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Present Status with Some Constraints and Future Development in the Horticultural Industry of Guangxi Province, China

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The horticultural industry is getting more prospective with upgrading of the living standard in Guangxi Province, China. Compared to other crops, horticultural products not only are used as foods for human health but also contribute to healing of the people's spirit. The present status and constraints of the horticultural industry in Guangxi Province were reviewed in each of the fruit, vegetable and flower industries, in connection with favorable weather conditions and resources of the province. Strategies for developing the horticultural industry in Guangxi Province were given as follows: (1) to work out a comprehensive plan with addressing the regional specificities; (2) to strengthen the abilities of technical supporters; and (3) to enhance the investment fund to establish a production base and to set up the information exchange service system for marketing.

INTRODUCTION

From beginning of the 21st century, production and consumption of fruits, vegetables and flowers have increased rapidly in China, mainly in response to upgrading in the living standard and education level. In addition, admittance to the World Trade Organization (WTO) in 2002 opened a new big developing chance to the horticultural industry (fruits, vegetables and flowers) in China.

Guangxi Zhuang Autonomous Regions (abbreviated as Guangxi thereafter) is located in the region of low latitude. The south reaches the tropical ocean and the north faces the Yunnan–Guizhou Plateau. With the Tropic of Cancer running through the middle region, Guangxi is in the sub-tropical zone of monsoon climate, and rich in natural resources and good in climatic conditions all the year round. Here is suited for growing of fruits, vegetables and flowers under warm sunshine and plentiful rainfall. At the same time, Guangxi is in an advantageous geographic location, with bordering Beibu Gulf on the south, neighboring Guangdong Province, Hongkong and Macao of the developed area in China on the east and being adjacent to Vietnam in the southwest. Convenient river and ocean transportation makes Guangxi the shortest gateway to the sea from the southwestern hinterland.

Nowadays, Guangxi is in a most challenging time for developing the horticultural industry under favorable natural, geographic and traffic conditions. Challenge is based on the new approach. How to improve and develop the horticultural industry in Guangxi is a new subject

in the horticulture research. It is necessary and urgent for us to analyze the present status and constraints of the horticultural industry in Guangxi and to present strategies for the future development.

PRESENT STATUS AND CONSTRAINTS IN THE FRUIT INDUSTRY OF GUANGXI

The year of 1990 was the 12th year from beginning of the innovation policy in China and was in the early stage of restructuring the rural industry. The cultivation area and production of fruits in 1990 were used as a reference and compared with those in 2000 through 2005. The comparison was made for both Guangxi and the whole China and is shown in Table 1.

As shown in Table 1, the cultivation area and production of fruits in Guangxi of 2000 were 2.64 and 3.93 times, respectively, of those of 1990. The ratios of Guangxi to the whole China increased from 5.74 and 4.89% in 1990 to 8.79 and 5.79% in 2000. The cultivation area and production of fruits in Guangxi gradually increased from 2000 to 2005. However, the ratio to the whole China was highest in 2002 in both the cultivation area and production. It means that Guangxi fell behind the whole country in development of the fruit industry after 2003.

As everyone knows, Guangxi is famous for production of subtropical fruits such as litchi, longan, banana, mango, pitaya, papaya and star fruit, and so on, different from the fruit production in other places of China. In the present review, the focus was placed on litchi, longan and banana, because Guangxi always occupied the top three in provinces of China in the cultivation area and production of those fruits during 2000 and 2005.

Litchi

Cultivation area and production

The cultivation area of litchi in Guangxi was only

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Table 1. Changes in the cultivation area and production of fruits in Guangxi and China in 1990 and 2000 to 2005

Year	Cultivation area (thousand hm ²)		Guangxi/China (%)	Production (thousand tons)		Guangxi/China (%)
	Guangxi	China		Guangxi	China	
1990	297.3	5179	5.74	916.1	18744	4.89
2000	785.0	8932	8.79	3601.4	62251	5.79
2001	814.0	9043	9.00	4062.8	66580	6.10
2002	819.6	9098	9.01	4557.8	69520	6.56
2003	821.3	9437	8.70	4622.4	145174	3.18
2004	844.1	9768	8.64	5262.4	153409	3.43
2005	865.2	10035	8.62	5715.8	161201	3.55

Sources: Committee of China Agriculture Yearbook (1991, 2001~2006); Government of Guangxi and Guangxi Yearbook Publisher (1990, 2001~2006); National Bureau of Statistics of China (1991, 2001~2006)

40.9 thousand ha in 1990 and increased rapidly to 205.6 thousand ha in 2000 with five-times increase during only ten years. It reached to 222.1 thousand ha in 2004, the highest area in the history of litchi cultivation. The production of litchi increased from 55.7 thousand tons in 1990 to 181.3 and 370.5 thousand tons in 2000 and 2004, respectively (Tang *et al.*, 2006).

The points at issue in cultivation

The following five matters are pointed out as constraints in the cultivation of litchi in Guangxi.

1) Selection of varieties is unreasonable and too many varieties are planted at a location. In Lingshan County, for example, that is the most famous place for litchi cultivation in Guangxi, more than a dozen varieties are grown in a region, such as "Heiye", "Heli", "Xiangli", "Sanyuehong", "Feizixiao", "Baitangying", "Baila", "Nuomichi", "Guiwei", "Jizuli", "Hongli", and so on. They are all good varieties planted in Guangxi. However, differences in the maturation period make difficult the simultaneous operation of harvest, storage, transportation, and processing for those litchi varieties. The maturation period of litchi varies with varieties but is in a relatively narrow period. As a result, cultivation of many varieties in a region often leads to the regional loss of production.

2) The composition of litchi varieties in cultivation is unreasonable, too. At present, the proportion of early-maturing, middle-maturing and late-maturing varieties of litchi is 15, 80 and 5%, respectively. The early- and late-maturing litchi varieties are too small under this proportion.

3) The capabilities of storage, processing and transportation after harvest are still not good enough. In Guangxi, half of fresh litchi fruits are transported to markets for sale immediately after harvesting without any treatment, and only 8% of litchi fruits are processed. For this reason, the loss of litchi by rot reaches annually to 20 to 40% of the fresh litchi product.

4) The yield of litchi is unstable and low owing to the stagnant improvement of cultivation and management techniques. The average production per ha is as low as 2,487 kg in Guangxi and lowest among four litchi-producing provinces of Guangdong, Guangxi, Hainan and Fujian.

5) Economic effect and profit by litchi cultivation is low. The average price of shipment from the field was

only 1.40 yuan (0.2 dollars) per kg, and the net income was just 431 yuan (62 dollars) per 667 m². Under such low economic return, it is difficult to stimulate farmers in litchi cultivation and to prevent them from lowering the management level (Qin, 2006).

The ways to deal with the situation

As the ways to deal with the constraints described in the above, the following works must be done at present.

1) First, it is necessary to make a long-term plan or goal for litchi cultivation without giving up it easily by some temporary situations. As everyone knows, Guangxi has many favorable conditions for developing litchi cultivation. As an effect of the scale expansion, the litchi production of 370.5 thousand tons of Guangxi in 2004 was higher than the productions in many countries except India (Tang *et al.*, 2006; Qin, 2006). In China, the production in Guangxi was only behind that in Guangdong Province.

2) Secondly, according to the climatic conditions, it is better to divide the cultivation areas of litchi into early-maturing, middle-maturing and late-maturing areas. At the same time, the proportion of early-, middle- and late-maturing varieties is needed to be shifted to 30 : 50 : 20 from 10 : 80 : 10 in the present.

3) Third, improvement of the capabilities of storage, transportation and processing after harvest is very important for litchi cultivation.

4) Fourth, litchi in Guangxi is mostly planted in mountainous and hilly areas, and it is difficult to construct an irrigation system on a sloping land and cultivation is prone to suffer from seasonal drought. At the same time, the low efficiency of management in litchi cultivation easily leads to the biennial bearing of fruits with the low production. Therefore, maintenance of roads to orchards on the slope, invention of a practical way for water supply, and development of new cultivation technologies are urgently necessary (Huang, 2003).

Longan

Cultivation area and production

The cultivation area of longan in Guangxi was 21.2 thousand ha in 1990, increased rapidly to 176.8 thousand ha in 2000 with 8.3 times increase, and reached a maximum of 225.7 thousand ha in 2002. It started to decrease from 2003 and descended to 172.9 thousand ha in 2005. The production of longan was in the same trend

as the cultivation area between 1990 and 2000; the production of longan was 40.9 thousand tons in 1990 and 163.0 thousand tons in 2000, with an increase of almost 4 times during this period. Different from the cultivation area, the production of longan continuously increased after 2003 and rose to 381.7 thousand tons in 2005 (Chen *et al.*, 2006).

The points at issue in cultivation

Constraints concerning the longan cultivation are quite similar as those in the litchi cultivation in Guangxi. Unreasonable distribution of cultivated areas and composition of longan varieties in Guangxi leads to the biennial bearing of fruits and to the frequent occurrences of natural damages such as freezing injury. The backwardness in the storing and processing techniques is another big problem in longan cultivation.

The ways to deal with the situation

First, to avoid concentration of the maturation period to a narrow range, the proportion of early-, middle- and late-maturing varieties of longan should be adjusted to 30 : 50 : 20, similar to the litchi cultivation. Secondly, the new management system should be introduced, such as production managed by a company and establishment of a production base under the contact work system with farmers. At the same time, producers and companies always attempt to exchange information with organizations and managers outside the production area and to expand the selling channel under enhancing the traffic capability.

Banana

Cultivation area and production

The cultivation area and production of banana in Guangxi were 15.3 thousand ha and 179.6 thousand tons, respectively, in 1990 and increased to 59.7 thousand ha and 1,111.6 thousand tons in 2000 with increases of 3.9 and 6.2 times, respectively, during a period of ten years. They increased continuously to 61 thousand ha and 1,340 thousand tons in 2005 (Tang *et al.*, 2006).

The points at issue in cultivation

The level of management and the establishment of brand for banana are more advanced than those for litchi and longan. However, there are still a lot of constraints remaining in banana cultivation as follows.

1) Since the present places of banana cultivation are not the most suitable places for its growing and banana

orchards are all located in the secondary-suitable places in Guangxi, the yield of banana is low or the production cost is high.

2) The effective system of fertilizer application is not established yet. Moreover, it is difficult to execute the crop rotation including banana.

3) Facilities of banana orchards are inadequate. For example, windbreak forests and cold protection around the orchard are not set good enough. In addition, the capability of prevention from natural disasters, such as typhoon and freeze, is still poor in Guangxi.

The ways to deal with the situation

First, it is to establish the places suitable to banana cultivation in Guangxi according to the climatic and environment conditions of the locations. Secondly, it is necessary to carry out soil testing and diagnosis of nutrient condition of banana plants and to develop the efficient system of fertilizer application. At the same time, it is to strengthen the fundamental facilities of banana orchards to improve the capability of prevention from natural disasters.

PRESENT STATUS AND CONSTRAINTS IN THE VEGETABLE INDUSTRY OF GUANGXI

Cultivation area and production

Guangxi has been called as “a natural greenhouse” due to its favorable weather conditions. Vegetables are grown all year round. Even in the winter season, vegetables can be cultivated without any special measures for cold protection and hence with the low cost. The cultivation areas and productions of vegetables in Guangxi and the whole China in 1990 as a reference and in 2000 through 2005, and the ratios of Guangxi to the whole China are shown in Table 2.

As shown in Table 2, the cultivation area of vegetables in Guangxi was 260.5 thousand ha in 1990, and the ratio to that of the whole China was only 4.11%. In 2000 after ten years from 1990, the cultivation area of vegetables in Guangxi increased to 899.5 thousand ha, which was about 3.5 times of that in 1990, and the ratio to that of the whole China also increased to 5.90%. It rose to 1,094.3 thousand ha in 2005 and the ratio to that of the whole China reached to 6.18%. Based on these results, it is stated that development of vegetable cultivation in these years in Guangxi has made it an important indus-

Table 2. Changes in the cultivation area and production of vegetables in Guangxi and China in 1990 and 2000 to 2005

Year	Cultivation area (thousand hm ²)		Guangxi/China (%)	Production (thousand tons)		Guangxi/China (%)
	Guangxi	China		Guangxi	China	
1990	260.5	6338	4.11	no data	195189	no data
2000	899.5	15237	5.90	23000	512570	4.49
2001	931.3	16402	5.68	24500	552221	4.44
2002	967.9	17353	5.58	17815	603315	2.95
2003	1006.8	17954	5.61	18639	540323	3.45
2004	1026.0	17560	5.84	19369	550647	3.52
2005	1094.3	17721	6.18	21184	no data	no data

Sources: Committee of China Agriculture Yearbook (1991, 2001~2006); Government of Guangxi and Guangxi Yearbook Publisher (1990, 2001~2006); National Bureau of Statistics of China (1991, 2001~2006)

try which presently occupies second place next to the cereal industry of rice and wheat.

Data of the production of vegetables in 1990 of Guangxi was not available, but it was estimated as around 8,022.5 thousand tons based on the average yield of China and the cultivation area. The production of vegetables in 2000 reached to 23,000 thousand tons and was 2.9 times of that in 1990. After showing a maximum in 2001, the production of vegetables dropped sharply in 2002 due to change in the kinds of cropped vegetables and reduction in the cropping rate. It turned upward since 2003 and recovered the level of 2000 until 2005.

Cultivation of wild vegetables

In addition to cultivation of normal or common vegetables, growing of wild plants or vegetables having medicinal functions is becoming a boom in Guangxi. The price of wild vegetables is considerably higher than the price of common vegetables. For example, the price of leek is only 2~3.6 yuan (0.25~0.5 dollars) per kg in Nanning City. However, the price of wild leek is 16 yuan (2.3 dollars) per kg and almost 8 times higher than that of leek. Nowadays, more than 300 varieties of wild vegetables are found in Guangxi. Among them, more than 80 varieties are edible. More than 30 varieties are usually used to cooking at present, and more than 20 varieties are now under test for the future utilization (Si *et al.*, 2004).

The points at issue in cultivation

Main constraints in the vegetable cultivation in Guangxi are pointed out as follows.

- 1) There is a risk of remaining of pesticides on vegetables.
- 2) The appearance and quality of vegetables are inferior to those of vegetables grown in advanced countries.
- 3) The loss of vegetables by rot during transportation is large owing to the backwardness of techniques in the pretreatment, transportation, storage, and processing.
- 4) The price of vegetables and the economic return of vegetable cultivation are unstable and variable with seasons and regions, depending on differences in the production capacity.
- 5) Because cultivation of vegetables is done mostly by individual farm household, the scale of production is small, the information collection system is inconvenient and unskillful, and the production efficiency is low.
- 6) The system of seed supply and the guarantee of seed quality are not good enough, and the education level of farm producers is still low.

The ways to deal with the situation

First, attention should be paid not only to the production but also to the quality of vegetables. That is, pesticides and chemical fertilizers are not only controlled by farm producers in their use but also should be registered strictly by companies of manufacturing and selling. In addition, since the sale of vegetables in a

supermarket is now increasing, it is necessary to pay attention to the immediate clean packing of vegetables and installation of a refrigerator at the production site, to prevent vegetables from the loss by rot during transportation. At the same time, cold storage trucks should be equipped for transportation to avoid the loss and deterioration of vegetables. Last, the sale of vegetable seeds must be controlled strictly by issue of a new policy, and the commercialized big-scale production system like in the banana production should be introduced to the vegetable production.

PRESENT STATUS AND CONSTRAINTS IN THE FLOWER INDUSTRY OF GUANGXI

Cultivation area

In China, the flower industry has developed rapidly since beginning of the 21st century, and it is the case to the flower industry in Guangxi. The cultivation areas of flowers in 1990 as a reference and in 2000 through 2005 are listed in Table 3. The cultivation area of Guangxi in 1990 is lack owing to the undeveloped status. After that flower cultivation in Guangxi was developed rapidly and the cultivation area attained to 5.82 thousand ha in 2000 with a ratio of 3.95% to that of the whole China. Since 2000 the cultivation area of flowers in Guangxi has increased steadily with an annual variation, but its developing level is late behind that of the whole China.

In Guangxi, jasmine and yulan magnolia flower (*Magnolia denudata*) are mainly planted. The cultivation area of these two flowers occupies more than 80% of the total cultivation area of flowers. Other flowers are ornamental saplings and potted plants, but fresh cut flowers are less produced yet. *Archontophoenix alexandrae* (palmae), *Roystonea regia*, *Ficus microcarpa* and cycad are cultivated as ornamental saplings, and chrysanthemum and rose are as potted plants.

Table 3. Changes in the cultivation area of flowers in Guangxi and China in 1990 and 2000 to 2005

Year	Cultivation area (thousand hm ²)		Guangxi/ China (%)
	Guangxi	China	
1990	no data	33.2	no data
2000	5.82	147.5	3.95
2001	5.88	246.1	2.39
2002	5.93	334.5	1.77
2003	6.69	430.1	1.56
2004	7.52	636.0	1.18
2005	6.82	810.0	0.84

Sources: Committee of China Agriculture Yearbook (1991, 2001~2006); Government of Guangxi and Guangxi Yearbook Publisher (1990, 2001~2006)

The points at issue in cultivation

The present constraints in the flower industry in Guangxi are pointed out as follows.

- 1) First, it is lack of a professional organization to manage and control the flower production in the government or association level.

2) Secondly, it is lack of professional research institutes and engineers of the flower industry.

3) Third, the flower industry in Guangxi is too small in the scale and is still staying in a low position for developing.

4) Fourth, favorable natural conditions are not well utilized for planting more plentiful kinds of flowers.

5) Fifth, due to lack of a well-established network between producers and salesmen, over-production and waste of labors are often happening in the flower cultivation (Zhu, 2007).

The ways to deal with the situation

According to the present situation of the flower industry, it can be regarded as a new developing industry in Guangxi. In order to continue a good developing trend in the future, it is necessary not only to establish a new association for management but also to build up a production base of the integrated production system consisting of a company and farmers in order to be able to enlarge the scale of flower production. In addition to planting of traditional varieties, growing of special varieties of sub-tropical zone, such as camellia, cymbidium, yew podocarpus, palm, cycad, and so on, should be promoted. Last, it is necessary to enhance the abilities of researchers and to set up a selling network between producers and markets or salesmen (Zhu, 2007).

FUTURE DEVELOPMENT

The present status, constraints and the ways for solution in the horticultural industry, including fruits, vegetables and flowers, in Guangxi have been reviewed in detail. Generally speaking, it can be predicted that the horticultural industry will be more advancing in Guangxi in correspondence with development of the economic status. Admittance of China to WTO and host-

ing of the annual meeting of China-ASEAN Exposition in Nanning City must increase the requirement for horticultural products. With improvement of the management level, betterment and updating of cultivation techniques through research, introduction of good-quality seeds, acceleration of breeding of new varieties, and the completed system of sale and distribution, under utilization of favorable natural conditions, it is well believed that Guangxi achieves further development in the horticultural industry in the future.

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