

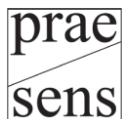
The Kiwifruit Industry and Kiwifruit Production in Western Húnán

Lisa Meingassner

Abstract

This article is about kiwifruit production in the north-western part of Húnán province in central China. It provides an overview of the kiwifruit industry in China and traces the development of kiwifruit production in this specific region. It presents the results of a case study conducted at Jishou University in Xiāngxī Tǔjīa and Miáo Autonomous Prefecture. Situated in a poor and economically underdeveloped area, the university concentrates on local minorities and the development of the region. It has initiated many projects to help in lifting poverty, one of them being the Kiwifruit Project, which encourages local farmers to get actively involved in kiwifruit production and processing. The paper highlights the cooperation between the academic institution, an industrial partner and government agencies in this endeavour. It addresses the problems and challenges that the establishment of a kiwifruit industry in Xiāngxī has faced over a run of more than two decades, shows solutions based on innovation as in the form of developing new breeds or the introduction of organic farming, and evaluates the socioeconomic as well as the ecological impact the project has had on the local society and environment.

Keywords: kiwifruit industry, Húnán province, poverty reduction, organic farming



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Introduction: Current state of research and methodology

This article uses the findings of a case study conducted in Húnán 湖南 province to answer questions on the kiwifruit industry and kiwifruit production in central-southern China. Alongside agricultural, ecological and economic aspects, the paper deals with the social impact brought about by the development of the kiwifruit industry in the specific context of this region.

Information about the development of the kiwifruit industry and kiwifruit production was scarce over quite a long period of time, not only in China, but in the whole world. In the past 20 years, though, the popularity of the kiwifruit has grown, together with the volume of research done and the number of texts published on the subject. Because of a comparatively late focus on the kiwifruit industry and the fruit's production in China, the literature and statistics are respectively rare or incomplete up to the mid-1990s. Only from then on have researchers started to pay attention to this topic.

Professor Huáng Hóng-wén 黄宏文, researcher at the Institute for Kiwifruit Research at the botanical gardens in Wūhàn 武汉, Húběi 湖北 province, has made outstanding contributions to research on kiwifruit and has published valuable papers in English and Chinese, partly in cooperation with the renowned expert E. R. Ferguson from New Zealand. There is not much literature on the kiwifruit industry and production in western Húnán. Several professors and researchers from Jíshǒu University 吉首大学 (*Jíshǒu dàxué*), the managers of local companies and local government officials have contributed documents on the subject. However, most of these papers have not been published and are designed for internal usage only. No detailed description of the development of the kiwifruit industry and kiwifruit production in Xiǎngxī Tǔjīa and Miáo Autonomous Prefecture 湘西土家族苗族自治州 (*Xiǎngxī Tǔjīazú Miáozú zìzhìhōu*), the site of the case study, has been published to date.

The lack of research done and of papers published on this issue has meant that conversations with kiwifruit farmers and experts have turned out to be an important part of the research project presented in this article. The author conducted ten interviews with experts in the field of the kiwifruit industry, production and processing, mostly managers or professors at local institutions and companies. The second important source of information was provided by interviews with 24 kiwifruit farmers spread all over Xiǎngxī. Their farms were selected in view of their altitude,¹ their location² and their form of management.³ The local government and the Office for Poverty Reduction in Xiǎngxī supplied the necessary statistical data.

1 300 to 1,100 metres.

2 Remote, or infrastructurally well connected.

3 Administered by a company or privately.

China, the country of origin

Kiwifruit was mentioned early in Chinese history and literature, for example in poems of the Táng 唐 dynasty and in various ancient and modern encyclopedias of Chinese flora and fauna or Chinese medical plants (Cui et al. 2002: 1-3).

Dr Augustine Henry, an Irish medical doctor, was the first foreign scientist who, during his nine-year stay in Yíchāng 宜昌, Húběi province, in central China, developed a deep interest in the Chinese flora. He collected more than 8,000 different seeds and plants (Ferguson 2004: 9) and sent his research results back to Britain. Amongst those documents various records on the kiwi fruit have been found.

After nine long years in central China, a rather hostile place at that time, Henry went back to Britain and was replaced by E. H. Wilson, who in 1900 sent the first kiwifruit seeds back to the United Kingdom. The British were not especially excited about the discovery of this as yet unknown plant, because they did not know much about cultivating it, and breeding did not bring satisfactory results, as they only possessed seeds from male plants. Research ceased and was stopped completely, both in Europe and America, when World War I started. As a consequence, the cultivation and production of the kiwifruit did not become popular in the western part of the world at that time.

In 1904, Australian missionaries were lucky in spreading the fruit outside of China. European and Australian missionaries in Yíchāng became friends with the researcher E. H. Wilson and therefore got to know more about the exotic fruit and its special taste. Isabel Fraser, who in 1904 paid a visit to her sister, who was stationed as a missionary in Yíchāng, was fascinated by the fruit and took the seeds back home to New Zealand. She then gave the seeds to Thomas and Alexander Allison, who spread the plant in New Zealand, and from 1910 on kiwifruit were produced there – for the first time outside of China. In 1930 the first orchard was established, in 1940 a kiwifruit industry started to blossom and has been successful since then (Ferguson 2004: 7-23).

The development of the kiwifruit industry in China

Cultivation

Kiwifruit can be found basically all over China. It is grown in Beijing, Tiānjīn 天津 and Chóngqīng 重庆, in the Guǎngxī Zhuàng 广西壮 and Tibet Autonomous Regions, as well as in 19 out of 22 provinces.⁴

Kiwifruit cultivation takes place between the latitude of 50° and the equator, a distance which hardly any other plant can cover. Most of the orchards are situated in central-south China and south-east China (Cui et al. 2002: 6).

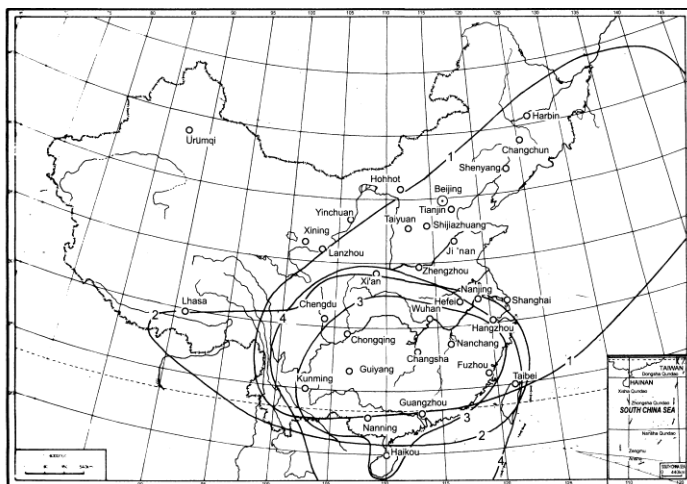


Figure 1 Actinidia in China⁵

Considering its enormous extent, it can be concluded that the plant is extraordinarily adaptable to different climatic and geological conditions. It can prosper in altitudes of 150 to 3,500 metres and withstands extreme differences in temperature (Cui et al. 2002: 13-14).

The idea of cultivating kiwifruit came in the year 1970 in China and the subsequent development can be divided into two important stages:

4 Yúnnán 云南, Sìchuān 四川, Guǎngdōng 广东, Fújiàn 福建, Zhèjiāng 浙江, Húnán 湖南, Húběi 湖北, Jiāngxī 江西, Ānhuī 安徽, Hénán 河南, Shǎnxī 陕西, Gānsù 甘肃, Héběi 河北, Liáoníng 辽宁, Jílín 吉林, Hēilóngjiāng 黑龙江, Guìzhōu 贵州, Shānxī 山西 and Shāndōng 山东 (Bundeszentrale für politische Bildung 2009: 90).

5 Cui et al. 2002: 8.

The first stage started from 1978, when the Chinese Academy for Agricultural Sciences (CAAS) 中国农业科学院 (*Zhōngguó nóngyè kēxuéyuàn*) conducted a nationwide evaluation of all kiwifruit cultivars. The project was supported by the government. It is still on record as the biggest project of its kind for collecting and evaluating wild species from the 27 provinces and autonomous regions in China. Researchers concluded that 62 cultivars out of 66 spread worldwide originate from China (Shí 2005: 3; Huang 2003: 13; Laodie Co. Ltd. 2006b: 3), which means that about 96 percent of all genotypes worldwide are to be found in China (Xiao 1999: 25).

The focus of the second stage starting from 1990 lies in improving the quality of kiwifruit and cultivating breeds with good storage ability, a higher yield, bigger fruit, better adaptation to climatic and soil conditions, etc.; the method used in this context is one of crossbreeding wild and cultivated kiwifruits. Researchers have already developed 57 new cultivars.

Actinidia chinensis is the most popular species and is cultivated in about 80 percent of China's orchards. In comparison, *Actinidia deliciosa* is more productive and brings higher yield. In China 70 percent of the harvest derives from *Actinidia deliciosa* vines (Ferguson and Huáng 2003: 51; Belrose 2007: 87). *A. chinensis* prospers in regions with a mild, warm climate, whereas *Actinidia deliciosa* can mostly be found in harsh and cold areas at higher altitudes.

The characteristic feature of kiwifruit growing in China is that every region cultivates its own breed, which normally grows only in that specific part of the country and only sometimes in neighbouring regions. Wild kiwifruit stocks have declined rapidly in the past decades over the whole of China, partly because of deforestation,⁶ partly because of the introduction of the exploitation of natural resources for the processing industry.

6 Kiwifruit vines need trees to support their climbing.

Acreage and production

While kiwifruit production in the 1990s was declining gradually in the rest of the world, China started to extend its kiwifruit orchards and its kiwifruit industry in that period.

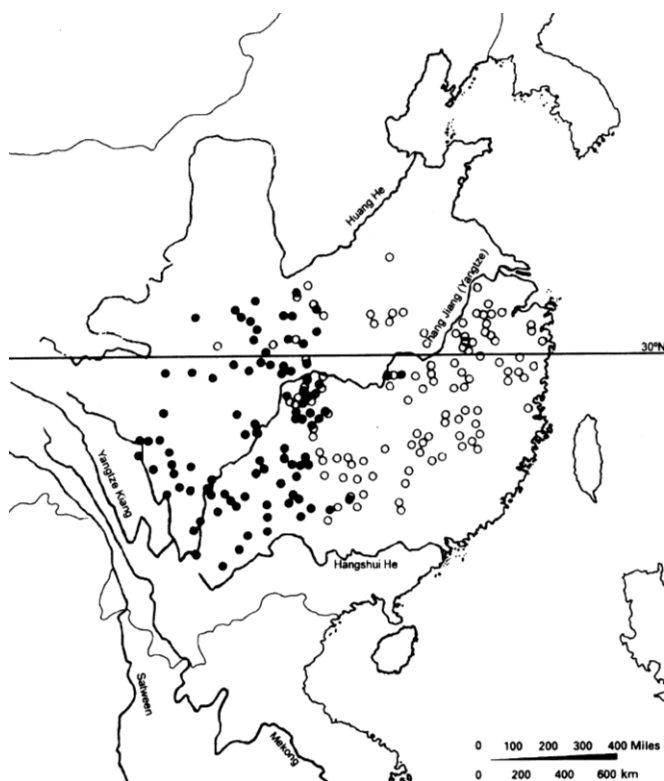
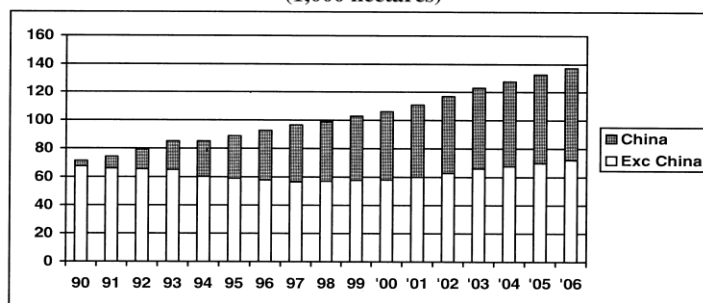


Figure 2 *Actinidia chinensis* (white circles) and *Actinidia deliciosa* (black dots) in China⁷

⁷ Ferguson and Huang 2001: 3.

Diagram 1 Area harvested worldwide (in 1,000 ha)⁸

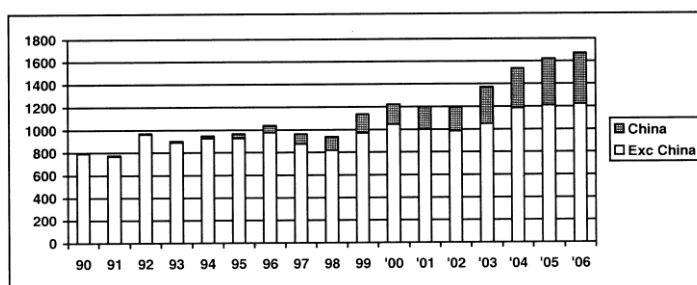
World: Area Harvested of Kiwifruit, 1990-2006
(1,000 hectares)



In 2005, the acreage of China's kiwifruit orchards amounted to 60,807 ha; in 2007 it had already increased to 65,000 ha (Zhǒng 2007). Due to the fact that young vines do not yield much fruit in the first three years, the harvest nonetheless was relatively low in comparison to the amount of acreage.

Diagram 2 Kiwifruit production worldwide (in 1,000 tons)⁹

World: Production of Kiwifruit, 1990-2006
(1,000 metric tons)



In the years between 1994 and 1996, China had produced only 40,000 tons of kiwifruit, and hence ranked seventh in the world, after Italy, New Zealand, Chile, France, Japan and Greece. In the period from 2004 to 2006, the country managed to catch up

⁸ Belrose 2007: 13.

⁹ Belrose 2007: 15.

and position itself as the second biggest producer immediately after Italy with an annual harvest of 425,000 tons (Belrose 2007: 20).

Although production numbers in China are very high, the majority of the fruit is sold within the country. Export makes up only 1.6 percent and mostly goes to the Russian Federation, but also to Canada, Hong Kong, South Korea, Taiwan, Japan, the Middle East, Italy, Spain, the Netherlands and Britain. Hence, China is still in the role of a net importer. Export even declined by 12.3 percent in the years 2004 to 2005 (Belrose 2007: 41-42). Because of different ripening times in the northern and southern hemisphere and limited storage opportunities, all countries have to import kiwifruit in the off-season. China imports fruit in the first six months of the year from the three 'Global Players', Italy, New Zealand and Chile¹⁰ (Belrose 2007: 33).

Kiwifruit industry and production in Húnán province and Xiǎngxī Tǔjīa and Miáo Autonomous Prefecture

Production conditions and acreage

Húnán province is located in central-south China at 24°39'-30°09' latitude and 109°43'-114°15' longitude. It extends over an area of 212,000 km² and has a population of 65 million inhabitants. Mountain ranges and hills make up 80 percent of the whole area. Húnán's subtropical, mild climate brings an average temperature of 16-18.5°C, a yearly condensation of 1,250-2,000 mm and an average humidity of 80 percent. On the average the province enjoys 192-310 frost-free days and 1,200-1,700 hours of sunshine per year. The region's soil is fertile and in general has a thick layer of humus containing 2-8 percent organic substance with a pH-value of 4-6.5 in areas of kiwifruit cultivation.

In the year 2005, Húnán recorded 5,900 ha of orchards, which in sum produced an annual amount of 40,000 tons of kiwifruit (Zhǒng 2007). Acreage had increased by 600 ha by 2003, crop harvest by 10,000 tons.

The western part of Húnán province suits kiwifruit farming most. Eighty percent of the orchards are located in this part of the region, which produces 60 percent of the province's fruit (Cui et al. 2002: 38; Wáng 2005: 103). In the last two decades the province has enforced kiwifruit production with one of the two *Actinidia* cultivars in 80 percent of its districts (Cui et al. 2002: 37-38; Wang and Zhong 2002: 69). Main production areas are the Xiǎngxī Tǔjīa and Miáo Autonomous Prefecture as well as the south-western part of western Húnán (Wang and Zhong 2002: 69; Wáng 2005: 103).

¹⁰ 157 tons, 3,992 tons, 293 tons (Belrose 2007: 33).

The subtropical, mild and humid climate in Xiǎngxī benefits the planting and growing of kiwifruit. The average yearly temperature lies between 16.5°C and 17.5°C, and mountain ranges prevent the winds from blowing too strongly and harshly from the north. Even in winter, temperatures seldom drop to under minus 8°C, while in summer they do not rise above 36°C. These perfect climatic conditions supply the kiwifruit plant with enough sunshine and rain. Well known as an uncomplicated and undemanding plant, kiwifruit grows on fertile loess soil with a high content of selenium¹¹ and a pH-value of 5.5 to 7.0 on steep slopes in altitudes of around 500 metres and higher, where it counterbalances the cultivation of citrus fruit – another important agricultural product of Xiǎngxī – which cannot grow in such high altitudes (XX Statistics 2005; Wu 2002: 4ff).

The region's dominant cultivar is Míliáng 1 米粮 1 号 (*Míliáng 1 hào*), which is mainly used for further processing, not for fresh fruit vending. The western part also records quite a large extent of wild kiwifruit resources. In 2002 these amounted to 23,000 tons, of which 6,250 were recorded in Xiǎngxī (Cui et al. 2002: 38).

Research, breeding and industrialisation

In the late 1970s, three well-known institutions were working successfully in the field of kiwifruit research, the Húnán Horticultural Research Institute, Húnán Agricultural University 湖南农业大学 (*Húnán Nóngyè Dàxué*) and Jíshǒu University 吉首大学 (*Jíshǒu Dàxué*). Together they have cultivated five new breeds from wild species, two *Actinidia deliciosa* and three *Actinidia chinensis*, which now are spread all over the region. In addition to these cultivars, breeds from other provinces or from New Zealand are cultivated in Xiǎngxī as well (Wang and Zhong 2002: 69-70). Hóngyáng 红杨, a cultivar with red flesh, for instance, originated in Sichuan province and has been introduced to Xiǎngxī in the past years because it fits the climatic conditions of Xiǎngxī. It is very suitable for export and fresh fruit vending (interview with Xu Zhiping, 2 April 2007).

In the early 1980s, the marketing and processing of kiwifruit got underway in Húnán province. Initially, only wild kiwifruit was used for producing fruit juice, wine and jam. After an incident at one of the biggest orchards in the north-west of the province, in which an area of 200 ha was destroyed by a bacterial virus, the initial enthusiasm about the fruit diminished. A lack of technological knowledge prevented the farmers from starting afresh, and their interest as well as the motivation of small companies declined rapidly.

One important factor in bringing the kiwifruit industry back to life again was the cultivation and propagation of Míliáng 1, a new breed cultivated by Jíshǒu Univer-

¹¹ 0.2 ppm to 0.8 ppm (Laodie Co. Ltd. 2006a: 2).

sity. This important step was supported by the local government in the course of its initiative for fighting poverty in Xiǎngxī by propagating the kiwifruit industry and kiwifruit production. In the course of this milestone project, orchards were established and farmers were subsidised by the government and the Office for Poverty Reduction (Wang and Zhong 2002: 70). Kiwifruit farmers now had the possibility of growing various kiwifruit cultivars, and gradually their numbers started to increase again. After a period of stagnation of about ten years, the kiwifruit industry suddenly began to flourish afresh, a trend which has continued over the past ten years.

Case study

Project development

Xiǎngxī is located in the north-western part of Húnán province and extends over an area of 15,462 km². The region's population is very poor and is mostly comprised of the Tǔjīa (41.36 percent) and Miáo (33.17 percent) national minorities; only 24.86 percent of Xiǎngxī's population are Hàn Chinese (Liáng 2005: 4). The region is one of China's fourteen poorest regions and benefits from the 'Develop the West' policies initiated in September 2001 (Holbig 2004: 353). This part of China is not only poor, but also remote and underdeveloped and shows slow progress in the improvement of its economic situation. About 40 percent of Xiǎngxī's population lives in the mountains, and the majority of the most poverty-stricken farmers are living in areas above an altitude of 500 metres (XX Statistics 2005; Wú 2002: 4ff).

In 1994, the local government of Xiǎngxī put its emphasis on fighting poverty and in 1996 the region was able to sustain itself for the first time without being dependent on food imports from other provinces (Wú 2002: 3). About 83 percent of Xiǎngxī's population are farmers and they are the ones most touched by poverty. In Húnán, the regions working on poverty reduction make up 38 percent of the provincial area. About 60 percent of the affected villages are situated in the western part of the province (Lǐ and Péng 2004: 82).

According to the Office for Poverty Reduction, in 2007 approximately 30 percent of Xiǎngxī's population was living below the poverty line, that is earning less than 860 yuan per year. In 1986, 84 percent of the population was living beyond the poverty line, which at that time was set at not more than 300 yuan. In 1998, the Office for Poverty Reduction in Xiǎngxī started the kiwifruit project, which was supported financially by 17 national and regional institutions, e.g. the Agricultural Bank of China, Bank of China, Chamber of Trade and Commerce in China, and the Central Office for Poverty Reduction (Bái and Léi 2004: 29; Laodie Co. Ltd. 2005a: 2).

The project was aimed at improving the farmers' living standards in Xiǎngxī, raising their income and enhancing their quality of life by introducing methods of organic or environmentally friendly production of local products, the development of new technologies and the strengthening of the regional economy in respect of sustainability. In pursuit of these goals the local government of Xiǎngxī lays stress on close cooperation with the most important institutions in the field of kiwifruit production, processing and industry: Jíshǒu University, which is deeply involved in the relative research and development, as well as the Húnán Laodie Agricultural Technology Co Ltd. (Laodie Co. Ltd.) founded in 1998.

Cooperation between science, industry and farmers

After the project had been successfully started, the region produced too much kiwifruit, which led to price cutting and a decline in farmer's motivation. Jíshǒu University, the institution which had developed and cultivated the special breed in Xiǎngxī, worked on solving this problem by developing a variety of finished products to cope with overproduction. Laodie Co. Ltd. was then involved in the task of processing, and only with the cooperation of the two institutions was Xiǎngxī's kiwifruit industry able to establish itself on the market and develop to what it is today.

Jíshǒu University

Located in the poor and underdeveloped region, Jíshǒu University focuses on the region and its problems. Its research is trained on the natural resources and the cultural heritage of Xiǎngxī with the aim of using research results for enhancing economic and social development. The kiwifruit project is one of the biggest and most successful projects Jíshǒu University has initiated to date. It started with the first *Actinidia Sinica* Symposium in China in 1978, in which the university participated. In 1984, Shí Zéliàng 石泽亮, former professor of biology at Jíshǒu University, used wild kiwifruit to cultivate the new kiwi breed Mǐliáng 1. In 1987, the local government supported the propagation of kiwifruit in Xiǎngxī, and 1990 the new cultivar was officially named and registered as Mǐliáng 1. Its advantages lie in its high rate of crop yield, its relatively high resistance to pests and diseases, and in its comparatively long storability (Cui et al. 2002: 231). In cold storage rooms it even can be kept for half a year (interview with Xu Zhi-ping: 2 April 2007) without losing too much water and vitamin C (Cui et al. 2002: 231, 279). In this sense Jíshǒu University played an important role in the development of the dominant kiwifruit cultivar in Xiǎngxī.

In the years from 1987 to 1998, the acreage of kiwifruit increased more than ten times from 9,000 *mu* to 100,000 *mu*.¹² Farmers started facing problems on the market and could not sell their fruit in time. Large amounts of the fruit rotted and business turned bad and seemed no longer worth the effort, so the farmers gradually turned to more profitable products, like citrus fruit or oil seeds. Zhang Yongkang, professor at the department of biological resources and environmental protection and the department of chemistry and chemical technology of Jishou University, recognised the problem and brought about the cooperation of Jishou University as a research institution and Laodie Ltd. Co. as its industrial partner. Starting from 1998, they produced kiwifruit juice, and in 1999 another new product was developed – Kiwi Essence, a capsule filled with oil from the kiwifruit seeds (interview with Zhang Yongkang, 3 April 2007). The capsules not only are healthy, but can be sold for a much higher price. Therefore, the invention of this new product was able to solve the problem of overproduction, as 1,000 tons of kiwifruit bring about one ton of kiwi seeds. For the production of one capsule, about 2,000 seeds are needed, making it a highly valuable product (Laodie Co. Ltd. 2006b: 11).

Laodie Co. Ltd.

Laodie Co. Ltd. was established in 1997 and originally produced brandy (E-mail from Li Jiaxing: 19 October 2007). Its management soon learned that kiwifruit processing was more profitable and, more importantly, that there was no competition in this market. In 2000, the company became a private limited company. It employs 300 people with an additional pool of up to 3,000 hired workers in times of harvest (interview with Li Jiaxing, 4 June 2007). This means Laodie Co. Ltd. provides jobs in production and processing, as well as in technology, research and development. Two further departments were established in 2001. The first one is responsible for the company-owned kiwifruit orchards, which make up 5 percent of all kiwifruit orchards in Xiāngxī (interview with Yu Xuedong, 2 April 2007). It takes care of supporting the farmers, answers their questions and tries to solve problems. An important aim is to fulfill production quotas and quality norms in cooperation with local farmers. The second institution created in 2001 is the Kiwifruit Association which was founded in 2004 and is meant to represent all kiwifruit farmers in Xiāngxī. The most active and competent farmers are selected by the company to act as experts supporting those farmers who have problems in kiwifruit farming.

In 2003 the Kiwifruit Industrialisation Technology Project Centre of Húnán province was founded and set up within the company. Sixty percent of the technology experts working there are professors at Jishou University, the remaining 40

¹² 1 *mu* = 0.067 ha = 670 m².

percent are experts from Húnán province and other provinces. About 50 percent of the company's staff in the technology and research department graduated from Jíshǒu University.

The company's principal concept is the close cooperation between farmers, the company, the pilot areas and Jíshǒu University.

The farmers can decide whether to sell their fruit to the company or to sell it themselves on the market. In the first case a contract has to be signed with the company, in which the price for the kiwifruit is defined for the coming year (XX Statistics 2003b: 6). The company guarantees the farmers a fixed price; the market price does not influence the agreement. Should it be higher than the price offered by the company, the farmers still have to sell their fruit for the negotiated amount to the company. Another condition in the contract prohibits the use of pesticides. In the year 2005, about 1,000 farmers signed an agreement with the company, which received 22,000 tons of kiwifruit from Xiǎngxī's farmers (interview with Yu Xuedong, 2 April 2007).

In sum, Xiǎngxī's 200,000 farmers grow kiwifruit on 100,528 *mu*¹³ in 237 small villages (Laodie Co. Ltd. 2005b). The company-owned orchards cover 34,000 *mu*. The Laodie Co. Ltd. leases the land and pays a sum of 50 yuan per year to the farmers (interview with Yu Xuedong, 2 April 2007). In return, the farmers receive the necessary technical training and financial support as well as seeds and materials for the orchards, like T-bars and wire as support for the vine.

Land in company-owned orchards can be used exclusively for growing kiwifruit and 100 percent of the harvest has to be sold to Laodie Co. Ltd. On average a farmer is responsible for 30 *mu* of kiwifruit orchards and earns about 20,000 yuan per annum. He or she therefore has a much more secure income than an average kiwifruit farmer. Another advantage is the close contact with experts, who occasionally pay a visit to the pilot areas and help to solve problems quickly and in a professional manner.

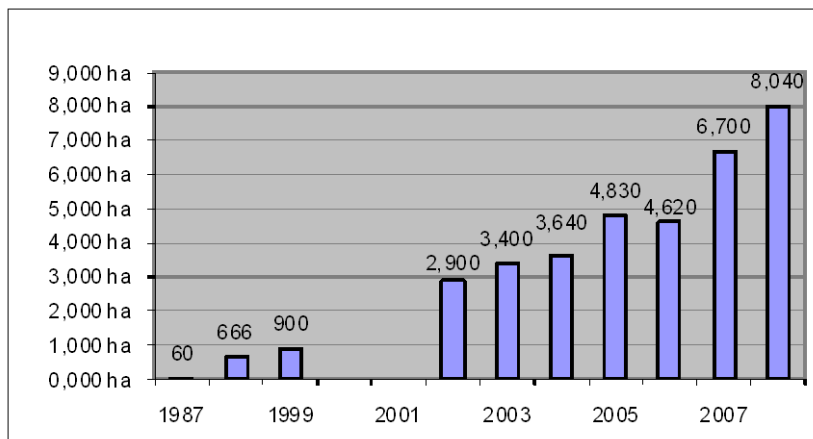
In the past ten years the company, in cooperation with technology experts from Jíshǒu University, has developed 36 new products, starting from food and beverages, like kiwi wine, different kinds of fruit juice, cookies and dried kiwifruit slices, through to healthcare and wellness products such as kiwi essence or kiwi seeds skin oil.

13 701.9 ha.

Outcome of concerted efforts

The first eleven years from 1987 to 1998 can be seen as the initial phase of the project.

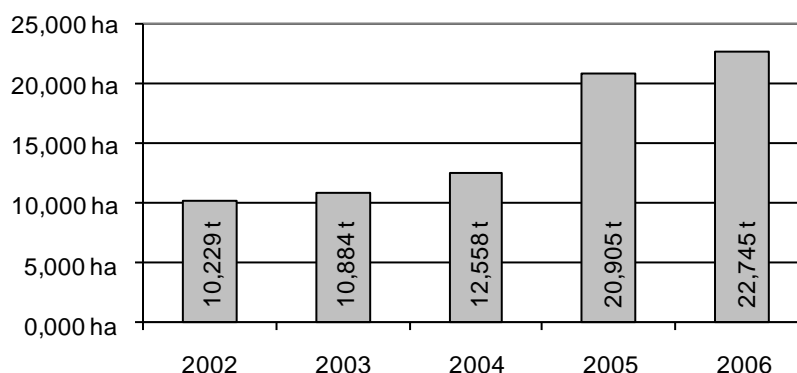
Diagram 3 Increase in kiwifruit cultivation area 1987- 2008¹⁴



Beginning from 1998, kiwifruit farmers received financial support from various institutions, which explains the increase in orchards. Unfortunately, no data are available for 2001 and 2002, but it can be assumed that acreage increased in those two years as well. A slight decrease in 2006 can be attributed to the low market value of the fruit. In 1991 one kilo of kiwifruit was sold for 2.2 to 2.4 yuan (Wáng 2002: 118). Today, farmers can sell their fruit for only half the price. However, a decrease in acreage does not necessarily lead to a decrease in harvest, as diagram 4 shows.

¹⁴ XX Statistics; interview with Yu Xuedong, 2 April 2007.

Diagram 4 Kiwifruit production 2002-2006¹⁵



Kiwifruit plants need up to three years to yield fruit, which can be harvested in the fourth year. This means that the amount of acreage does not automatically translate into the amount of fruit harvested. In Xiǎngxī, kiwifruit plants are relatively young and many of the orchards have started to yield fruit only in recent years. Nonetheless, the harvest in 2006 increased despite a decrease in acreage in the same year. This positive outcome is partly owed to the fact that Miliáng 1 gives a comparatively rich return.

The development of Xiǎngxī's kiwifruit industry since the middle of the 1990s has been quite impressive. No other agricultural product has developed that rapidly over the past ten years, making it one of the three main producing regions in China besides Qínlíng 秦岭 in Shǎnxī and Yǒuniúshān 有牛山 in Hénán (Laodie Co. Ltd. 2005a: 3). This development, of course, affects the whole region in various ways.

Impact on the region

Socioeconomic impact

The situation of the farmers in Xiǎngxī started to improve in 1980 because at that time the tax for special crops was abolished. Liàojiāqiáo 廖家桥 was the first village where a certain number of farmers tried kiwifruit farming. As they were quite successful and became rich relatively quickly, their neighbours and the neighbouring villages were motivated to change from traditional farming to kiwifruit farming as well. From the point of view of the farmers, the foremost motivation for a change to

¹⁵ XX Statistics 2002-2006.

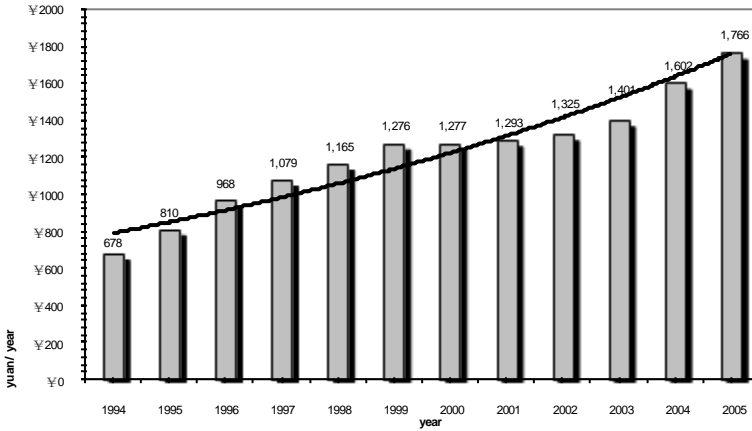
kiwifruit cultivation was the hope for bigger earnings. The government's promise of profitable business was the main reason to reduce the cultivation of chili, maize, rice and oil and start something completely new. For most of the farmers, it was worth the risk. Between 1980 and 1997, the income of some farmers in Liaojiaqiao increased by more than 20 times (Bái and Léi 2004: 30).

According to the 24 interviews the author conducted with kiwifruit farmers in Xiāngxī, the average yearly income of their families amounted to 6,877.8 yuan - compared to 2,683.3 yuan before the start of the kiwifruit project. The income of farmers from company-owned areas was even higher, as they were offered a fixed yearly income of 20,000 yuan. According to statistics, the average income of Xiāngxī's farmers in general is far less than what the kiwifruit farmers earn.

A report issued by the local administration speaks of an increase of up to 7 percent not only in the number of houses made of ferro-concrete and brick, but also in living space between the years 2000 and 2005. Improvements in infrastructure facilitated the access to nearby towns and markets for people in remote villages. In 2005, all of the villages were supplied with electricity and postal services, and 86 percent of them had telephone connection. About 90 percent of the rural households were equipped with television and 63 percent with radio. Expenses for clothes have increased by 5 percent, and looking at the amount of money spent on leisure time, education and culture, one can see that the situation of Xiāngxī's farmers has changed for the better in the past years (Yáng and Yuè 2006).

Last but not least, Laodie Co. Ltd. provides about 300 jobs, especially for young researchers in the field of food technology and natural resources, and gives them the opportunity to work actively on the development and improvement of the region they were born into, which hopefully prevents them from migrating to bigger cities. The project centre at Laodie Co. Ltd. stands for a good example of profitable research and cooperation between industry and research institutions. It makes Xiāngxī well known in the neighbouring regions and provinces and attracts potential investors, tourists and workers.

Diagram 5 Income of Xiǎngxī's farmers 1994-2005¹⁶



Ecological impact

The fact that nature in this region is adapted to the wild kiwifruit vine meant that the switch to kiwifruit cultivation did not bring any fundamental environmental changes. On the contrary, regions located in higher altitudes benefited from the renewed and wider distribution of the plant. Farms situated higher than 500 metres above sea level, which for various reasons could not cultivate any other agricultural product, suddenly were able to use their land in a profitable way, as the kiwifruit vine is quite uncomplicated and modest enough to root and prosper in less fertile soil and in high altitudes.

The ingenious root system of the plant helps to prevent erosion, which is a very important factor in Xiǎngxī, where 26.1 percent¹⁷ of the acreage is affected by this problem (Lǐ and Péng 2004: 48). ‘Switch crop for forest’ is an initiative which was founded in the course of the ‘Develop the West’ programme. In Xiǎngxī, the project was started in August 2000 and was supported by the government with 4,752 million yuan (Zhāng 2006: 174). Orchards rank among forests, and therefore the establishment of kiwifruit orchards is contributing to the reforestation of formerly cleared areas. They help to cultivate previously neglected slopes and protect the soil against aridness (Wú and Shí 2004: 93).

¹⁶ XX Statistics 199-2005.

¹⁷ 14,758.5 km².

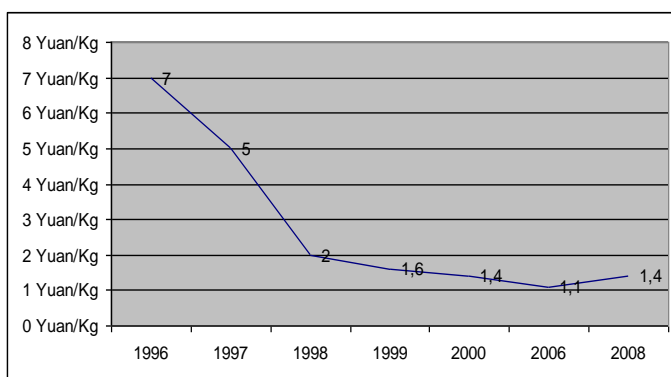
Problems and solutions

Xiǎngxī's limited access to the international market

The cultivar Miliáng 1, developed by Jishǒu University and spread all over Xiǎngxī, is ideal for further processing, such as producing juice or dried kiwi slices, but is less appropriate for being sold as fresh fruit on the market. For this reason, the kiwi-fruit industry in Xiǎngxī has concentrated on fruit processing. Laodie Co. Ltd. has filled this market niche and is the biggest company of its kind in the region. IST-Fruit, another company that is involved in Xiǎngxī's kiwifruit industry, is a privately run company with 30 to 700 employees,¹⁸ which has focused on fresh fruit vending in combination with agriculture and food technology. IST-Fruit is engaged in the import and export of agricultural products and in the investment, design and construction of cool storage rooms and packaging material. The company works very closely with five Chinese institutions and four Italian companies (Péng 2004: 37). It has four business centres in China (IKO 2002; Péng 2004: 37) and since 2003 a registered office in Xiǎngxī. However, there is no export or import of kiwifruit in Xiǎngxī yet.

Both companies plan to import cultivars from other provinces to Xiǎngxī in the near future. There are two reasons for this strategy. With only one cultivar offered on the local market, prices inevitably are depressed to the point where kiwifruit farming for many farmers is not worth the effort any more.

Diagram 6 Price for kiwifruit 1996-2008¹⁹



¹⁸ The number of staff varies seasonally.

¹⁹ Han et al. 2003: 57; contract with kiwifruit farmers.

Apart from bringing more profit for the farmers, the spreading of new breeds in the region should increase Xiāngxī's chances on the international market. Hayward, which belongs to *Actinidia deliciosa*, is the world's most famous kiwifruit cultivar and well known for having been imported from China to New Zealand in the year 1904, from where it has spread all over the world (Belrose 2007: 87). IST-Fruit is planning to propagate this breed, which is cultivated in 14 percent of China's orchards, but should be expanded as it is more suitable for export than the fresh fruit produced so far.

The suitability of the fruit produced is, nonetheless, not the only obstacle on the way to a barrier-free export of kiwifruit. When joining the World Trade Organisation on 11 December 2001, China agreed to accept internationally accredited conditions of trade. WTO members accordingly insisted on the cutback of import and export tariffs in order to improve their own conditions for exporting products to China. In the year 2004, import tariffs on agricultural products were reduced from 31.5 to 14.5 percent.²⁰ As a consequence, foreign kiwifruit cultivars can enter the Chinese market more easily and run the risk of harming China's rural economic development (Hofstadler 2001: 36). Besides the cutback of import and export tariffs, the abolition (Hán et al.: 2003: 51) or modification (Hofstadler 200: 59) of export subsidies is a further disadvantage for China's export policy.

Another challenge for Chinese companies aiming at exporting their products to Western countries are rules and regulations concerning food quality and security. In this context the European Union is one of the strictest control bodies and the EurepGAP Standards²¹ have become more and more accepted internationally (Belrose 2007: 9). For quite a long period of time, representatives of the kiwifruit industry in China issued their own regulations, and quantity was preferred to quality. Only after initiatives undertaken by food activists did the government start to work on rules and regulations in food safety together with the retailers. The General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ) 国家质量监督检验检疫总局 (*guójiāzhìliàng jiāndū jiǎnchá jiǎnyì zǒngjú*) is the administrative and law enforcement organ for quality control, measurement, inspection of import and export commodities, entry-exit health quarantine, entry-exit animal quarantine, certification and standardisation in China (AQSIQ 2006). Companies that want to export have to gain inspection and quality licences from foreign companies that agree with the companies' arrangements in China. These licences are very difficult to obtain for the majority of Chinese companies (Matthews and Ingersent 2001: 89; AQSIQ 2006).

20 According to Hán, the tariff dropped from 30 percent to 14.5 percent (Hán et al. 2003: 51).

21 The EurepGAP standard aims at strengthening the trust of consumers in the quality of food and food safety. Founded in 1997 by British retail businesses, the Euro Retailer Produce Working Group (shortened to Eurep) focuses on the implementation of good agricultural practice (GAP) in combination with environment protection, health and safety at the workplace as well as social issues and animal welfare (cited from Open PR 2006).

In addition to the above mentioned factors, Xiāngxī's companies are confronted with the problem of less developed technology in kiwifruit production and processing compared to their European and American counterparts. Work efficiency and quality as well as technology have to be improved and developed before taking the step on the international market (Du 2004: 61-62).

The new approach of quality before quantity

As mentioned above, for a long time high crop yield was more important for the Chinese kiwifruit industry than product quality. However, the improvement in fruit quality plays an increasingly important role today.

The idea of ecological agriculture in the sense of a sustainable, environmentally friendly system, using only a very small amount of pesticides or chemical fertiliser for producing agricultural goods, emerged in the 1980s (Sanders 2006: 116). The initiative was started in Western industrialised countries, where the demand for healthy food and awareness of product origins and processing became a trend earlier than in Asia. Interested in exporting its products to Europe and America in the near future, China now follows the international trend in biological and organic farming and is working on the implementation of international guidelines and production standards. Since 2003 the development and improvement of the food industry has placed a special focus on green food products 绿色食品 (*lǜsè shípín*) with ambitious efforts to promote environmentally healthy ways of agriculture and production (XX Statistics 2005). 40,000 ha of oranges, 20,000 ha of tobacco, 13,334 ha of Chinese herbs and 4,667 ha of kiwifruit are being cultivated according to green standards (Xiàng, Máo and Péng 2006). According to the White Paper of the Chinese government on food quality and safety of August 2007, the export of green products had increased by 40 percent in five years (State Council Information Office 2007).

The China Green Products Development Centre 中国绿色食品发展中心 (*Zhōngguó lǜsè shípín kāifā zhōngxīn*) annually investigates all regions in which organic or biological farming is operated. They control water, soil and air quality. Xiāngxī, where the green industry has established itself quite well over the past few years, has not faced any problems during these investigations so far, because there is hardly any industrial pollution in the region's mountainous area. Contamination resulting from traffic is also extremely low (Chén and Lǐ 2003: 23). Of Xiāngxī's agricultural area, 36.8 percent is used for growing green food products and approximately 10 percent of all kiwifruit orchards in the region follow the rules for growing such products (XX Statistics 2005).

Farmers' access to the national market

The very first problem most of the farmers are confronted with if they want to start a kiwifruit business is financing. The capital required for seed is relatively high. Seedlings are quite cheap when being bought in volume and have not even been mentioned by the farmers, but T-bars and wire cost between 1,000 and 3,000 yuan per *mu*. Only one farmer out of five has therefore managed to finance the start-up without being supported by government funds.

Another severe problem is information. An incomplete information infrastructure in Xiǎngxī has led to many farmers not having enough knowledge about the latest technologies and economic developments. Many farmers were not satisfied with their training in the course of the implementation of the kiwifruit project. They would have expected more support in gaining better knowledge of the plant itself, appropriate cultivation techniques and other special features of kiwifruit farming in their region.

Their limited understanding of market rules and mechanisms has meant that many of the farmers cannot imagine organising themselves to sell their fruit on their own. Cooperation between kiwifruit farmers, traders and companies had therefore to be insisted on. Laodie Co. Ltd. is a good example of organising such cooperation, from which both sides are able to benefit. A lot of farmers therefore decide to sell their whole harvest to Laodie, even though the price offered by the company might be lower than the market value. Fruit and processed goods are also sold to vendors from major cities within Húnán province, such as Chángshā 长沙, Héngyáng 衡阳, Chángdé 常德 and Huáihuà 怀化, or from neighbouring provinces such as Guizhōu, Guǎngdōng, Guǎngxī 广西 and Fújiàn. Only a few farmers rely on one purchaser alone; they tend to sell their fruit to different vendors or to Laodie, depending on the price offered. Laodie Co. Ltd.'s fixed price offers a safe way of selling their fruit for the farmers. Those who do not want to depend on the fluctuating market value sign a contract with the company. In 2006 the price was fixed at 0.55 yuan per 500 grams (contract between farmers and Laodie Co. Ltd.), compared to 0.7 yuan per 500 grams for farmers who sold the kiwis on their own. Foreign traders paid up to one yuan per 500 grams (interviews with farmers in eleven locations).

Apart from providing the individual farmer with a secure option, Sanders and Brandt recommend the archetype of cooperation as a precondition for organising ecological agriculture. Most of the farmers do not own enough land to make the ecological readjustment of their agricultural land a profitable endeavour. A joint effort is seen as a more efficient approach (Brandt et al. 2002: 70), because the consolidation of many small areas, as was the case in Laodie's company-owned orchards, is easier to administer than many small orchards spread all over Xiǎngxī. Besides, the farmers do not have to worry about selling their fruit and benefit from a fixed yearly income.

Independent farmers, who selling their fruit on their own, have also managed to increase their income, but they mostly use pesticides and cannot sell their fruit as green food products. For purposes of propagating ecological agriculture and green food products, support for farmers as well as cooperation between companies and research institutions have to be enforced and intensified (Tián 2004: 73; IKO 2002).

Conclusion

The kiwifruit project, which was started in 1990, has already overcome a series of problems, including overproduction, sinking market value, deficiencies with regard to product quality and food security, as well as a lack in training and information for the farmers. Two very positive aspects of the development in Xiāngxī are the increasing awareness of ecological agriculture leading to the production of green products and the successful fight against poverty resulting in better living and working conditions for local farmers. They can learn the reasonable use of natural resources while at the same time increasing their income (Shih 2006: 101-102). On the negative side, the interdependency of the farmers, either through a contract with the Laodie Co. Ltd. or through governmental subsidies, keeps them from acting as autonomous and self-confident participants in the market.

Problems of food security and product quality are still waiting to be solved as a precondition for enhancing the export of Xiāngxī's kiwifruit to the international market. Whether Xiāngxī's kiwifruit can be established as a competitor of the big global players New Zealand, Chile and Italy and whether processed kiwifruit products will become popular on the international market is a question to be answered in the years to come.

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GLOSSARY

<i>Fúpín bàngōngshì</i>	扶贫办公室	Office for Poverty Reduction
<i>Gúojiā chūrùjìng jiǎnyàn ji- ǎnyìjú</i>	国家出入境检验检疫局	State Administration of Exit and Entry Inspection and Quarantine
<i>Gúojiā zhìliàng jiāndū jiǎnyàn jiǎnyì zǒngjú</i>	国家质量监督检验检疫 总局	General Administration for Qual- ity Supervision, Inspection and Quarantine (AQSIQ)
<i>Guǒwángsù</i>	果王素	kiwi essence
<i>Hóngyáng</i>	红杨	Hóngyáng
<i>Húnán lǎodìe nóngyè kējì kāifā gǔfèn yóuxiàn gōngsī</i>	湖南老爹农业科技开发 股份有限公司	Húnán Laodie Co. Ltd.
<i>Húnán Nóngyè Dàxué</i>	湖南农业大学	Húnán Agricultural University
<i>Húnánshěng mihóutáo chányèhuà gōngchéng jìshù yánjiū zhōngxīn</i>	湖南省猕猴桃产业化工 程技术研究中心	Industrialisation Technology Project Centre of Húnán Province
<i>Jìshǒu dàxué</i>	吉首大学	Jìshǒu University
<i>Lǜsè chǎnyè</i>	绿色产业	green industry
<i>Lǜsè shípǐn</i>	绿色食品	green food products
<i>Mihóutáo</i>	猕猴桃	kiwifruit
<i>Mihóutáo chǎnyè xiéhuì</i>	猕猴桃产业协会	Kiwifruit Association
<i>Mǐliáng 1 hào</i>	米粮 1 号	Mǐliáng 1
<i>Tuìgēng huánlín</i>	退耕还林	Switch crop for forests
<i>Xiāngxī Tǔjiāzú Míaozú zì- hìzhōu</i>	湘西土家族苗族自治州	Xiāngxī Tǔjiā and Míao Autono- mous Prefecture
<i>Xībù dàkāifā zhèngcè</i>	西部大开发政策	Develop the West Policy
<i>Yìshìdá gōngsī</i>	亿事达公司	IST-Fruit
<i>Yóujī nóngyè</i>	有机农业	organic farming
<i>Zhōngguó lǜsè shípǐn kāifā zhōngxīn</i>	中国绿色食品发展中心	China Green Products Develop- ment Centre
<i>Zhōngguó nóngyè kēxuéyuàn</i>	中国农业科学院	China Academy for Agricultural Sciences (CAAS)