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# Analysis on Development Potential of *Millettia speciosa* Champ Industry in Guangdong Province

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**Abstract** In recent years, *Millettia speciosa* Champ has attracted extensive attention because of its high medicinal and edible value. This paper will summarize the composition and application of *Millettia speciosa* Champ, analyze the advantages and existing problems in developing *Millettia speciosa* Champ industry in Guangdong Province according to the demand for *Millettia speciosa* Champ and the present situation in Guangdong Province, and put forward reasonable countermeasures and suggestions.

**Key words** *Millettia speciosa* Champ, Guangdong Province, Development potential

## 1 Introduction

*Millettia speciosa* Champ, also called the Beautiful *Millettia* Root<sup>[1]</sup>, is the tuberous root of the *Millettia speciosa* of fabaceae and papilionaceae. It is mainly distributed in Guangdong Province, Guangxi Province, Hainan Province, Hong Kong and Macao as well as some Southeast Asian nations, growing in the bushes<sup>[2–3]</sup>. *Millettia speciosa* Champ is sweet in taste, neutral in nature and attributive to the lung and kidney meridians with the efficacy of deficiency tonifying & lung moistening, loins strengthening & kidney invigorating and tendon strengthening & collateral activating. It has shown significant effect in the treatment of lumbar muscle strain, tuberculosis, phlegm eliminating & cough relieving, liver protection, arthritis, chronic bronchitis and immunity improvement<sup>[4–5]</sup>. Because of its super high economic and medicinal value, the demand for it is steadily on the increase<sup>[6–7]</sup>. In recent years, it has become very popular among people with extensive application in drug manufacturing and soup cooking *etc.* as a raw material.

Guangdong Province is the first major province of economy in China. With the development of economy and improvement of living standards, the awareness of health and food therapy has risen. Healthy medicinal materials are becoming more and more popular among people. However, industrialization has not yet been achieved in the artificial cultivation of *Millettia speciosa* Champ. It is of great necessity to conduct research on the cultivation of *Millettia speciosa* Champ in Guangdong Province, establish testing and demonstration bases, expand the planting area of *Millettia*

*speciosa* Champ to achieve scale cultivation, advertise the functions of *Millettia speciosa* Champ, and make a breakthrough for the development of *Millettia speciosa* Champ industry.

## 2 Composition of *Millettia speciosa* Champ

Many scholars at home and abroad have started the researches on the chemical composition of the root of *Millettia speciosa* Champ since the 1990s. It has been found that the main components of *Millettia speciosa* Champ are formononetin and maackiain, the contents of which can be used as the indicators for evaluating the quality of *Millettia speciosa* Champ<sup>[6,8]</sup>. In addition, some other compounds have been separated from the ethyl acetate of the ethanol extract from *Millettia speciosa* Champ, such as 3, 4, 2'-, 4'-tetrahydroxy chalcone, pyracenic acid, (–)-syringaresinol, drodehydrediconife alcohol, 5-hydroxymethylfurfural,  $\alpha$ -methoxyl-2, 5-furan-dihydroxy-benzoic acid, stigmasterol, stigmasterol-3-*O*- $\beta$ -D-glucoside,  $\beta$ -sitosterol & daucosterol, isoliquiritigenin, pterocarpin, medicarpin and homopterocarpin. In the second place, as one of the material bases of reinforcing drugs, *Millettia speciosa* Champ contains abundant trace elements, especially Cu, Fe, Mn and Zn. These trace elements play an important role in the synthesis of enzyme and hemoglobin in the body and the improvement in hematopoietic function<sup>[9–10]</sup>. Moreover, *Millettia speciosa* Champ also contains some flavonoids compounds such as pterocarpin and chalcone, as well as polysaccharides and triterpenoids<sup>[6,8]</sup>. It is known that polysaccharides play a significant role in enhancing or regulating immune functions<sup>[11]</sup>.

## 3 Application of *Millettia speciosa* Champ

With the effects of anti-oxidation, anti-inflammation, immune regulation, anti-cancer and anti-fatigue, *Millettia speciosa* Champ is mainly applied for the following purposes: (1) Medicated food and medicinal liquor. Medicated food and medicinal liquor are of high nutritional value and can be used for preventing and curing diseases, protecting health and prolonging life. Because of its

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nourishing effect, *Milletia speciosa* Champ has been used for making medicated food and medicinal liquor in Hainan Province, Guangdong Province and some other places. (2) Production of Chinese patent medicines. Because of its efficacy and healthcare functions, *Milletia speciosa* Champ has been applied to produce loins-strengthening and kidney-invigorating bolus and fitness capsule since the 1970s. Professor Deng Tietao, a famous doctor of traditional Chinese medicine, has cured motor neuron diseases successively by using the *Milletia speciosa* Champ<sup>[12-14]</sup>. (3) Soup cooking. Experimental researches show that *Milletia speciosa* Champ has a low content of fat-soluble effective components but a high content of water-soluble extracts, including polysaccharides and some other effective components. The application of *Milletia speciosa* Champ in soup cooking may help to fully release the nutrients and give full play to the function of bone and tendon strengthening. Cooking soup with *Milletia speciosa* Champ is more commonly found in the southern provinces, especially Guangdong Province and Guangxi Province.

## 4 Advantages and Existing Problems in Developing *Milletia speciosa* Champ Industry in Guangdong Province

**4.1 Advantages in developing *Milletia speciosa* Champ industry in Guangdong Province** Residing in the subtropical area characterized by subtropical monsoon climate, Guangdong Province has ample rainfall, abundant water resources, long sunshine duration and sufficient heat as compared with other provinces in China. *Milletia speciosa* Champ is fond of warm and humid climate with abundant sunshine. It is suitable to be grown in the low-latitude warm and humid regions of the tropics and subtropics with the annual average temperature of around 20 °C. Guangdong Province has a long summer and short winter with high accumulated temperature and less frost. The climate and soil resources here are suitable for the growth of *Milletia speciosa* Champ, which forms a climate advantage.

Guangdong Province is economically developed, and the development of economy has given rise to people's pursuit of healthy food and medicine. *Milletia speciosa* Champ has received great attention because of its special effect in health care. Another factor to boost the demand of *Milletia speciosa* Champ is that people in Guangdong Province have always had the habit of cooking soup with medicinal materials to keep good health. At present, *Milletia speciosa* Champ is in short supply in the market. Meanwhile, advanced economy is also a major advantage to promote industrial development. Therefore, *Milletia speciosa* Champ industry has broad market prospect and good economic benefits in Guangdong Province.

In addition, as the gathering place of the wild genetic resources of *Milletia speciosa* Champ, Guangdong Province has certain advantages in collecting and preserving the provenance of *Milletia speciosa* Champ. At present, some scientific research institutions have begun the cooperation with enterprises to research the

tissue culture seedling technology of *Milletia speciosa* Champ. In recent years, continuous planting bases of *Milletia speciosa* Champ have appeared in succession. Tissue culture seedlings of *Milletia speciosa* Champ have also begun to appear in some seedling exhibitions and agricultural expos. A number of seedling companies and individual farmers have shown great interest in planting and selling *Milletia speciosa* Champ as a traditional Chinese medicine.

## 4.2 Existing Problems in Developing *Milletia speciosa* Champ Industry in Guangdong Province

**4.2.1 Wild planting resources are under threat.** With the deepening awareness of the healthcare functions of *Milletia speciosa* Champ, people's demand for *Milletia speciosa* Champ is increasing year by year. Despite of this, there is a short of researches on *Milletia speciosa* Champ. According to herbalogical study, it is firstly set out in the Summary of Medicinal Properties of Herbs and is a local medicinal material recorded in *Chinese Herbal Medicine Material Standard of Guangxi Province* (1990 edition)<sup>[16]</sup>. Due to a lack of adequate awareness, wild resources have not been taken seriously with effective protection and management measures and regulations. Excessive picking and digging behaviors of people have resulted in a serious decline in the quantity of *Milletia speciosa* Champ, which has seriously threatened the preservation and propagation of the genetic resources of wild *Milletia speciosa* Champ. The annual decline in standing stock might even threaten the preservation and sustainable utilization of wild resources<sup>[17]</sup>.

**4.2.2 There is a lack of scientific cultivation genetic breeding techniques.** At present, the *Milletia speciosa* Champ used by people for food is mainly wild *Milletia speciosa* Champ that is lacking in regulation. People do not know enough about the botanical, biological and genetic characteristics of *Milletia speciosa* Champ. In the wild state, *Milletia speciosa* Champ is mainly propagated by seed. The current situation of slow germination, low germination rate, slow growth and low reproduction rate<sup>[18]</sup> is rarely possible to meet human needs. Now people have realized the supply-demand imbalance of *Milletia speciosa* Champ and have begun to attach importance to the scientific research on *Milletia speciosa* Champ. But the scientific cultivation and genetic breeding technologies are still at an early stage, and systematic research has not yet been carried out due to an inadequate number of research institutions and talents in this respect<sup>[17]</sup>. It is difficult to achieve the target of large-scale planting and cultivation in a short period.

**4.2.3 Bitter *milletia speciosa* is used to disrupt the market.** Under the current situation that *Milletia speciosa* Champ is in short supply in the market, some businessmen use the dried root of *Mchampioni Benth* that is commonly known as bitter *milletia speciosa* as the adulterant of *Milletia speciosa* Champ, which is very likely to mislead the consumers. In fact, there is significant difference between the two in the respects of shape, properties and efficacy *etc.*<sup>[19]</sup>. The root of *Milletia speciosa* Champ has long, nubby, crooked and spindle-shaped tubercle with yellow & rough skin

and a sweet taste. But the bitter *Milletia speciosa* is cylinder-shaped and has a bitter taste with a radial textured cross-section<sup>[19]</sup>. However, people do not have such basic knowledge to distinguish and often have a wrong understanding of the effects of *Milletia Speciosa* Champ, which will affect the development of *Milletia Speciosa* Champ industry.

**4.2.4 Industrialization** has not yet been formed. Wild *Milletia Speciosa* Champ resources have been collected to supply the market all the time, which almost leads to resource exhaustion. Even the genetic resources are under threat. In order to attach importance to and develop *Milletia Speciosa* Champ industry, relevant research and development institutions have devoted lots of manpower and material resources to carry on research<sup>[2]</sup>. Some colleges and universities and research institutions have also tried to establish tissue culture plants to produce tissue culture seedlings of *Milletia Speciosa* Champ. In addition, the Ministry of Agriculture has established the Standardized Production Demonstration Park of South China Medicinal Plants in support of setting up a standardized production demonstration park of *Milletia Speciosa* Champ. In some places, cultivated species have appeared. But as *Milletia Speciosa* Champ is suitable to grow in a favorable environment, the planting scale is still very limited in a shortage of land resources at present. The stage of large-scale supply has not yet been achieved, which results in inadequate cultivation availability<sup>[20]</sup>.

## 5 Recommendations for Developing *Milletia Speciosa* Champ Industry in Guangdong Province

**5.1 Strengthening the protection of wild *Milletia Speciosa* Champ resources** It is recommended to take protective measures in the regions with concentrated distribution of *Milletia Speciosa* Champ so as to preserve wild genetic resources. Both in-situ conservation and ex-situ conservation can be applied. In the distribution areas, designate the protection zone, strengthen publicity and assign specialists for safeguarding and management for the purpose of protecting existing wild genetic resources of *Milletia Speciosa* Champ. According to the requirements on the growing environment of the wild resources, ex-situ conservation can also be applied. Establish the germplasm repository for *Milletia Speciosa* Champ at a certain scale to collect and preserve the existing genetic resources of wild *Milletia Speciosa* Champ. Through this process, the basic materials for follow-up studies on seed selection, breeding and cultivation techniques of *Milletia Speciosa* Champ can be provided.

**5.2 Scaling up the research on artificial cultivation techniques of *Milletia Speciosa* Champ** On the basis of wild *Milletia speciosa* Champ resources, it is recommended to set up scientific research projects and assign special talents and research teams so as to conduct research on the botany, biology, cultivation, genetics and seed breeding of *Milletia speciosa* Champ<sup>[17]</sup>. Encourage the research units to cooperate with enterprises to promote the research on tissue culture and rapid propagation techniques. Apply modern technologies to carry out artificial cultivation

and solve the problem of high-quality seed breeding for the purpose of meeting the increasing demand. Besides, study the planting method of interplanting *Milletia speciosa* Champ among tall trees in consideration of land conservation<sup>[19]</sup> and observe the ecological and economical benefits of interplanting *Milletia speciosa* Champ with other crops.

**5.3 Establishing industrialized production bases** Currently, the supply of *Milletia speciosa* Champ falls short of demand in the market. The cultivation of *Milletia speciosa* Champ shows good market prospect and brings good economic benefits<sup>[21]</sup>. Tissue culture and rapid propagation technique has become an effective approach for the seedling breeding and industrial development of *Milletia speciosa* Champ. Overcoming the technical difficulties in tissue culture and establishing tissue culture plants and industrialized production bases is the only way to develop *Milletia speciosa* Champ industry in Guangdong Province. Research units and enterprises should also take an active part in the scientific research and demonstration projects of *Milletia speciosa* Champ. Promote scientific research by projects, and promote scale cultivation by scientific research. Take the lead to establish standardized production demonstration bases in major provinces and cities, which will produce certain radiation and driving effects upon local villages and towns. In this way, the development of the entire *Milletia speciosa* Champ industry will be further promoted.

**5.4 Developing relevant policies and encouraging the cultivation and research of *Milletia speciosa* Champ** The government and agricultural research departments should have a full understanding of the development advantages and prospect of *Milletia speciosa* Champ in Guangdong Province, strengthen publicity, formulate relevant policies, and encourage enterprises and peasant households to plant *Milletia speciosa* Champ and conduct relevant research. Relevant scientific research institutions may promote the continuous and stable development of *Milletia speciosa* Champ industry by means of declaring projects, promoting demonstration, bringing science and technology to the countryside and establishing research teams *etc.*

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All enterprises should strengthen brand building, constantly inject the spirit of the brand into the product development, manufacturing operations, marketing channels and advertising, and build the unique brand culture, to constantly increase the clothing brand value and improve competitiveness in international markets.

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