

### ***(2) The high processing cost and low selling of old goods lead to low prices of new goods***

In the past few years, the enthusiasm of growers to manage is low, and some planting areas have even seen tree cutting, resulting in further significant yield reductions. The annual demand for gardenia is nearly 6,000 tons. In addition to medicinal and food dual use, it is also a raw material for the chemical industry. Gardenia demand has been affected by the pandemic in recent years, resulting in slow digestion. Moreover, the market of gardenia is also higher under the control of large households due to the impact of the general rise in the market of Chinese medicinal materials. During the new production period, large households continued to purchase fresh fruits in the production area, and the cost price of new goods was raised. To make matters worse, many merchants dumped old goods at below-market prices, resulting in a large number of new sources of goods being stranded in the production areas. Consequently, the price of new goods is low (Fig. 5).



*Figure 5: Comparison of old and new gardenias*

### ***(3) Jiangxi gardenia production capacity is affected by other production areas, and the price changes periodically***

Gardenia is currently mainly a growing variety for the market. Jiangxi Province used to be the largest producing area, but with the large-scale planting of new varieties in Fujian production areas, the production capacity of Fujian production areas accounted for more than 60% of domestic gardenia production. Fujian is dominated by hilly and mountainous areas, and the fertilization technology based on drones has been very mature. The scale of gardenia planting in Fujian has gradually expanded, the management level has been continuously improved, and Fujian Province has developed into the largest gardenia planting production area in China. At present, the planting scale of gardenia here exceeds 50,000 mu, and the annual output of gardenia is about 10,000 tons. In 2021, the Fujian gardenia market is abundant in supply, with 8,500 tons of origin inventory, occupying an important market position. This, coupled with the advantages of content standards and low price, has enabled Fujian gardenia to be welcomed by the market, and its output in recent years has been far greater than that of Jiangxi production areas. The market space of Jiangxi gardenia has been severely squeezed, and the price has a great impact. The market and production of Jiangxi gardenia often affect each other, and the price change has a certain periodicity. Since 2010, its market has experienced several ups and downs, and it has become the object of attention of merchants.

In general, Gardenia production has decreased in recent years, and the price has increased significantly since 2020, but the low-price inventory reflux market has inhibited the continuous upward trend of new goods. The operating environment of the gardenia market is poor, and the performance of gardenia is not optimistic due to various factors. It is difficult for the market demand for gardenia to improve significantly, and it is expected that the market situation in the later period is not optimistic.

Jiangxi is an important real estate area of gardenia in China, and it is an important way for Jiangxi to implement the rural revitalization strategy, build a gardenia industry, and make the people rich. Jiangxi

gardenia industry has been developing for many years, ranking among the best in scale and promising prospects. This suggests that it is necessary to increase capital investment, hold gardenia and gardenia fruit picking festivals, strengthen the construction of supporting facilities, improve processing efficiency, reduce processing costs, increase investment in the research and development of gardenia industry, develop a variety of forms and varieties of gardenia processing products, combine Jiangxi's rural revitalization and beautiful rural construction, develop rural eco-tourism, form gardenia + rural tourism, culture, leisure and other industrial models, promote the sustainable and healthy development of Jiangxi's gardenia industry, and thus achieving high-quality economic development in Jiangxi.

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