

## Comparative Analysis of Functional Components for Tea Flower in Different Areas in Hainan

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**Keywords:** Hainan, tea flower, functional components, comparative analysis

**Abstract:** Content of functional components, such as tea polyphenol, crude polysaccharide, total flavone, total saponins, and amino acid in tea flower and tea in main tea production area in Hainan Province, China was mainly determined in the experiment. It is found through comparative analysis that total content of tea polyphenol, tea polysaccharide, and amino acid in tea is higher than tea flower; however, content of total flavone and total saponins in tea flower is higher than that in tea. In general, functional components contained in tea flower are close to that in tea. Content of functional components of tea flower in Zhongyeyzhong Tea Garden on Five Finger Mountain in Hainan (organic planting) is obviously higher than that of Dayezhong tea flower in other production areas. Content of functional components respectively is: 6.5mg/100g of tea polyphenol, 1150mg/100g of crude polysaccharide, 1130 mg/100g of total flavone, 761mg/100g of total saponins, and 11.01g/100g of amino acid. Content of above-mentioned components for Dayezhong tea flower in other production areas may be slightly different. Mean value of functional components for Dayezhong tea is 5.7mg/100g of tea polyphenol, 848mg/100g of crude polysaccharide, 818 mg/100g of total flavone, 507mg/100g total saponins, and 8.67g/100g of amino acid.

In recent years, tea industry is gradually revitalized in Hainan Province where has about 20 thousand mu of planting area. Big leaf tea is universally planted in tea gardens in Hainan Province, accounting for 80% of total planting area. Planted tea varieties mainly include Hainan Dayezhong tea and Yunnan Dayezhong tea. Zhongyeyzhong tea is mainly in Five Finger Mountain and Chenmai and is mainly subject to organic planting. Xiaoyezhong tea tree used to be introduced. However, it has basically varied to Dayezhong tea tree due to climate in Hainan.

Dayezhong tea tree in Hainan tea garden basically blooms all the year round. The high flowering period is between July and August. Flowering season of wild Dayezhong tea is from November to February next year. Wild tea tree has small flowering amount and small flowers. Tea garden with Zhongyeyzhong tea tree planted in Five Finger and Chenmai in Hainan Province has the largest flowering amount and the largest output during November to February next year. 900kg~1200kg of fresh flowers or flower buds can be picked up in tea garden per mu in the season with the largest output of tea flower; 1200~1500kg of fresh flowers or flower buds can be picked up in Zhongyeyzhong tea garden per mu. Output of Zhongyeyzhong tea flower is obviously higher than that of Dayezhong tea flower.

### 1. Materials and instruments

#### 1.1 Materials

Experimental sample collection site: Baoting, Five Finger Mountain, Baisha, Qiongzong, and Ding'an

Experimental sample collection of tea flower: flower bud and tea with a bud and two leaves in tea production areas

#### 1.2 Instruments

722spectrophotometer: Shanghai Youke Instrument Co., Ltd.; TDL-408B centrifuge: Jintan

Hongke Instrument Plant; UV755B ultraviolet-visible spectrophotometer: Shenzhen Dingxinyi Laboratory Equipment Co., Ltd.; WSL-2 chromometer: Shanghai Shengguang Machinery Plant; HX-1800 automatic amino acid analyzer: Wuhan Hengxin Instrument.

## 2. Methods

### 2.1 Sample handling

Fresh leaf and flower bud → sunning (sunning for 1h in a sunny day) → water removing (pan-fired for 4min with motorized pulley) → rolling → drying (50-60°C; drying until there is 5% of moisture content) → determine samples

### 2.2 Determination methods

Tea polyphenol (calculated according to dry basis): GB/T 8313-2008 methods to determine content of tea polyphenol and catechin in tea; crude polysaccharide (calculated according to glucose): method to determine polysaccharide (anthrone colorimetry); flavone (calculated according to rutin): determination of flavone in health food; total saponins (calculated according to panaxoside Re): determination of total saponins in health food.

## 3. Result analysis

### 3.1 Analysis of tea polyphenol

Fig. 1 shows that content of tea polyphenol in tea is obviously higher than that in tea flower. Content of tea polyphenol in tea in different production areas ranges from 19.5g/100g to 21.9g/100g, while content of tea polyphenol in tea flower ranges from 5.2g/100g to 6.5g/100g. There is no obvious difference. Content of tea polyphenol in tea in organic tea garden in Five Finger Mountain is the highest, which is 21.9g/100g. Moreover, content of tea polyphenol in Zhongyeyzhong tea flower in organic tea garden in Five Finger Mountain is also the highest, which is 6.5g/100g.

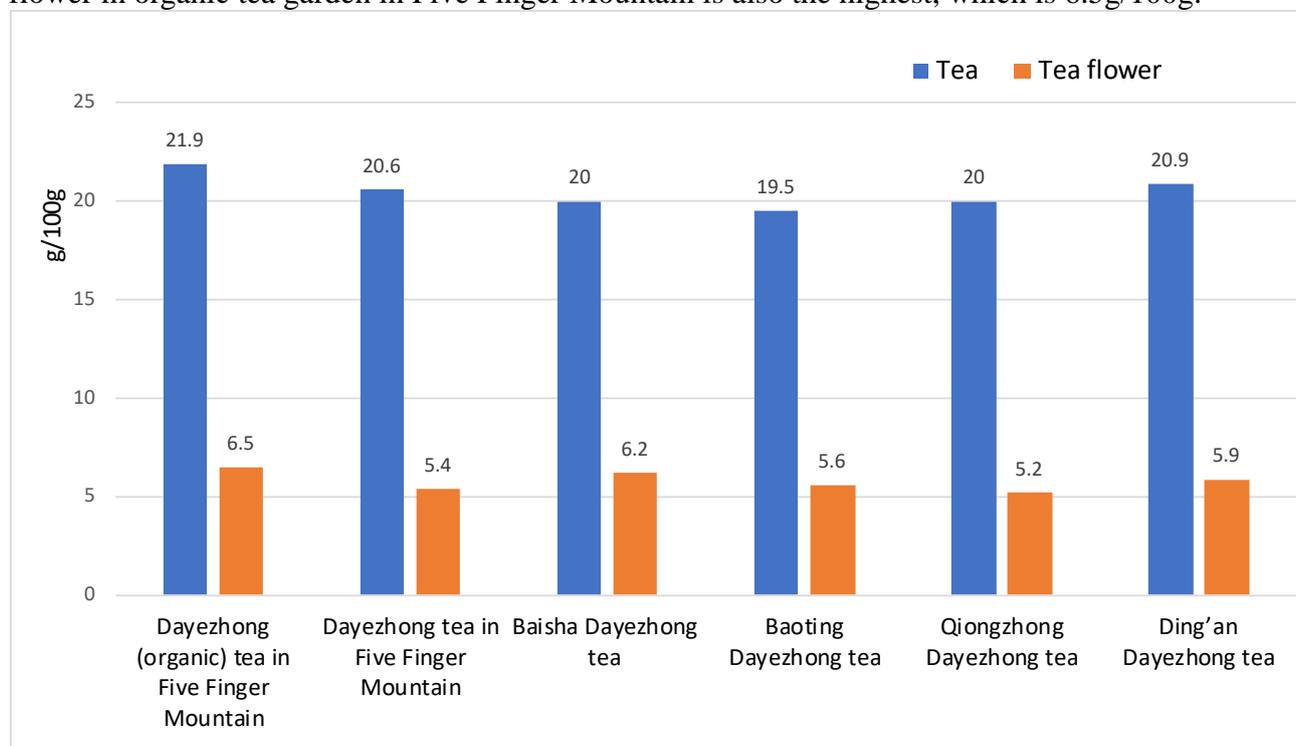


Fig. 1 Comparative Chart for Content of Tea Polyphenol in Tea and Tea Flower

### 3.2 Analysis of tea polysaccharide

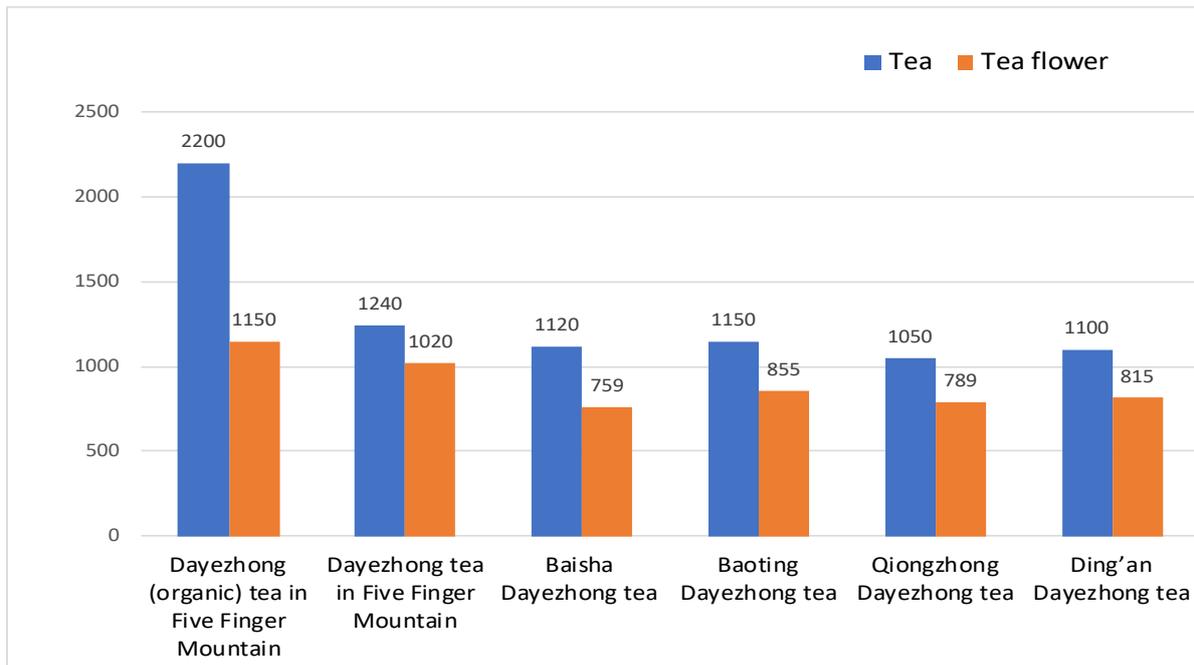


Fig. 2 Comparative Chart for Content of Crude Polysaccharide in Tea and Tea Flower

Fig. 2 shows that content of polysaccharide content in tea is higher than that in tea flower. Content of polysaccharide content in tea in different production areas ranges from 1050mg/100g to 2200mg/100g, while that in tea flower ranges from 759mg/100g to 1150mg/100g. Content of polysaccharide content in Zhongyeyzhong tea in organic tea garden in Five Finger Mountain is obviously the highest among that in tea in other production areas, which is 2200mg/100. There is no obvious difference in content of crude polysaccharide in Dayezhong tea in other production areas. Content of Qiongzong Dayezhong tea is the lowest, which is 1050mg/100g. Content of crude polysaccharide in Zhongyeyzhong tea flower in organic tea garden in Five Finger Mountain is the highest among that in tea flower in other production areas, which is 1150mg/100g. Content of Baishao Zhongyeyzhong tea flower is the lowest, which is 759mg/100g

### 3.3 Analysis of total flavone

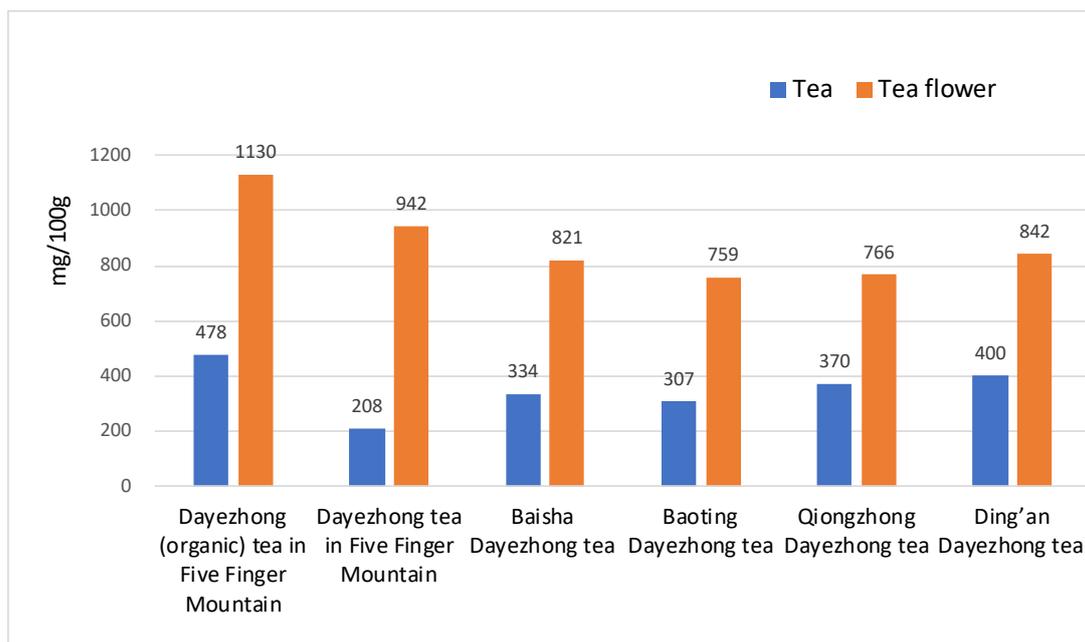


Fig. 3 Comparative Chart for Content of Total Flavone in Tea and Tea Flower

Fig. 3 shows that content of total flavone in tea flower is obviously higher than that in tea. Content of total flavone in tea flower in different production areas ranges from 1130mg/100g to 759mg/100g, while that in tea ranges from 208mg/100g to 478mg/100g. Content of total flavone in tea flower and tea in organic tea garden in Five Finger Mountain is the highest amount that in other production areas, which is respectively 1130mg/100g and 478 mg/100g. Baoting Dayezhong tea flower and tea have the lowest content of total flavone, which is respectively 759mg/100g and 307mg/100g.

### 3.4 Analysis of total saponins

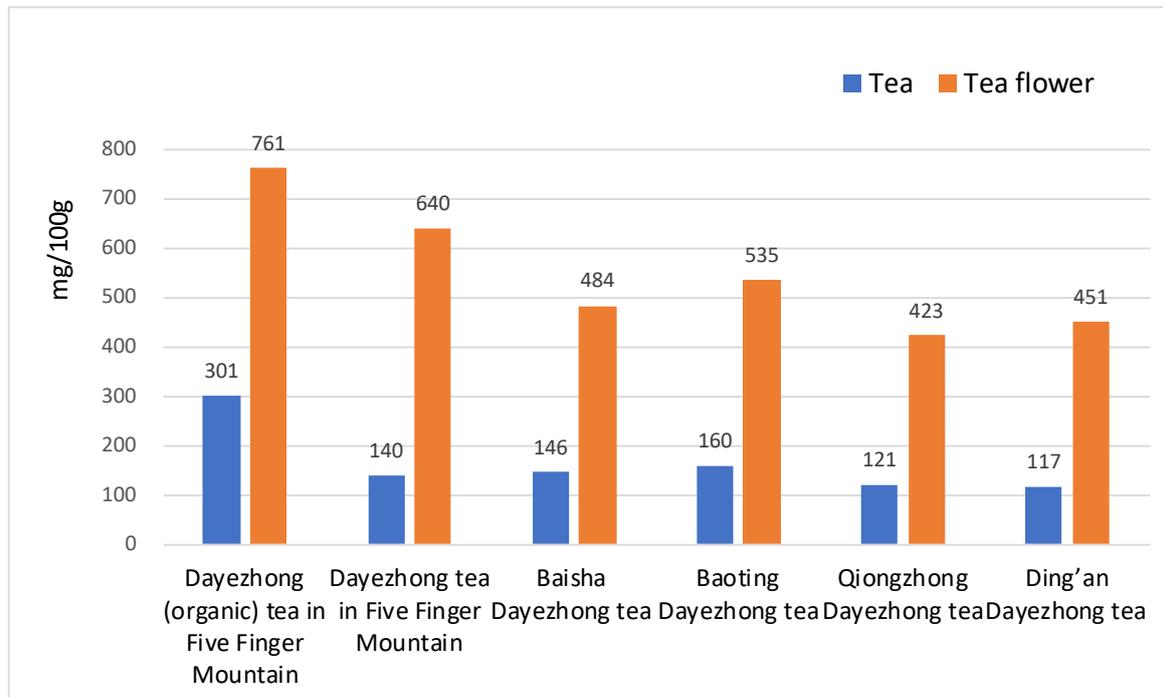


Fig. 4 Comparative Chart for Content of Total Saponins in Tea and Tea Flower

Fig. 4 shows that content of total saponins in tea flower is obviously higher than that in tea. Rank for content of total saponins in tea flower in different production areas is: Zhongyeyzhong in Five Finger Mountain > Dayezhong in Five Finger Mountain > Baoting Dayezhong > Baisha Dayezhong > Ding'an Dayezhong > Qiongzong Dayezhong. Content of total saponins in Dayezhong tea flower and tea in organic tea garden in Five Finger Garden is the highest among that in other production areas, which is respectively 761mg/100g and 301 mg/100g. Qiongzong Dayezhong tea flower and tea have the lowest content of total saponins, which is respectively 423mg/100g and 121mg/100g.

### 3.5 Analysis of amino acid

Fig. 5 shows that content of amino acid in tea is obviously higher than that in tea flower. Content of tea polyphenol in tea in different areas ranges from 22.38g/100g to 15.82g/100g. There are obvious differences. Content of amino acid in tea flower ranges from 7.74g/100g to 11.01g/100g. Total content of amino acid in Zhongyeyzhong tea in organic tea garden in Five Finger Mountain is the highest, which is 22.38g/100g. Content of amino acid in Zhongyeyzhong tea flower in organic tea garden in Five Finger Garden is the highest among that in other tea flower, which is 11.01g/100g. Content of amino acid in Baisha Dayezhong tea is the lowest among that in tea, which is 15.82g/100g. Content of amino acid in Baisha Dayezhong tea flower is the lowest among that in other tea flowers, which is 7.74mg/100g.

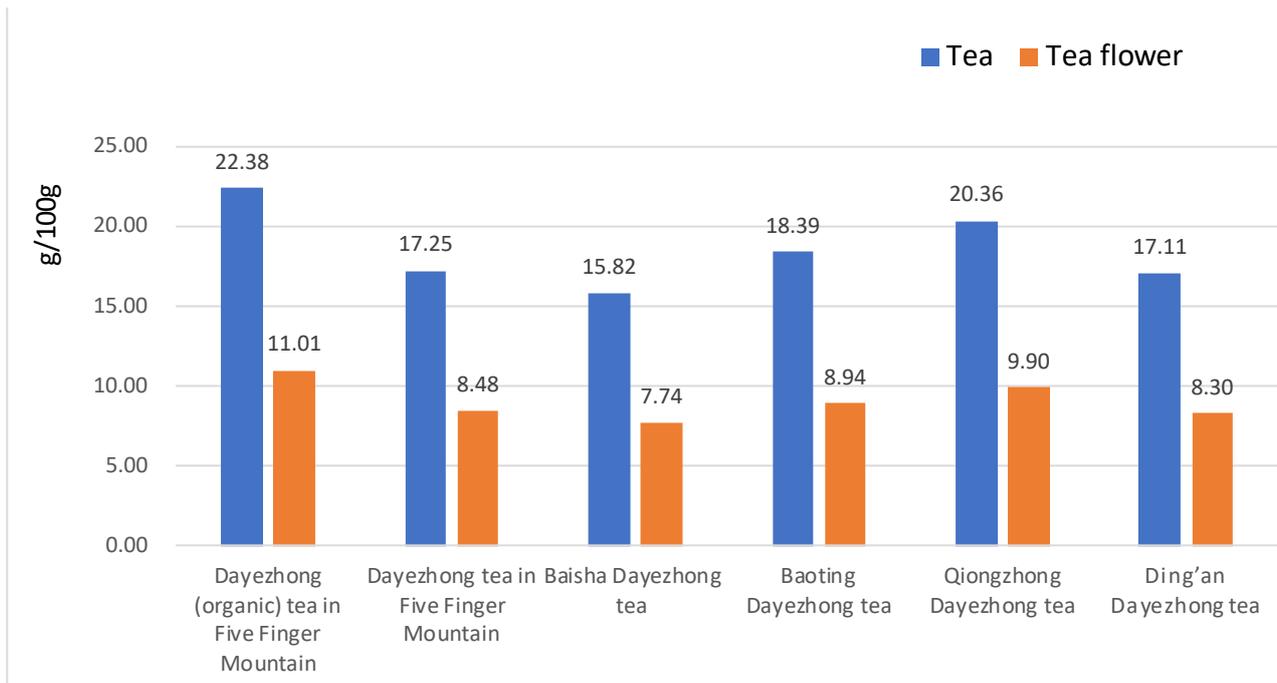


Fig. 5 Comparative Chart for Total Content of Amino Acid in Tea and Tea Flower

### 3.6 Analysis of functional components in tea flower

Table 3 Table for Main Functional Components of Tea Flower

| Functional components | Organic Zhongyeyzhong | Dayezhong in Five Finger Mountain | Ding'an Daye | Baisha Daye | Qiongzong Daye | Baoting Daye | Mean value of Daye |
|-----------------------|-----------------------|-----------------------------------|--------------|-------------|----------------|--------------|--------------------|
| Tea polyphenol        | 6.5                   | 5.4                               | 6.2          | 5.6         | 5.2            | 5.9          | 5.7                |
| Crude polysaccharide  | 1150                  | 1020                              | 759          | 855         | 789            | 815          | 848                |
| Total flavone         | 1130                  | 902                               | 821          | 759         | 766            | 842          | 818                |
| Total saponins        | 761                   | 640                               | 484          | 535         | 423            | 451          | 507                |
| Amino acid            | 11.1                  | 8.48                              | 8.30         | 7.74        | 8.94           | 9.90         | 8.67               |

Fig. 3 shows that functional components of tea flower in (organic planted) Zhongyeyzhong tea garden in Five Finger Mountain in Hainan Province is obviously higher than that of Dayezhong tea flower in other production areas. Content of functional components is respectively: 6.5mg/100g of tea polyphenol, 1150mg/100g of crude polysaccharide, 1130 mg/100g of total flavone, 761mg/100g of total saponins, and 11.01g/100g of amino acid. Content of above-mentioned functional components for Dayezhong tea flower in other production areas may be slightly different. Mean value of functional components for Dayezhong tea is 5.7mg/100g of tea polyphenol, 848mg/100g of crude polysaccharide, 818 mg/100g of total flavone, 507mg/100g of total saponins, and 8.67g/100g of amino acid.

### 4. Conclusion

Based on above-mentioned analysis, functional components of tea flower in (organic planted) Dayezhong tea garden in Five Finger Mountain in Hainan Province is obviously higher than that in Dayezhong tea flower in other production areas. Content of functional components is respectively: 6.5mg/100g of tea polyphenol, 1150mg/100g of crude polysaccharide, 1130 mg/100g of total flavone, 761mg/100g of total saponins, and 11.01g/100g of amino acid. Content of above-mentioned functional components for Dayezhong tea flower in other production areas is slight different. Mean value of functional components for Dayezhong tea is 5.7mg/100g of tea

polyphenol, 848mg/100g of crude polysaccharide, 818 mg/100g of total flavone, 507mg/100g of total saponins, and 8.67g/100g of amino acid.

It is found through comparative analysis of functional components for Dayezhong tea and tea flower that total content of tea polyphenol, tea polysaccharide, and amino acid in tea is higher than that in tea flower. However, content of total flavone and total saponins in tea flower is higher than that in tea. In general, functional components contained in tea flower are similar to that contained in tea. Moreover, amino acid composition is similar to each other.

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### References

- [1] Diao Mengyao, She Lin, and Sheng Jiping. Current situation and outlook of research utilization of tea flower resources [J]. *Food and Nutrition in China*, 2017, 23 (12):24-28.
- [2] Huang Xiao, Wang Bingwu, et al. Influences of different drying methods on quality of tea flower [3]. *Food Science and Technology*, 2017, 42 (12): 82-87.
- [3] Chen Dongmei, He Jinwu, and Fan Weiwei. Analysis of flowing for different varieties of tea trees in Hainan Province and functional components for tea flower [J]. *Farm Products Processing*, 2018(04):52-53+57.
- [4] Chen Dongmei, Li Ming, and Chen Mingxing. Analysis of functional components for tea flower in Five Finger Mountain [J]. *Food Research and Development*, 2017, 38 (07): 119-121.
- [5] Wang Yaguang. Determination methods of functional components for health food [M]. Beijing: China Light Industry Press, 2002: 15
- [6] Ministry of Health of the PRC. Technical specification of detection and evaluation for health food (WFJF [2004] 42) [Z]. 2003, 02, 14