



*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

# Development Situations and Recommendations for *Zanthoxylum schinifolium* Industry in Zhaoyang District of Yunnan Province

Ning ZHANG, Lianming WEN\*, Zhanghua LI

Zhaoyang District Forestry Bureau, Zhaotong 657000, China

**Abstract** Zhaoyang District is an important *Zanthoxylum schinifolium* planting area in Zhaotong City and even Yunnan Province, and it has a long history of cultivation. Through the survey and analysis of the status and problems of the development of *Z. schinifolium* industry, it came up with the recommendations for improving the *Z. schinifolium* industry, including introducing foreign capital to increase the added value of the products, and strengthening selection and breeding of fine seeds and research of high-yield technologies.

**Key words** *Zanthoxylum schinifolium*, Industry development, Development Situations, Recommendations, Zhaoyang District

## 1 Introduction

*Zanthoxylum* spp. is Rutaceae *Zanthoxylum* shrub or small arbor, and originated in China. Zhaoyang District is an important area with long history of *Zanthoxylum* planting. In the whole district, there are green and red fruits of artificially planted *Zanthoxylum*, accordingly there are *Zanthoxylum schinifolium* Sieb. et Zucc. and *Zanthoxylum bungeanum* Maxim. *Z. schinifolium* is mainly distributed in the three townships (Tianba, Yanshan, and Dazhaizi) with altitude of 600–1 800 m in the dry and hot valley of the Jinsha River, while *Z. bungeanum* is mainly distributed in 16 townships except Dashanbao Town.

*Zanthoxylum* is woody oil tree species integrating edible, medicinal, and ecological values. At present, with the constant deepening of people's understanding of the economic, medicinal and ecological value of *Zanthoxylum*, as well as the attention of governments at all levels, the guidance of market price, and the voluntary development of forest farmers, the *Z. schinifolium* industry has been further developed. However, there are some problems to be exposed. In order to fully understand and grasp the development status and problems of *Z. schinifolium* industry in Zhaoyang District, we carried out a survey on the development status and problems of *Z. schinifolium* industry in Zhaoyang District, and came up with the recommendations for its development, so as to provide certain references for government and forestry authorities to formulate appropriate policies.

## 2 Conditions and necessities of developing *Z. schinifolium* industry in Zhaoyang District

**2.1 Rich natural resources** Zhaoyang District, situated in the northeastern part of the Wumeng Mountain area of the north of the Yunnan-Guizhou Plateau, is the political, economic, and cultural information center of Zhaotong City. Covering an area of 2 167.00 ha including 90 166.4 ha of farmland, 114 347.1 ha of forest area (forest coverage rate is 38.01%), Zhaoyang District administers

20 towns (offices). The total population is 891 400, and the agricultural population is 480 200. Zhaoyang District is a typical plateau landform. The area is cut by rivers such as the Jinsha River and Niulan River, forming a complex terrain with alternating high and low altitude mountains and narrow river valleys. Light, heat, water elements and plant communities have differences in the north-south level and changes in vertical height. It has a typical plateau monsoon climate, distinct wet and dry seasons. The average temperature is 11.6°C, the average annual evaporation is 2 244.3 mm, the average annual rainfall is 750–1 000 mm, and the relative humidity is 74%. The average annual sunshine is 1 710 h, and the accumulated annual temperature of  $\geq 10^{\circ}\text{C}$  is 3 237.4°C. Throughout the year, the frost-free period is 220 d. The rich land, human resources and favorable plateau monsoon climate provide necessary conditions for the development of the *Zanthoxylum* industry in Zhaoyang District.

**2.2 Long history of cultivation** *Z. schinifolium* is a kind of economical tree species with many uses such as edible spices, spices, oils and medicinal materials. *Z. schinifolium* is also one of the native tree species in Zhaoyang District. As early as the Ming and Qing dynasties, Yi people in Yanshan Town had planted *Z. schinifolium*. Due to long history of planting, forest farmers have a certain practical basis for the cultivation and management of *Z. schinifolium*, which has laid favorable conditions for the development of the *Z. schinifolium* industry.

**2.3 Function of ecological restoration to promote economic development** The *Z. schinifolium* in Zhaoyang District is mainly distributed in the karst rock desertification area with altitude of 600–1 800 m in the hot dry valley of the Jinsha River. This area is characterized by little farmland, low forest coverage, thin rocky exposed rock layer, ecological degradation and a vulnerable habitat. It is a difficult problem how to restore the ecology and develop the local economy in the process of returning farmland to forestry. Planting *Z. schinifolium* can solve this problem. *Z. schinifolium* grows fast and has a well-developed root system. It is suitable for planting in arid and thin soil, and has the function of maintaining water and soil and improving the ecological environment. Besides, the economic value of *Z. schinifolium* is high. The price of dried

*Z. schinifolium* in recent years is stable at 80 – 110 yuan/kg, so the income of *Z. schinifolium* is up to 30 240 yuan/ha. Therefore, planting *Z. schinifolium* can effectively restore the ecology and promote regional economic development.

### 3 Development situation of *Z. schinifolium* industry in Zhaoyang District

**3.1 *Z. schinifolium* planting area** Yanshan Town, Tianba and Dazhaizi townships in Jinsha River valleys have a total area of 20 671.01 ha, the farmland and forest area is 17 388.9 ha, and the area with altitude of 600 – 1 800 m suitable for planting *Z. schinifolium* is 5 216.7 ha. At present, the planting area of *Z. schinifolium* is 3 323.9 ha, involving 3 898 families (18 016 farmers), while about 1 892.8 ha of idle land and forest land can be developed for planting *Z. schinifolium*.

**3.2 Annual output value of *Z. schinifolium*** In existing planting area of 3 323.9 ha *Z. schinifolium*, 255.5 ha *Z. schinifolium* forest has become old and needs upgrade. And 528.4 ha *Z. schinifolium* forest is not put into production. However, *Z. schinifolium* forest entering the best fruiting period lacks fertilizer application, pruning, and prevention and control of insect pests and diseases, the annual production of fresh *Z. schinifolium* is 945 kg/ha, total yield of fresh *Z. schinifolium* is 2 400.3 t, and dry *Z. schinifolium* is 960.1 t. Calculated at the lowest 80 yuan/kg in 2015, 2016, and 2017, the output value is about 30 240 yuan/ha, and the total output value is about 76.808 million yuan.

### 4 Existing problems in the development of *Z. schinifolium* industry

**4.1 Low development and utilization rate** Zhaoyang District has a long history of cultivation of *Z. schinifolium*, the annual yield of fresh *Z. schinifolium* is 2 400.3 t, but the product is mainly dry *Z. schinifolium*, the added value is extremely low. By now, only Yanshan Town has established the *Z. schinifolium* sales association, but no enterprise has joined. What's more, the research, development, and deep processing of *Z. schinifolium* powder, oil, and seed acid organic fertilizer are still in a blank. All of these restrict the healthy development of *Z. schinifolium* industry.

**4.2 Lack of industrial construction funds and insufficient research of high yield technologies** The Jinsha River valley is an arid rocky desertification area, where the soil lacks water and fertilizer, and the investment in supporting facilities for fertilization and irrigation is almost zero. With many years of efforts, although the forestry departments have summarized many applicable cultivation technologies according to local conditions through model forests, experimental demonstration forests, etc., the lack of a series of studies on demand of water and fertilizer, pest control and harvest management of *Z. schinifolium* resulted in failure to ensure the high yield and stability of *Z. schinifolium*.

**4.3 Fine seed base construction of *Z. schinifolium* lagging behind the pace of industrial development** Forest quality relies on seed, while seed lies in the quality. The planting area of *Z. schinifolium* in Zhaoyang District has been increasing year by year. Nevertheless, there is no standard fine seed breeding base in

Jinsha River valley. *Z. schinifolium* seedlings planted by the farmers are mainly purchased from other areas. Varieties have different quality. These easily lead to large area of low-yield *Z. schinifolium* or widespread of insect pests and diseases, accordingly leading to the failure of the development of the *Z. schinifolium* industry.

### 5 Recommendations for development of the *Z. schinifolium* industry

**5.1 Introducing foreign capital and increasing the added value of *Z. schinifolium*** It is recommended to adopt the method of "making up for the drawback of late start through high starting point", to attract advanced technologies and introduce nonpublic economy to participate in the construction of *Z. schinifolium*. For example, it is possible to take the operation mode of "company + base + farmers", form the advantage of the *Z. schinifolium* industry under the guidance of science and technology and market, to increase the added value of *Z. schinifolium*, and raise the popularity of *Z. schinifolium*.

**5.2 Strengthening fine seed selection and breeding and research of high yield technologies** (i) The healthy development of the *Z. schinifolium* industry is inseparable from fine seed. However, introduction or sexual reproduction of seed has high risk, and it takes a long time to recover the costs. Some *Z. schinifolium* farmers adopt wild *Z. schinifolium* and rock *Z. schinifolium* with strong vitality as rootstocks. They branches with many spikes, full grain, free of insect pests and diseases to make asexual reproduction and have obtained excellent effect. It is recommended that government should increase the input of funds, and scientific and technological personnel should get involved in the experiment and promotion of fine seed breeding. (ii) It is recommended to carry out research of *Z. schinifolium* cultivation technologies in different site conditions, including water and fertilizer demand rules, pruning, florescence adjustment, prevention and control of insect pests and diseases, and fruit collection and harvesting standard. (iii) It is recommended to undertake the research of technologies for improving the quality and increasing the yield of *Z. schinifolium*, and increase the per unit area yield and quality of *Z. schinifolium*.

### References

- [1] YU SN. Study on the Chinese prickly ash[J]. China Condiment, 2012, 37(12):10–12, 28. (in Chinese).
- [2] JIN DY. Yunnan edible woody oil marketing research[J]. Forestry Economics, 2014, 36(4): 94–97. (in Chinese).
- [3] FENG ZW, DUAN ZY. Management techniques of *Zanthoxylum bungeanum* cultivation garden in Jinsha Valley of Northeast Yunnan[J]. Journal of West China Forestry Science, 2006, 35(2):128–131. (in Chinese).
- [4] JIANG QJ, LI ZM, CHEN JB, et al. Studying on fungicidal control of the Chinese prickly ash root rot[J]. Journal of Yunnan Agricultural University, 2007, 22(5):766–772. (in Chinese).
- [5] HE YR, ZHANG D, ZHANG YC, et al. Approach to soil degradation process in dry and hot valley region of Jinsha River, Yunnan Province [J]. Journal of Soil and Water Conservation, 1999, 5(4):1–5, 38. (in Chinese).