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Current Situations and Countermeasures of Development of Kiwifruit Industry in Guizhou Province

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Abstract On the basis of current development situations of planting, scientific research and processing of kiwifruit industry in Guizhou Province, the paper analyzes main factors restricting development of kiwifruit industry, including lack of unified planning, standardized planting specifications, and backward management of kiwifruit orchard. In accordance with current development situations and restricting factors, the paper presents some countermeasures for development of kiwifruit industry in Guizhou Province, including scientific planning, optimizing variety structure, management of cultivation technology, training of kiwifruit farmers, as well as marketing.

Key words Kiwifruit, Variety optimizing, Industry development, Guizhou

Kiwifruit (Latin name: *Actinidia chinensis*) belongs to the *Actinidiaceae* family and *Actinidia* genus. It is a kind of nutritious fruit tree, containing rich vitamin C. Edible in fresh or processed state and high economic value, it has always been reputed as the king of fruits. Guizhou is one of the regions with distribution of kiwifruit. Up to date, China has 59 kinds, 43 varieties and 7 variants of kiwifruit. Guizhou has 34 kinds and phylogenetic groups^[1]. Since 1989 when it started planting kiwifruit, Xiuwen County of Guizhou Province has established a kiwifruit production base covering an area over 4 000 hm², with Liuguanghe Kiwifruit famous both at home and abroad. From 2000, Shuicheng County began introducing Hongyang Kiwifruit. The registered Qianhong Brand Liangdu red heart kiwifruit won gold medal in China Fruit and Seedling Exhibition (Jiangxi) in 2007, and later it was awarded as designated fruit of 2008 Beijing Olympics and designated organic fruit of World Expo 2010 Shanghai China. In recent years, at the time when development of Guizhou fruit industry stays at the golden period, the kiwifruit has been included into one of the most important industries of fine fruit development in Guizhou Province. Therefore, making clear thinking of development, locating problems of development of kiwifruit industry in Guizhou and seeking proper solutions and approaches are of great significance to speeding up healthy development of kiwifruit industry and improving ki-

wifruit production level. On the basis of current development situations of kiwifruit industry in Guizhou, we analyzed major factors restricting kiwifruit industry and put forward some ideas and countermeasures, in the hope of providing theoretical reference for sound development of kiwifruit industry in Guizhou Province.

1 Current development situations of kiwifruit industry in Guizhou

1.1 Current planting situations In the middle and later period of the 1990s, Guizhou kiwifruit production experienced a period of golden development. The planting area was up to 6 000 hm², and the variety mainly includes Qinmei, Hayward, and Guichang, etc. After 2008, it started popularizing Hongyang kiwifruit in Shuicheng, Weng'an and Meitan regions. According to survey and statistics in 2009, the planting area of kiwifruit was 5 600 hm² in Guizhou, accounting for 4.2% of its total planting area of fruit trees, and 7.5% of total kiwifruit planting area of China; the output reached 13 000 tons, taking up 1.9% of the whole country^[2]. In Guizhou, enterprises developing kiwifruit planting industry mainly include Zunrong Guibao Group and Meinong Development Company, as well as poverty-relief and development organizations subordinate to regions, cities and counties.

1.2 Current scientific research situations Scientific researches of kiwifruit in Guizhou Province are mainly taken in Guizhou University and Guizhou Horticultural Institute. Since 2000, Guizhou Horticultural Institute increased input into researches of kiwifruit, introduced Hongyang kiwifruit to Shuicheng County, which brings about noticeable effect. In 2007, it was certified by Guizhou Variety Certification Commission and popularized in Shuicheng, Weng'an and Meitan regions. In 2011, Guizhou Horticultural Institute drafted and implemented two local standards: *Hongyang Kiwifruit* (DB52/T 714 – 2011) and *Technical Specifications of Production for Hongyang Kiwifruit* (DB52/T 715 – 2011), which were issued

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by Guizhou Quality and Technical Supervision Bureau. Researches of Guizhou University on kiwifruit mainly focus on physiological development and fruit softening, and the researches are relatively in-depth.

1.3 Current processing situations In recent years, enterprises developing kiwifruit processing industry in Guizhou mainly includes Zunrong Guibao Group, Winfirst Group, and Hanfang Company. Zunrong Guibao Group is mainly engaged in fruit drink and other companies focus on producing health care medicines. Since kiwifruit is mainly sold in fresh state, these companies are gradually reducing the portion of processing kiwifruit.

2 Factors restricting development of kiwifruit industry in Guizhou

2.1 Lack of unified planning, standardized planting specifications Many kiwifruit orchards in Guizhou Province lack unified planning and standardized planting management technology. Planting is arbitrary, overall distribution awareness is weak, the popularity of modern science and technology is low, and the use of fruit expander is still widespread.

2.2 Backward management of kiwifruit orchard

2.2.1 Extensive management, badly short of input and low level of technical application.

(i) Short of input. Guizhou is a less developed region; in rural areas, the situation is worse. Most kiwifruit planting households have no capital to invest in infrastructure. At present, 90% kiwifruit planting households still use hedge or fence, some even use simple bamboo shelf, and few planting households use racks or T-racks. Shortage of input and no return for various reasons lead to extensive management of cultivation and low yield (per unit area yield lower than 4 500 kg/hm²), bad quality and low benefit.

(ii) Lack of scientific management. Due to failure to understand science and technology and low management level, some kiwifruit orchards built at huge cost are out of management, and consequently forming "out of management – low yield – out of management" vicious cycle.

(iii) Inadequate popularization effort in advanced technology^[3-5]. Most kiwifruits recently developed in Guizhou Province have been distributed to farmers. However, due to unfamiliar with kiwifruit cultivation technology, the production of kiwifruit is limited.

2.2.2 Mixed varieties, few high quality varieties and unreasonable variety structure. At present, Guizhou Province has introduced over 10 kiwifruit varieties. Fine varieties, such as Guichang and Hongyang, only account for 20% of total number of varieties and 50% of total planting area. Mixed and few high quality varieties result in big difference in sales price. For example, Miliang No.1 and Qinmei were sold at unit price lower than 2 yuan/kg in 2008, lower than 3 yuan/kg in 2009, while Guichang was sold at as high as 6–8 yuan/kg in 2008 and 8–10 yuan/kg in 2009. In addition, most varieties are late-maturing, so the variety structure is not reasonable, leading to excessive concentration of kiwifruit going on the market.

2.2.3 Slow development, small scale, and serious lagging of industrialized development. Through our survey, merely in Xiuwen County of Guizhou Province, the area suitable for planting kiwifruit is up to 6 670 hm². In 2000, the planting area was only 4 000 hm². Later, due to low benefit, the planting area was not increased but reduced gradually. By 2009, the planting area was only 2 000 hm². Slow development and small scale bring about linkage effect that deep processing industry of kiwifruit after production is serious lagging or takes on a blank state.

2.2.4 Weak infrastructure, low orchard quality and backward storage facilities. Most kiwifruit orchards input little in infrastructure construction, mainly shown from no working passage, no water pool, no cement T-rack, let alone standardized or modern orchards. Besides, as to kiwifruit, there is always saying that it will be softened in 7 days, become bad in 10 days and rotten in half a month. Since there is no gas storage room yet in Guizhou, and the marketing period is too concentrated, large quantity of fresh kiwifruits will be rotten and economic benefits will be lowered.

2.2.5 Weak scientific research and technical force. At present, institutions about technical research of kiwifruit in Guizhou Province only have Guizhou Horticultural Institute, Agricultural College of Guizhou University, Guiyang University, and fruit stations of some cities and counties. Working staff directly participating in kiwifruit research are relatively few. Therefore, with increase in planting area of kiwifruit in recent years, it is difficult to suit demands of development. In the aspect of kiwifruit resource development, application and breeding, supporting technology for industrialized development, molecular biology, biological chemistry and processing and development, kiwifruit genetic diversity and systematics, the research is nearly blank or few, so it is required to strengthen scientific research and popularization of kiwifruit.

3 Advantages and potential of kiwifruit industrial development in Guizhou

3.1 Advantages in industrial development

3.1.1 Resource conditions for developing kiwifruit industry. Guizhou is one of the regions with distribution of kiwifruit in China. Up to date, China has 59 kinds, 43 varieties and 7 variants of kiwifruit. Guizhou has 34 kinds and phylogenetic groups^[1].

3.1.2 Advantages in ecological environment and geography. Guizhou Province (24°37'–29°13'N and 103°36'–109°35'E) is situated at east slope of Yunnan–Guizhou Plateau. Within the province, most regions have average temperature of the whole year of 15°C with ≥10°C effective accumulated temperature about 5 000°C, annual sunshine time up to 1 100 to 1 400 hours, annual precipitation above 1 000 mm, and relative humidity about 80%, so most areas are suitable for growth and development of kiwifruit^[1]. As a hub of communications in southwestern regions, Guizhou Province has been integrated into Pan-Pearl River Delta Economic Zone with rapid development of social economy. After completion of construction of Guiyang–Guangzhou High-speed Railway and highway, the highway in Guizhou will form a 6 horizontal, 7 vertical and 8

connecting transport junction, which will further narrow the distance between Guizhou Province and Pearl River Delta and Changjiang Delta, provides precious opportunity for fine fruits going out of Guizhou mountainous areas, and will definitely promote rapid development of fine kiwifruit industrial development in Guizhou Province.

3.1.3 Comparative advantages of benefits. As a new variety of fruit with high content of vitamin C, kiwifruit is sold at a much higher price than other common fruits. In Meitan, the retail price of Hongyang brand kiwifruit is as high as 50 yuan/kg. If packaged, the same Shuicheng brand kiwifruit can be sold at 60 yuan/kg, showing a relatively high comparative advantage of benefits.

3.2 Potential of industrial development

3.2.1 Potential of market demand. Kiwifruit is a new variety of fruit and favored by people for its high content of vitamin C. Apart from rich nutrients, kiwifruit also has high medicinal value and ornamental value. It is characterized by rapid growth, early fruiting and high yield. At present, the global kiwifruit yield is 1.5 million tons, accounting for only 0.2% of total yield of fruits, and 1/60 of the apple yield of the world. The annual trade volume of kiwifruit is about 1 million tons in the world, while only European market has annual demand of 0.8 million tons. In China, the kiwifruit yield can not satisfy domestic demand yet, and it needs importing a lot from New Zealand, to meet consumption demand of large and medium cities, such as Beijing, Tianjin, and Shanghai. Compared with large kiwifruit production countries, such as New Zealand, Italy and Chile, China's kiwifruit production has price advantage (low cost), geographical advantage (close to the Middle East and Southeast Asian market), sales season advantage (big difference in the maturing time of the same variety), so it is competitive at both domestic and abroad market. And it has great development potential and high economic value.

3.2.2 Brand potential. Local varieties of kiwifruit in Guizhou Province mainly include Guichang, Guimi, Guifeng and Guilu, among which Guichang has large planting area and high quality and yield. Besides, Hongyang kiwifruit introduced since 2000 shows better yield and quality than the origin and was certified by Guizhou Variety Certification Commission in 2007. Hongyang kiwifruit receives favorable market response and often gets into short supply, so it can be planted in moderate scale. In addition, there are rich wild kiwifruit resources in Guizhou Province. If increasing development effort in wild resources and breeding high quality varieties suitable for cultivation in Guizhou and meeting market demands, as well as creating its own characteristic brand, the kiwifruit industry will have a broad prospect in Guizhou.

4 Countermeasures for promoting development of Guizhou kiwifruit industry

4.1 Scientific planning to ensure regional, large-scale and standardized planting

4.1.1 Distribution planning. The development of kiwifruit industry in Guizhou Province should take No.1 document of cen-

tral government and No.2 document issued by the State Council as guiding policy. With great support of agricultural departments of the province, city and county, it should strictly implement the spirit of the Opinions on Speeding up Fine Fruit Industry Development in Guizhou, adhere to the principle of "unified planning, proper distribution, centralized and large-scale development" and combine actual situations of cities and counties, to build high level standardized and moderate-scale kiwifruit production base, determine large-scale, standardized and market-oriented direction, and actively adjust agricultural industrial structure.

(i) Production scale. Guizhou Province should strive to build 13 300 hm² high quality kiwifruit production base with Xiuwen, Shuicheng and Weng'an as core development areas by the end of 2015, transform old kiwifruit orchards 6 670 hm², to keep the production scale of standardized kiwifruit orchard at 20 000 hm².

(ii) Distribution of variety structure. Guizhou Province should take Xiuwen County as the center to develop 6 670 hm² kiwifruit, control and reduce planting area of Qinmei, expand famous brands Hayward and Guichang; take Shuicheng County and Weng'an County as center to develop 6 670 hm² Hongyang kiwifruit; actively introduce and test yellow heart brands Jinyan and Huayou, and strive to increase the planting area to 6 670 hm².

4.1.2 Establishing technical standards and requirements. Kiwifruit production in Guizhou Province should strictly accord with requirements of *Hongyang Kiwifruit* (DB52/T 714 –2011) and *Technical Specifications of Production for Hongyang Kiwifruit* (DB52/T 715 –2011). Besides, it should carefully select orchards suitable for planting kiwifruit, ensure seedling quality, properly match male and female plants that have close affinity, and plant in appropriate time. In the course of growth and development, it is required to enhance soil, fertilizer and water management, and pruning in time. Furthermore, proper measures should be taken for plant diseases and insect pests, including applying suitable pesticide, collecting in proper time and packaging in grades.

4.2 Establishing safeguard measures

4.2.1 Taking charge of model orchard construction severely. It is recommended to further enhance awareness of kiwifruit farmers for standardized production, explore and research comprehensive support technologies for standardized production of kiwifruit, accelerate normative orchard construction, fertilizer application, scientific pruning, artificial pollination, reasonable load, fruit bagging, orchard weeding, plant disease and insect pest prevention and control, and ecological demonstration, to bring the production and quality to a higher level. In main production regions of Guizhou Province, it should gradually establish standard model orchards and harmless fine kiwifruit production base. Using racks in planting kiwifruit, the per unit area yield can reach 21 000 kg/hm²; using T-rack, the yield is up to 12 000 kg/hm²; using hedge or fence, the yield is only 4 500 to 7 500 kg/hm². On the basis of the above situations, planning kiwifruit planting should take a long view, popularize

the application of racks, T-rack, transform existing hedge and fence into T-rack or racks, and increase technical, fertilizer, and pesticide input, to raise kiwifruit yield, and conduct fine scientific management to increase economic benefits of kiwifruit farmers.

4.2.2 Strengthening training of kiwifruit farmers. All regions should enhance exchange and cooperation with superior competent authorities, colleges and universities and scientific research institutes. Especially, it should enhance the effort in popularizing technologies in rural areas and implement scientific training plan. We recommend establishing long-term training mechanism with municipal and provincial experts as main teachers, professional personnel as propagation forces and kiwifruit farmers as trainees. In the course of training, it should attach great importance to improvement of practical technologies and skills, combining operating theories, market knowledge, information technology, and policies and regulations.

4.2.3 Speeding up industrialized operation. It is proposed to support qualified leading enterprises to build kiwifruit production, storage, and export base, extend the industrial chain, and increase the added value. In centralized producing region of kiwifruit, it is possible to establish pre-cooling storage, to lift the overall kiwifruit storage capacity of Guizhou Province. Besides, it should energetically support various kinds of agricultural industrialized operating organizations and found professional cooperatives, to improve organizational level of kiwifruit farmers and speed up industrialized operation of kiwifruit industry^[6]. For example, the development of kiwifruit in Shaanxi and Hunan is benefited from industrialized road^[7-12]; the model of "company + university + association + base" established by Hunan Jishou Laodie Sci-tech Development Limited Company has received enormous benefit^[13].

4.2.4 Enhancing market exploiting effort. In sales seasons of each year, it is recommended to draw lessons from existing market network system, organize agricultural industrialized leading enterprises and large kiwifruit distributing households, participate in various agricultural exhibitions both at home abroad, or hold agricultural exhibitions, exploit and occupy market. At the same time, it should strengthen producing region construction^[14-16].

4.2.5 Reinforcing kiwifruit cultural construction. Relying on Guizhou's natural and tourism resources richly endowed by nature, we recommend developing sight-seeing orchards, make tourists and visitors know kiwifruit culture, find out knowledge of kiwifruit production, storage, and health care, so as to pull the consumption and promote rapid and stable development of kiwifruit industry.

4.2.6 Strictly implementing market supervision. It should enhance market management, forbid application of fruit expander, and strike out fake and poor pesticides, seedlings, fertilizers and packages in compliance with laws, to fully protect lawful rights and interests of kiwifruit farmers, trades and developers related to kiwifruit^[17-18]. In addition, it is required to speed up construction of security supervision system for kiwifruit quality, lift inspection and supervision ability, and control the prod-

uct quality well, to guarantee rapid and sound development of kiwifruit industry in Guizhou Province.

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