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Agendas and Counter Strategies of the Flower and Plant Industries in Japan and China

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Abstract

In the 2010s, Japan's flower and plant industry continued to stagnate in consumption and production, experiencing signs of a declining industry. Revitalization of the industry is desired. However, China's flower and plant industry has been growing. The consumption, production, and exports and imports of flowers and plants have grown rapidly. However, in recent years, exports have slowed down. There are also problems of insufficient supply in China, both in quantity and quality. This study examines and compares the present status and the problems of the flower and plant industries in Japan and China. We focus on consumption, distribution, production, and trade. We discuss the policy and counter strategies in both countries.

Keywords: flower production, flower trade, flower consumption, comparison between Japan and China, revitalization strategy, growth strategy

INTRODUCTION

Japan's flower and plant industry began to decrease in consumption and production around 2000 and stagnated in the 2010s, experiencing signs of a declining industry. Today, industrial revitalization and reconstruction are desired (Imanishi, 2014 and 2016). China's high economic growth since 2000 has led to a large increase in flower consumption, production, and exports and imports. The flower and plant industry is one of the growing industries in China (Cheng, S., Yang, J. and Li, X., 2012; China Flower Association, 2017; Niisato, 2018; Niisato and Cheng, 2021). However, in recent years, exports have slowed down. There are also problems of insufficient supply, both in quantity and quality.

This study examines and compares the current status and the problems of the flower and plant industries in Japan and China by conducting a statistical survey of flowers and plants. We focus on consumption, distribution, production, and trade. We discuss the policies and strategies adopted in both countries. In Japan, recovery strategies are considered, while in China, growth strategies are adopted.

JAPAN

Current situation

1. Production: contraction trend.

Japan is one of the world's largest producers and consumers of flowers and plants. According to AIPH (2017), in the production area of cut flowers, Japan ranks fourth in the world after India, China, and the US. Regarding the production value of cut flowers, Japan ranks third in the world after China and the US. However, Japan's production of cut flowers has been declining continuously since 2000. In recent years, this tendency has been remarkable. Figure 1 depicts a decreasing trend of the production area of flowers and plants by category, and Figure 2 depicts the changes in production volume. The production area and production volume for flowers and plants decreased year by year.

From 2014 to 2015, the production area of cut flowers decreased by 2% to 14,820 ha.

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the production volume decreased by 2% to 3,867 million pieces; and the production area of pot plants decreased by 2% to 1,737 ha. The production volume decreased by 2% to 230 million pots; the bulb production area decreased by 4% to 364 ha; the production volume decreased by 6% to 102 million bulbs; and the production area of seedlings for flower beds was 1,488 ha, which was almost the same as that of the previous year (a ha decrease), although the production volume was 666 million pieces, decreasing by 4%.

In 2018, the production area of cut flowers decreased by 2% from the previous year to 14,170 ha, and the production volume decreased by 5% to 3,534 million plants. The production area of pot plants decreased by 2% to 1,605 ha, and the production volume of pot plants decreased by 5% to 210 million pots. The bulb production decreased by 6% to 287 ha, and the production volume decreased by 6% to 87 million bulbs. The production area of seedling for flower beds decreased by 2% to 1,378 ha, and the production volume was 595 million pieces, reducing by 2%.

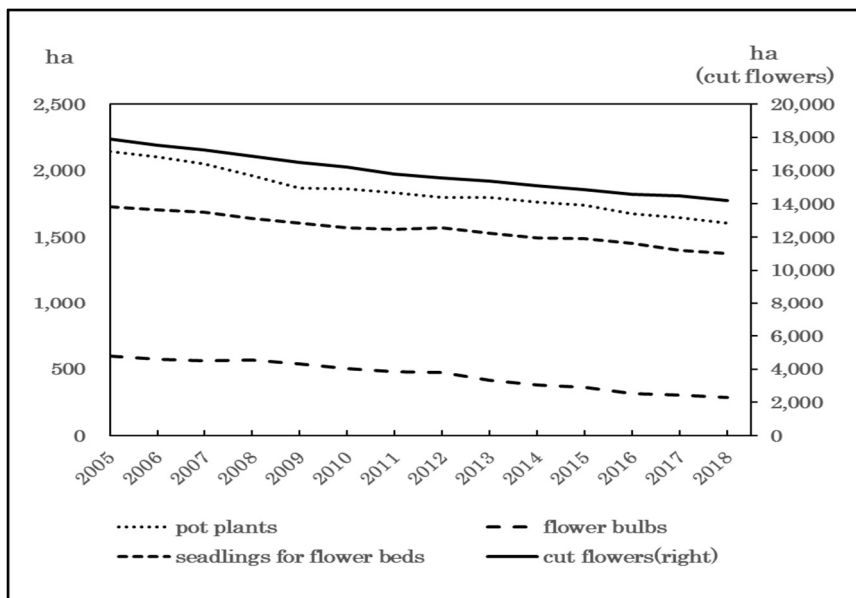


Figure 1. Trend of production area of flowers and plants, Japan. Source: Ministry of Agriculture, Forestry and Fisheries (2020c).

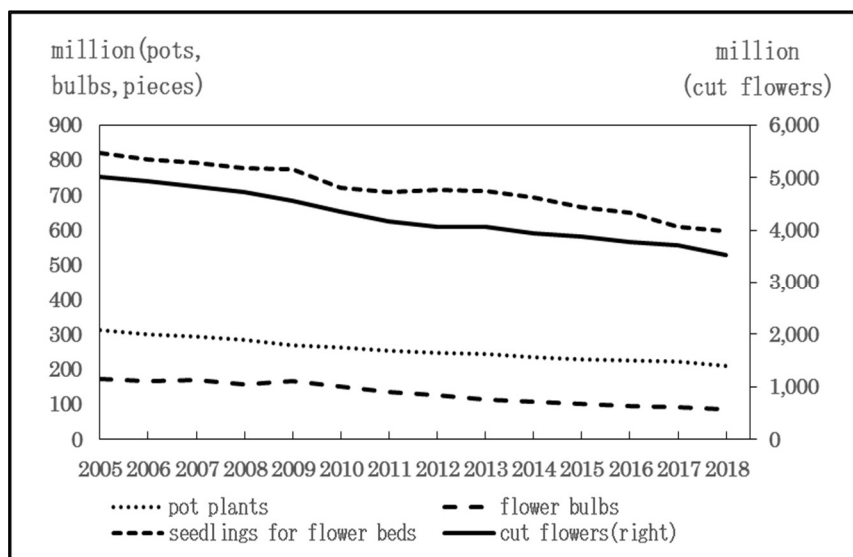


Figure 2. Trends in production volume of flowers and plants, Japan. Source: Ministry of Agriculture, Forestry and Fisheries (2020c).

The total production area for flowers and plants was 22,380 ha in 2005, 18,412 ha in 2015 (82% of that of 2005), and 17,440 ha in 2018 (78% of that of 2005). Since 2000, the domestic supply of the Japan's flower and plant industry has experienced a downward trend.

2. Imports: decrease in quantity and increase in price.

Imports of flowers and plants make up for Japan's inadequate supply, enrich the variety of flowers, and meet the consumption demand for flowers and plants in Japan. In 2018, imported cut flowers accounted for 28% of the cut flower supply in volume (Ministry of Agriculture, Forestry and Fisheries, 2020b).

According to trade statistics (Ministry of Finance, 2020), the import value of cut flowers in 2018 reached a record high of 40.3 billion yen, which was a 3.2% increase from the previous year (39.1 billion yen). In 2019, it decreased by 2.5% to 39.3 billion yen, which was almost the same as the 2015 value of 39.2 billion yen. However, it is a 26% increase from 2011 (31.1 billion yen). As depicted in Figure 3, the value of imports is on the rise. In terms of volume, cut flower imports peaked at 47,337 tons in 2012. It has been decreasing year by year, reaching 46,748 tons in 2013, 42,978 tons in 2014, and 41,337 tons in 2015. After that, it gradually increased, reaching 44,617 tons in 2019 but not up to the 2012 figure. As depicted in Figure 3, the amount of cut flower imports has been on a downward trend in recent years.

Figure 3 depicts the changes in import unit price. The average import price (unit price) per ton of imported cut flowers decreased from 2007 to 2011 and then increased until 2015. After that, the price dropped slightly, although it remained high. The volume increased until 2012 and then declined until 2015. It increased slightly until 2019. However, it has not reached the 2012 level. Imported flowers led to the rise of the phenomenon of "decreasing quantity and rising price." First, this was caused by the rise in import prices due to the depreciation of the yen. From late 2012 to 2015, the yen depreciated more than by 30%. To secure the supply of goods, it is necessary to raise import prices. Second, the sales volume (demand) of imported products is constrained because the Japanese economy is in a slump.

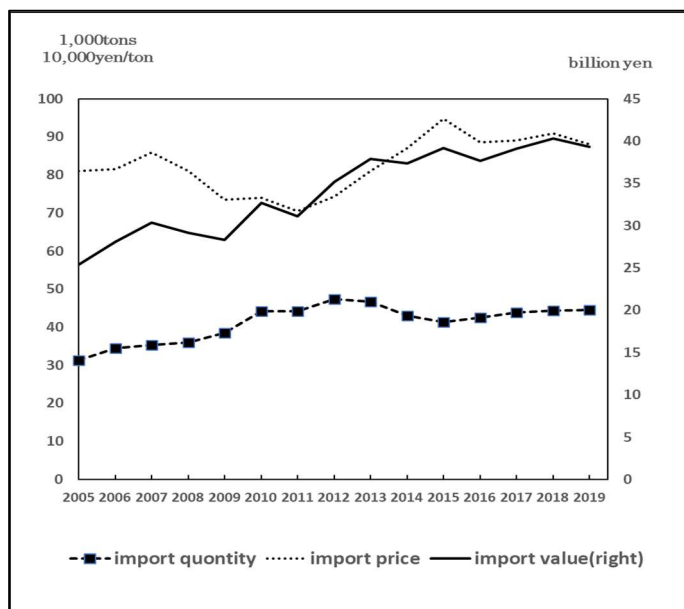


Figure 3. Trend of cut flower imports, Japan. Note: Cut flowers do not include foliage and branches. Source: Ministry of Finance (2020).

3. Consumption: Continued contraction of the flower market.

According to the 2014 survey on flower market distribution (Japan Flower Wholesale

Market Association, 2014), the transactions of 129 member markets decreased by 1.9% from the previous year to 372.4 billion yen. Of this amount, sales of cut flowers were 265.73 billion yen; pot plants, 95.05 billion yen; flowering trees, 3.21 billion yen (decreased by 1.9%, 2.0%, and 8.5% from the previous year, respectively); and materials and others, 8.49 billion yen (same as last year). According to a survey of 60 wholesale markets and cut flowers of 31 items, 1.227 billion pieces of chrysanthemum cut flowers were sold for 58.7 billion yen, decreasing by 2.4% and 5.6% from the previous year, respectively. Carnations, the second largest, sold 364 million pieces with a sales value of 16.7 billion yen, decreasing by 2.4% and 0.4% from the previous year, respectively. Roses were ranked third, selling 214 million pieces and 16.3 billion yen, decreasing by 6% and 4%, respectively. According to a survey of 51 pot plants in 21 wholesale markets, cyclamen had the largest sales volume, where 8.6 million pots were sold for 3.19 billion yen, decreasing by 5.9% and 6.4% from the previous year, respectively. Regarding, orchids, which had the highest sales value, 449.7 million pots were sold for 10.95 billion yen, decreasing by 7.9% and 2.7% from the previous year, respectively.

The scale of wholesale market management is shrinking too, and the number of wholesale markets in 2014 decreased by one from the previous year to 129. The number of full-time directors was 414, decreasing by 2.8% from the previous year. The number of full-time employees decreased by 1.3% from the previous year to 2,905; the number of part-time workers decreased by 0.8% from the previous year to 1,750; capital decreased by 3.5% from the previous year to 10.02 billion yen; and the number of registered buyers decreased by 0.3% from the previous year to 44,039. There were 417 wholesalers, decreasing by 2.3%.

The wholesale flower market turnover improved slightly in 2015 but is far from the level in 2010, before the Great East Japan Earthquake. According to a 2015 survey on flower market distribution (Japan Flower Wholesale Market Association, 2015), the transaction volume of the 129 member markets was 380.2 billion yen (2.1% up from the previous year). Cut flowers were 274.505 billion yen (3.3% up); flowering trees were 3.404 billion yen (6.2% up); pot plants were 94.06 billion yen (1% down); and materials and others were 8.23 billion yen (3.1% decrease). According to a survey of 31 types of cut flowers at 60 wholesale markets, the sales volume of chrysanthemums was 1.18 billion, decreasing by 4.1% from the previous year, and the sales value was 362 million, which was the same as that of the previous year with a sales volume of 17,820 million yen (a 6.5% up). Roses sold 204.6 million (5% down) pieces for 16,330 million yen. According to a survey of 51 pot plants in 21 wholesale markets, 795.4 million pots of cyclamen were sold for 3.04 billion yen, decreasing by 7.5% and 4.7% from the previous year, respectively. Orchid sales amounted to 4.399 million pots, decreasing by 2.1%, and the sales value was 11.12 billion yen, increasing by 1.6% from the previous year.

In 129 wholesale markets, the number of non-managers decreased by 6.9%; the number of regular employees decreased by 0.1%; the number of temporary workers decreased by 4.5%; and the number of registered buyers decreased by 2.1% compared with that of 2014.

Table 1. Wholesale markets in 2010 and 2015. Source: Japan Flower Wholesale Market Association (2010) and (2015).

	2010 (billion yen)	2015 (billion yen)	decrease rate (%)
Cut flowers	289.4	274.5	5.1
Pot plants	105.3	94.1	10.6
Flowering trees	4.4	3.4	22.7
Materials and others	9.5	8.2	13.7
Total	408.6	380.2	7.0

The size of the wholesale flower market continues to shrink, and even under the

circumstances of the rapid depreciation of the yen, it will not return to the level of 2010. Pot plants, flowering trees, and materials and others decreased by approximately 11%, 23%, and 14%, respectively (Table 1). As mentioned above, in 2015, although the transaction value of the flower wholesale market generally increased, the sales volume was still on a downward trend. Deflation was mitigated to some extent by the aggressive policies of “Abenomics” and the weakened yen, but the consumer price index rose to 96.8 in 2012, 95.8 in 2013, 95.2 in 2014, and 103.0 in 2015 (partly due to the consumption tax hike from 5% to 8% in April 2014). Even at the retail level, retail florist sales of luxury flowers have slumped, and the number of flowers used in hotel weddings has declined. According to a survey of home improvement stores by the DIY Association, the sales of 38 home improvement stores in 2015 were 2.6357 trillion yen (1.6% down from the previous year), and the number of visitors was 1.027 billion (1.8% down from the previous year). DIY tools and materials accounted for 24.6% of sales; home used goods accounted for 20.7%; and gardening and exterior products accounted for 13.5%.

Problems of stagnant flower and plant industry

1. Significant decrease in producers.

Japan’s flower and plant industry, as well as other agricultural sectors, is facing serious problems such as the ageing of farmers and a shortage of successors. The number of production and management entities has decreased significantly. According to the 2015 Census of Agriculture and Forestry (published every five years)(Ministry of Agriculture, Fishery and Forestry,2020a), the number of agricultural management entities in February 2015 was 1.377 million, which was a decrease of 18.0% from five years ago. Out of these, 1.344 million were family-owned management entities, which decreased by 18.4%. The number of organizational management entities was 33,000, which increased by 6.4%. The number of farms was 2.155 million, decreasing by 14.7% from five years ago. Out of these, 1.33 million commercial farms and 825,000 noncommercial farms decreased by 18.5% and 7.9%, respectively. Among the commercial farm households, the number of full-time farm households decreased by 1.9% to 443,000; the number of Type 1 part-time farm households decreased to 165,000, which was a decrease of 26.6%; and the number of Type 2 part-time farm households decreased by 24.4% to 722,000. The number of commercial farms engaged in agriculture decreased by 25.1% to 3,399,000, out of which the population mainly engaged in farming decreased by 19.5% to 2,097,000. Among the farming population, the number of core persons mainly engaged in farming was 1.754 million, which was a decrease of 14.5%. The average age is 66.4 years old, and 63.5% of them are over 65 years old. Among them, the average age of core persons is 67 years old, and 64.6% of them are 65 years old or older (Table 2).

Table 2. Population engaged in mainly farming and core persons engaged in farming by age.
Source: Ministry of Agriculture, Fishery and Forestry (2020a).

Age	2005		2010		2015		1,000persons
	Engagement in farming	Core	Engagement in farming	Core	Engagement in farming	Core	
15-39	318	110	177	96	14	89	
40-49	240	181	147	121	110	92	
50-59	479	382	358	310	234	202	
60-64	365	280	39	271	280	242	
65 and above	1,951	1,287	1,605	1,253	1,331	1,132	

Figure 4 shows the number of commercial farms for flowers and plants decreased from 88,000 in 2000 to 81,000 in 2005, 67,000 in 2010, and 58,000 in 2015. The total number of commercial farms for agricultural products decreased from 2,337,000 in 2000 to

1,963,000 in 2005, 1,631,000 in 2010, and 1,330,000 in 2015. However, the extent of the decrease in 2015 was 43.1% for commercial farms for agricultural products, and in 2000, it was only 34.1% for commercial farms for flowers and plants.

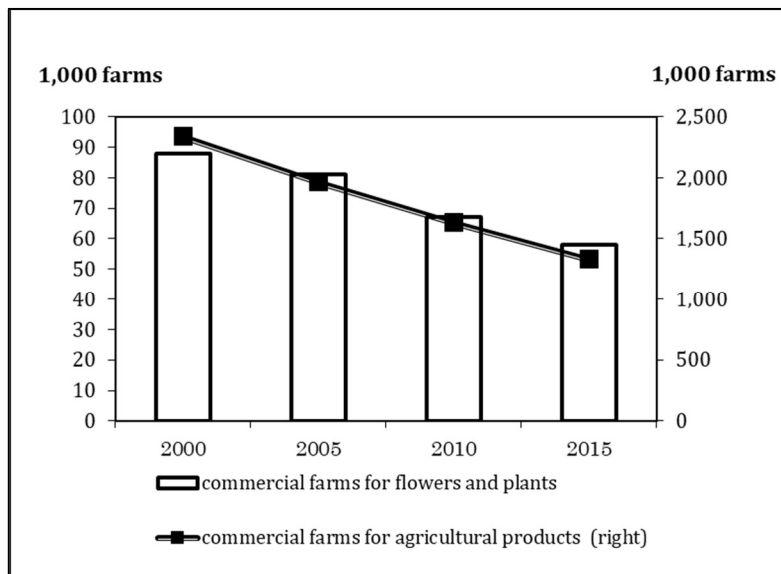


Figure 4. Changes in the number of commercial farms for flowers and plants and for agricultural products. Source: Ministry of Agriculture, Forestry and Fisheries (2019).

2. Sluggish consumption.

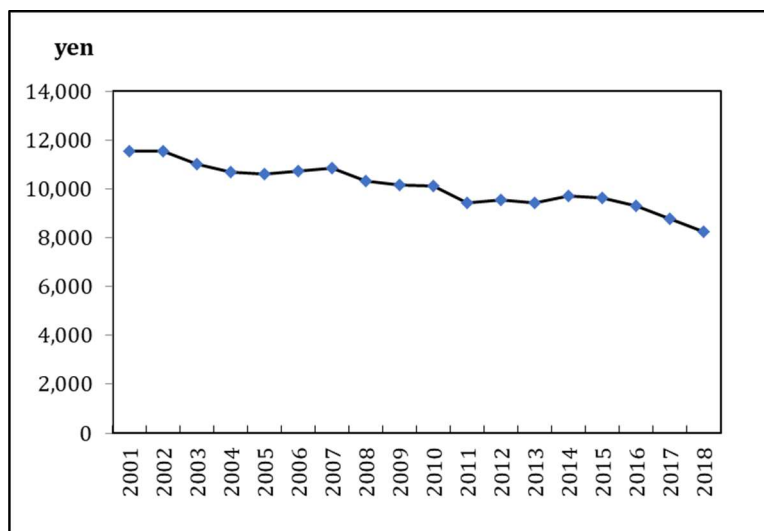


Figure 5. Cut flowers expenditure per household. Source: Ministry of Internal Affairs and Communications (2018).

According to the 2015 Comprehensive Survey of Living Conditions (Ministry of Health, Labor and Welfare, 2015), the average household income was 5,419,000 yen, which was a 2.5% increase from the previous year and the first recovery in three years. However, income class disparity was still serious, with 61.2% of households earning below the average income, about 40% earning 1–4 million yen, and 6.4% earning less than 1 million yen. According to the 2018 Comprehensive Survey of Living Conditions (Ministry of Health, Labor

and Welfare, 2018), the average household income in 2017 was 5,516,000 yen, which was a 1.5% down from the previous year, and the income class disparity was below the average for 62.4% of households, with 40% earning 1–4 million yen and 6.2% earning less than 1 million yen. In both 2015 and 2018, about 60% of all households answered that they were painful (extremely painful and somewhat painful).

According to the survey of the household economy (Ministry of Internal Affairs and Communications, 2018), the expenditure of two-or-more person households decreased by 2.9% in 2014, 2.3% in 2015, 1.7% in 2016, 0.3% in 2017, and 0.4% in 2018. Flowers are a type of spiritual and cultural consumer goods, and unlike daily necessities such as food and vegetables, people tend to lose their willingness to buy them when their income decreases. The average purchase value of cut flowers per household in 2015 was 9,616 yen, which was a decrease of 1.0% from 9,707 yen in 2014. It continued to decline to 9,317 yen in 2016, 8,757 yen in 2017, and 8,255 yen in 2018 (Figure 5). The frequency of spending for cut flowers per household in 2015 was nine times—the same as in 2014 and 0.2 points lower than that in 2013. Furthermore, it decreased in 2016, 2017, and 2018 to 8.0 times.

3. Changes in consumers' lifestyles.

With the rapid development of the Japanese economy after the Second World War, the culture of flowers has spread rapidly, and flower arrangements for home use, gardening, office flower arrangements, and giving flowers have become a part of daily life. However, the rise of internet culture has changed the Japanese way of life to a great extent. Middle-aged and young people in particular have little interest in traditional floral art and culture. According to the 2015 annual survey of household economy (Ministry of Internal Affairs and Communications, 2015), the younger a household, that is, households with two or more younger people, the lower the average annual spending for cut flowers and gardening supplies, whereas those aged 50–59 spent 9,006 yen; 40–49 spent 4,179 yen; 30–39 spent 2,866 yen; and 29 spent 1,669 yen (Fig. 6). In 2018, it was 11,964 yen for those aged 70 and above, 11,183 yen for those aged 60–69, 7,212 yen for those aged 50–59, 3,429 yen for those aged 40–49, and 2,406 yen for those aged 30–39. The spending of those less than 29 years was 2,158 yen (Fig. 6).

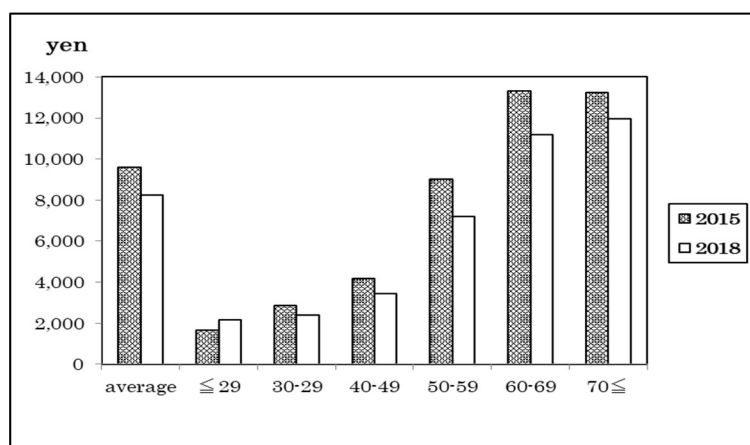


Figure 6. Annual spending for cut flowers by age of household head (2015, 2018). Source: Ministry of Internal Affairs and Communications (2015) and (2018).

According to the Japan Productivity Center (2016), the market size of the leisure-related industry in 2015 was 72.299 trillion yen, which was a decrease of 1.0% from the previous year and the first decline in four years (p.69). In all markets, except pachinko and pachislot, which had an outstandingly large market size, sales increased by 1.2% from the previous year, marking the third consecutive year of growth. Among them, the tourism and excursion sector increased by 0.6% from the previous year and grew for the fourth consecutive year. The sports sector increased by 1.9% year-on-year and has continued to

recover after falling for three consecutive years. The hobby and creative sector decreased by 1.0% from the previous year, marking the fifth consecutive year of decline. The main reason is that the sales of cameras and video cameras have decreased significantly, and the sales of books and magazines have been sluggish. The entertainment sector decreased by 1.5% from the previous year, which was mainly due to the pachinko/pachislot slump and the scale reduction of video games and game software (p.69). Regarding the number of people participating in leisure activities, the first is 55 million for domestic tourism, which was an increase of 1.9% from the previous year. The second was 43.9 million for eating out, which decreased by 12.2%. The third was 43.4 million people who engaged in driving, which was a 10.9% decrease from the previous year. Horticulture and gardening ranked 15th, with a large decrease of 11% from 30 million in the previous year to 26.7 million (p.23).

According to the Japan Productivity Center (2019), the size of the leisure market in 2018 was 71.914 trillion yen, decreasing slightly from 2015. However, excluding the pachinko/pachislot sector, sales increased for five consecutive years (p.69). Reading ranks third in participation in leisure activities, and driving ranks fourth. Horticulture and gardening ranked 15th, with 25.6 million people in 2018. This is a decrease of 1.1 million people in three years (p.23).

Revitalization strategies

1. Flowers and plants promotion act.

The Flowers and Plants Promotion Act was enacted in July and enforced in December 2014. Based on this law, in April 2015, the Ministry of Agriculture, Forestry and Fisheries announced the basic policies for the revitalization of the flower industry and floral culture. The targets in 2035 are 650 billion yen for production, 45 billion yen for exports, and 30 billion yen for imports. The targets by category are 6.7 billion pieces for cut flowers, 410 million pots for pot plants, 310 million pieces for flowering trees, 210 million bulbs for flower bulbs, 1.1 billion pieces for seedlings for flower beds, 6,4000 ha for turf, and 52 million plants for ground-covering plants.

The policy measures for the flower and plant industry are as follows: 1) Strengthen the infrastructure for flower and plant production and support the protection and utilization of intellectual property rights to stabilize management by producers. 2) Develop new varieties and sophisticated breeding technology for the promotion of productivity and quality improvement. 3) Ensure sophisticated processing and distribution, develop distribution-related facilities such as wholesale markets, rationalize distribution routes, and reuse cardboard and other materials. 4) Establish a cold chain from production to distribution/sales to preserve the freshness of flowers and plants. 5) Promote export. 6) Employ sophisticated breeding technology to implement research and development projects. 7) Promote research and development, breed new varieties, shorten the cultivation period, and improve the quality of flowers and plants such as long-life. 8) Implement countermeasures against global warming.

Furthermore, measures to promote floral culture (e.g., education) and measures to increase demand for flowers and plants (e.g., sales of cut flowers guaranteed to last for a long time) were also specified (Ministry of Agriculture, Forestry and Fisheries, 2015).

In April 2020, the Ministry of Agriculture, Forestry and Fisheries announced new basic policies after reviewing its basic policies for revitalizing the flower and plant industry and floral culture. As an intermediate target for the final target in 2035, the output target for 2030 is set at 450 billion yen for domestic production of flowers and plants, 20 billion yen for exports, and 30 billion yen for imports. Promotion policies, including the area expansion of next-generation greenhouse horticulture, aimed at converting the current production system to an environment-controlled production system and the introduction of smart agricultural techniques using robots, artificial intelligence (AI) and the Internet of Things (IoT), such as automatic weight sorting of flowers and automatic control of risks (e.g., natural disasters). In addition, agricultural insurance as a cushion for natural disasters, income insurance for natural disasters, and horticultural facility mutual aid that

compensates for the loss of agricultural greenhouses should be introduced. A production system should be established to promote flower and plant production. Overseas demand should be expanded via government exhibitions at international expositions and inbound tourism (Ministry of Agriculture, Forestry and Fisheries, 2020b).

The Ministry of Agriculture, Forestry and Fisheries has an annual budget of about 1 billion yen to support the production and supply of domestic flowers and plants. It is used to support associations and encourage all aspects of the flower and plant industry. In 2020, it was used to promote the establishment of the next-generation domestic flower industry; to support the establishment of regional strategic items and to solve their production, distribution, and consumption challenges; for technical demonstration support, which was led by national and prefectural research institutes; to disseminate information through international horticultural expositions (2021 Doha, Qatar, 2022 Arlele, Netherlands); (As a related project) to improve conditions for promoting the formation of future production areas.

2. Popularization of floral education.

Floral education is an activity that fosters children's feelings of kindness and beauty through the opportunity to get close to flowers and greenery and grow them. In 2008, the National Floral Education Activity Promotion Council (<https://www.hanaiku.gr.jp/>) was established, consisting of 39 organizations, including the Japan Flower Promotion Center, the Urban Greening Organization, and the Flower Production Association. It was established to disseminate and enlighten floral education activities such as support for floral education guidance mainly at kindergartens and elementary schools, as well as to plan and promote floral education activities. It is looking for maintenance, administration, and floral education activity support funds.

The Ministry of Agriculture, Forestry and Fisheries; the Ministry of Education, Culture, Sports, Science and Technology; the Ministry of Land, Infrastructure, Transport and Tourism; and other relevant ministries and agencies have also established a liaison committee to assist the National Floral Education Activity Promotion Council in carrying out various flower education activities. For example, in 2011, the Ministry of Agriculture, Forestry and Fisheries formulated the "Hanaiku (Floral education) Activity Promotion Policy and Nationwide Collection of Hanaiku (Floral education) Activity Case Studies" (https://www.maff.go.jp/j/seisam/kaki/flower/f_hanaiku/zirei/index.html). The Japan's flower and plant industry generally believes that "floral education" activities play an important role in passing on floral culture and stimulating consumption. The industry, governments and schools are actively and cooperatively engaging in floral activities.

Aichi prefecture is the largest producer of flowers and plants in Japan. In 2013, various flower-related organizations in the prefecture established the "Flower Kingdom Aichi Prefectural Movement Executive Committee" (<http://www.flower-kingdom.aichi/>). There is a registration system for flower education teachers that cover flower arrangements, flower bed making, group planting, and pressed flowers. They teach about flowers and plants as lecturers in floral education classes at kindergartens, nursery schools, schools, local governments, and companies. And students and citizens come to love, utilize, and cultivate flowers, and to have the daily lives of citizens who make flowers bloom. They promote activities that featured the theme of flowers and develop floral education.

3. Expansion of exports.

According to the trade statistics (Ministry of Finance, 2020), the value of flower and plant exports, which consist of bulbs, live plants (flowering trees, bonsai, and pot plants), cut flowers, and forage and branches, increased from 2.98 billion yen in 2006 to 10.03 billion yen in 2013. After that, it decreased by 39.7% to 6.05 billion yen in 2014 but grew significantly to 8.52 billion yen in 2015, 9.11 billion yen in 2016, and 13.9 billion yen in 2017. However, it decreased to 13.3 billion yen in 2018 and 10.6 billion yen in 2019 because trees, which account for 90% of exports, decreased significantly. In the long run, exports have grown 3.6 times over the past 13 years. By region, exports to China (including Hong Kong

and Taiwan) and Vietnam accounted for about 90% (Ministry of Agriculture, Forestry and Fisheries., 2022b).

In recent years, exports of cut flowers have been on the rise. In 2013, the export volume was 39 tons, which was an increase of 68% from the previous year, and the export value was 167 million, which was an increase of 42%. In 2014, it was 55 tons and 334 million yen, which was an increase of 43% and 100%, respectively. In 2015, it was 83 tons and 513 million yen, which was an increase of 51% and 54%, respectively. In 2016, it was 102 tons and 717 million yen; in 2017, it was 135 tons and 862 million yen; in 2018, it was 164 tons and 889 million yen; and in 2019, it was 191 tons and 884 million yen, experiencing remarkable growth in both quantity and value. About 80% of export destinations are the United States, mainland China, South Korea, and Hong Kong.

The Export Strategy Executive Committee of the Ministry of Agriculture, Forestry and Fisheries (<https://www.maff.go.jp/j/shokusan/exports/e%kikaku/zikkou.html>) proposed flower and plant exports of 13.5 billion yen in 2016 and 15 billion yen in 2020. The “Floral Industry Promotion Policy” (2016, 2020) set the export target for 2030 and 2035 at 20 billion yen and 45 billion yen, respectively. In recent years, the demand for high-end and famous flowers and plants has increased in markets such as China, indicating that there is a high possibility of Japan’s flower and plant exports. However, at present, sufficient information has not been collected on changes in demand in importing countries, and the colors and shapes of flower products required by importing countries have not been grasped. Efforts to overcome these problems will play an important role in further expanding exports of luxury flower and plant products.

4. Wet and cold chain systems.

After harvesting, cut flowers are transported from producers to consumers via a wet cold chain system. This not only improves the freshness of flowers and prolongs the long-life (blooming) but also makes it possible to save resources by recycling buckets that carry flowers and reducing the amount of cardboard used. Since the Ministry of Agriculture, Forestry and Fisheries surveyed wet low temperature distribution of cut flowers in 1996, the amount of cut flowers sold in wet low temperature distribution has increased by more than 10% every year (increased by 12.3% from 2007 to 2008) (Ministry of Agriculture, Forestry and Fisheries, 2010). However, the ratio of the amount of wet low temperature to the shipment amount of cut flowers was as low as 7.9%. In addition, the rate of wet low temperature distribution differs depending on the type of cut flowers. Gypsophila is 55%; rose is 47%; lisianthus is 47%; and chrysanthemum is 0.5% (2008). Wet low temperature distribution of cut flowers is more expensive than natural distribution, but the loss rate is extremely low. Moreover, as fresh flowers are transported raw, they last longer, so they are preferred by flower shops. As dry transportation causes more water loss than wet transportation, long-life is reduced by about four days.

Wholesale flower markets are the central link for quality control and monitoring of flowers, and florists are encouraged to use transport buckets to solve the high costs of wet and cold transport. For example, reusable packaging containers that not only reduce waste such as cardboard but also save labor and make logistics greener have been developed. According to the statistics of the Japan ELF System Association, from 2001 to 2007, a total of 18,893,503 special ELT buckets containing water and an antibacterial agent (T-bag) were distributed (Arai, 2008). In 2017, the cumulative total expanded to 62,191,778 (Kanaya Lid, 2020). To improve long-life, it is essential to establish and popularize wet and cold chains that connect the production, distribution, and retail stages.

5. Popularization of long-life guaranteed sales

The Ministry of Agriculture, Forestry and Fisheries proposed to actively promote “sales of flowers with a long-life guarantee” and carried out a demonstration project for selling cut flowers with a long-life guarantee. At each flower shop, a long-life sale sticker (5 or 7 days) was attached to the target product. After rigorous post-harvest processing, temperature control, and water transportation, the bouquets were purchased from the

market and placed in fungicide-filled buckets, along with nutrition bags and care instructions. According to a survey (MPS Japan, 2011), 70% of people are satisfied with flowers that have a long-life of seven days. Extending flower viewing periods is very important to improve customer satisfaction, and to extend flower long-life, it is necessary to improve the management accuracy of production, distribution, retail, and other links.

The Ministry of Agriculture, Forestry and Fisheries has allowed MPS Japan Co., Ltd. (<http://www.mps-jfma.net/himochi>) to certify the quality control of the long-life of flowers. MPS (Flower Industry Comprehensive Certificate) is a global certification system for freshness, quality assurance, and the working environment of flowers. MPS includes MPS for producers, MPS for market, and MPS for distribution. The freshness and morphology of flowers in production, distribution (markets, wholesalers, processing nodes, and transport), retail, and other links are factored into the quality of certified flower display periods. Once MPS certification is obtained, a certification label can be affixed to the product. MPS Japan publishes a list of certified suppliers on its website and informs related companies, such as wholesale markets and intermediate wholesalers. Accreditation of the quality control of the long-life period will realize differentiated management of domestic and imported flowers and improve the competitiveness of domestic flowers.

CHINA

Current situation

1. Sustainable expansion of production scale.

China's scale of production of flowers and plants ranks first in the world (AIPH. 2017 and 2018). In 2018, the production area reached 1,633 thousand ha (Table 3). This was an increase of 26% from 2015, which is a three-year average annual growth rate of 8.0%, and production continued to expand. From 2015, cut flowers increased by 1.84 billion to 17.66 billion pieces, which was an increase of 12% (annual average growth rate of 3.7%). The number of pot plants increased from 4.14 billion to 5.65 billion pots, which was an increase of 36.5% and an average annual growth rate of 10.9%. Seedlings and flowering trees increased by 16.4% from 10.03 billion to 11.67 billion pieces, which was an annual average growth rate of 5.2%. Turf increased from 390 million m² to 620 million m², which was an increase of 59% and a 16.7% annual average growth rate. In addition, the production of edible and medicinal flowers, flowers for flowerbeds, and dried flowers increased significantly.

The flower market has expanded and, in 2018, there were 4,162 flower markets nationwide (Table 3). The markets are at the core of the development of the local flower industries. In particular, in major production and consumption areas, the growth of large-scale flower markets will have a great impact on the flower markets in China and East Asia. For example, Kunming International Flower Auction (KIFA) in Yunnan Province had sales of more than 1 billion yuan (approximately 6.7 billion yen) in 2018 and handled 1.28 billion flowers. Cut flowers of roses account for more than 60% of China's total flower transaction volume. Yunnan flowers are not only sold domestically but also worldwide, making KIFA an important channel. Price fluctuations have a great impact on domestic and international flower prices.

Table 3. Flower and plant production in 2018. Source: Ministry of Agriculture and Rural Affairs (2018).

	Production					
	Area	Cut flowers	Put plants	Seedlings and flowering trees	Turf	Number of flower markets
	ha	million pieces	million pots	million pieces	million m ²	
Nationwide total	1,632,754	17,663.86	5,649.94	11,666.72	617.02	4,162
Beijing	4,497	33.00	155.29	17.29	4.31	15
Tianjin	370	0.36	27.10	3.36	0.40	10
Hebei	41,344	120.03	70.33	1,170.18	1.40	289
Inner Mongolia	1,598	2.85	69.47	3.63	0.91	115
Inner Mongolian Group	-	-	-	-	-	-
Liaoning	32,107	95.04	93.83	22.37	0.07	23
Jilin	2,222	20.65	3.94	28.86	1.01	41
Jilin Group	-	-	-	-	-	-
Changbai Mountain Group	-	-	-	-	-	-
Heilongjiang	886	28.43	3.02	9.01	0.07	16
Heilongjiang Group	-	-	-	-	-	-
Shanghai	921	82.67	188.16	0.83	7.13	15
Jiangsu	310,766	1,429.47	342.50	4,005.59	208.40	233
Zhejiang	67,857	611.45	399.07	1,839.10	45.17	112
Anhui	46,721	103.93	177.22	342.97	121.26	417
Fujian	64,909	1,623.30	1,390.59	253.18	24.74	217
Gangxi	57,343	352.38	114.92	227.29	17.29	298
Shandong	163,535	1,659.85	1,015.78	911.59	1.61	391
Henan	135,693	655.06	118.84	501.30	3.23	228
Hubei	107,402	157.84	196.10	242.08	13.43	243
Hunan	67,897	76.95	45.11	248.42	52.62	318
Canton	76,125	2,785.32	306.56	165.99	25.72	129
Guangxi	32,324	141.00	74.60	167.68	59.46	61
Hainan	10,222	688.62	131.35	25.70	5.02	24
Chongqing	35,692	20.60	24.21	121.51	7.25	108
Sichuan	52,723	435.85	245.43	230.06	4.76	380
Guizhou	37,904	81.77	26.59	322.02	3.46	84
Yunnan	204,395	6,222.16	106.35	159.57	0.42	47
Tibet	136	0.62	0.01	0.19		3
Shaanxi	67,020	61.49	178.41	385.83	6.93	83
Gansu	3,007	77.01	52.14	27.30	0.11	88
Aomi	100	1.00	4.50	0.04		12
Ningxia	1,385	65.02	75.68	73.82	0.53	12
Xinjiang	444	0.50	6.88	131.05	0.21	46
Xinjiang Corps	51	-	0.88	3.67	-	4
Daxinganling	3	0.29	-	0.42	-	-

2. Strong export expansion.

Although the world economy has been in a period of moderate recovery in recent years, the growth of China's exports of flowers and plants have generally been strong. According to China's customs statistics, the total export value of flowers and plants was 358 million dollars in 2019, which was an increase of 14.7% from 312 million dollars in 2018. This is 1.4 times that in 2015 (256 million dollars), with an average annual growth rate of 8.7%. Chinese flowers and plants are exported to about 97 countries and regions. Pot plants, cut flowers, foliage and branches, and seedlings are the main export items, worth 137.76 million dollars, 114.45 million dollars, 55.63 million dollars, and 38.63 million dollars, accounting for 38.5%, 32.0%, 15.5%, and 10.8% of the total export value, respectively. Regarding the five-year change in exports from 2015 to 2019, exports of pot plants, cut flowers, and seedlings have been growing steadily, with exports in 2019 increasing by 29.5%, 10.8%, and 8.8% from 2018, respectively. However, foliage and branches decreased slightly by 2.2% (Table 4).

Table 4. Chinese flower exports in 2019 (Top four growth rates). Source: Customs Statistics. In China Flower Association (2020).

	Exports (million dollars)	Share (%)	Growth rate (%)
Total	358.00	100.0	14.70
Pot plants	137.76	38.5	29.46
Cut flowers	114.46	32.0	10.76
Foliage and branches	55.63	15.5	-2.19
Seedlings	38.63	10.6	8.84

Japan, South Korea, and the Netherlands are the major export destinations of China's flowers, with export values of 93.08 million, 50.12 million, and 39.38 million dollars, accounting for 26%, 14%, and 11% of total exports, respectively. The amount of exports increased from 2018 to 2019 (Table 5).

Table 5 China's flower exports in 2019 by country (top 3) Source: Customs Statistics. In China Flower Association (2020).

	Exports (million dollars)	Share in total exports (%)	Growth rate (%)
Japan	93.08	26	2.0
South Korean	50.12	14	22.2
The Netherlands	39.38	11	12.0

3. Production areas of cut flowers and pot plants.

Yunnan is the main production area for cut flowers (Table 6). In 2018, the production of cut flowers (including foliage and branches) in Yunnan Province was 6.26 billion pieces, accounting for 35.2% of the total shipment value of cut flowers in the country. Pot plants are mainly produced in Fujian and Shandong provinces (Table 7). Fujian is located in a subtropical region, with abundant light and temperature. Particularly, Zhangzhou in Fujian Province, Fuzhou, and Longyan are suitable for producing various pot plants. Fujian produces 1.39 billion pot plants, accounting for 24.6% of the total domestic production of pot plants. Shandong Province has excellent natural conditions and abundant resources of pot plants, producing 1.02 billion pot plants and accounting for 18.0% of the national production of pot plants. Ornamental seedlings (seedlings and flowering trees) are mainly produced in Jiangsu and Zhejiang provinces. This area is located on the coast, with different types of landforms, including mountains, hills, plains, and coasts, forming a variety of climates and fertile plant resources. The output of ornamental seedlings is 4 billion and 1.84

billion pieces, accounting for 34.33% and 15.76% of the total domestic ornamental seedling production, respectively.

Table 6. Top five production areas for cut flowers, and foliage and branches in 2018. Source: calculated from Table 3

	Cut flowers production (millions)	Share (%)
National wide	17,663.86	100.00
Yunnan	6,222.16	35.23
Guangdong	2,785.32	15.77
Shandong	1,659.85	9.40
Fujian	1,623.30	9.19
Jiangsu	1,429.47	8.09

Table 7. Top five production regions for pot plants in 2018. Source: calculated from Table 3

	Pot plants production (million pots)	Share (%)
National wide	5,649.94	100.00
Fujian	1,290.52	24.61
Shandong	1,015.78	17.98
Zhejiang	399.07	7.06
Jiangsu	342.50	6.06
Guangdong	206.56	5.43

4. Issues faced by small farmers and the flower industry.

At present, flower and plant production in China is still dominated by small-scale production with many farmers rather than large-scale production by enterprises. From 2015 to 2018, the number of flower and plant farmers increased from 1,347,600 to 1,432,400, which was an increase of 6.3% in three years, and the number of employees increased from 5,057,700 to 5,234,500, which was an increase of 3.5%. The number of flower and plant enterprises increased from 52,500 to 53,900 (an increase of 2.7%), of which the number of large and medium-sized enterprises with cultivated areas exceeding 3 ha or annual shipment value exceeding 5 million yuan increased from 9,136 to 9,514 (an increase of 4.1%). The rapid growth of the flower and plant industry has contributed to the transformation of agricultural development methods, the optimization and upgrading of agricultural structures, the modernization of agriculture, and the improvement of farmers' living standards.

However, despite its rapid development, China's flower and plant industry generally faces challenges such as poor organization, high logistics costs, slow breed renewal, and lagging cultivation techniques. It faces the contradictions of market price fluctuations and stable development, high logistics costs and expansion of sales channels, protection of new varieties, and development of high-end flowers. Measures to solve these problems and eliminate all contradictions will play an important role in the sustainable development of China's flower and plant industry. Further development of the logistics system is critical to improving the organization of the industry, fostering new types of flower and plant businesses, protecting intellectual property rights of new varieties, and improving the quality of flower and plant products in retail sales.

Challenges in flower distribution

1. Scattered small-scale production.

There are many powerful large enterprises in China's flower and plant industry. However, scattered small-scale growers still account for more than 70% of the total

production. Flowers and plants are fresh ornaments and face a higher risk in production and distribution than essential agricultural products, such as grains and vegetables. In unpredictable markets, it is difficult for dispersed small farmers to obtain accurate information. Therefore, they are often in a weak position in the production and trade of commodities. There is also a discrepancy between the peak periods of supply and demand. Combined with the peculiarities of flower consumption, flower prices fluctuate at various times, having peak, general, and stagnant demands. Therefore, farmers are likely to face challenging situations.

2. Backward logistics facilities and high transportation costs.

In Yunnan Province, which is the main production area of cut flowers, the level of post-harvest processing by flower growers is generally low; overloading is serious; there is no complete cold chain logistics system and information network; and the loss of cut flowers at the logistics stage is 30%. The main production areas of foliage plants are Guangdong and Fujian provinces. The distribution process from the production area to the consumption area is mainly natural distribution, and roofless trucks are the mainstream. Houseplants are piled up, and the cargo bed is full. Therefore, it is only necessary to cover the cargo bed with a sheet, and it is difficult to store, especially in winter, leading to huge losses.

3. Insufficient new variety development.

According to Market KIFA statistics, in 2016, there were 200 new varieties of cut flower of roses (including certified varieties), 170 single-flowered rose varieties, and 30 multi-flowered (spray) rose varieties. In 2017, 70 varieties were added (45 single- and 25 multi-flower varieties). In 2018, 86 new varieties (73 single- and 13 multi-wheeled) were added. Over the past three years, 356 new rose varieties (288 single and 68 multi-flower varieties) have been certified. However, the proportion of China's own new varieties is less than 1%, and new varieties added over the past two years have almost no origin in China. In 2018, KIFA traded 180 million new varieties and paid 14.842 million yuan in patent fees to foreign enterprises. It is necessary to develop new varieties of Chinese origin with good quality. New cultivars with high quality not only have the characteristics of showy, beautiful, and straight flower types, and lush foliage but also are easy to cultivate and have strong stress tolerance. Further, they can be produced by local flower farmers and can adapt to their production level.

Growth strategies to accelerate the development of the Yunnan flower and plant industry

1. Strengthening research and development of new varieties.

China has abundant plant resources. Focusing on enterprises or large-scale flower and plant producers; effectively integrating research and development resources; and establishing a scientific and technical research and development system that combines "production, marketing, learning, research, and management," we need to rely on technological progress and innovation to accelerate the transformation of growth patterns. The application project funds of the Ministry of Science and Technology should give priority to enterprises, and enterprises are encouraged to extract a large amount of research and development funds from sales and cultivate their own new brands.

2. Improvement of the logistics system.

It is necessary to set up distribution bases in the main production areas and establish a feedback system for collection, sorting, processing, packaging, refrigeration, quality inspection, shipping, and information transmission. The distribution line from the distribution base in the production area to the wholesale markets in the consumption area is equipped with constant temperature refrigerated vehicles, and the standards and specifications of packing containers, carts, circulating water buckets, and pallets are formulated to ensure efficient cargo handling of carts. Establish trial-and-error transport for

unloading function and cold water storage, as well as a recycling system for carts and buckets. Establish transfer stations to support wholesale markets and configure collection, sorting, packing, refrigeration, quality inspection, distribution, shipping, and delivery systems, as well as large temperature-controlled refrigerated container (sea container) vehicles. Build a distribution base for flower and plant farmers. Build a low-carbon cold chain logistics network in the production area wholesale market and production area transfer station terminal market.

3. Collaboration between flower and plant cooperatives and large enterprises.

Flower and plant cooperatives are self-organizations of flower and plant farmers. They can solve the problems of sorting, processing, packaging, and transportation that cannot be handled by a single farmer; strengthen the market negotiation ability of production and sales of flowers and plants; ensure the quality of flowers and plants from source; and protect farmers. Compared with cooperatives, large companies have advantages in terms of capital, technology, and capacity; know how to operate according to international rules; play a leading role in the development of the flower industry; and receive excellent seedlings from abroad and advanced technology. The collaboration of agricultural cooperatives and large enterprises can integrate scattered small-scale production into large-scale production. This solves the problem of connecting scattered small-scale production with a unified large-scale market. It can guide and adjust the production of flower and plant farmers according to changing international market rules and reduce economic risks. Moreover, through relatively unified diplomatic negotiations, it is possible to stabilize the sale prices of flowers and plants and protect the interests of the producers. The importance of large collaboration in protecting new varieties and the information exchanged with the international flower industry was quickly transmitted through agricultural cooperatives to thousands of flower and plant farmers to consciously protect new varieties. This can also foster the development of new varieties, improve new varieties, and strengthen the competitiveness of China's flower and plant industry.

4. Establishment of a business-oriented industrial service association and enhancement of market bargaining power for external sales.

China should establish business-oriented industrial service associations led by economic bodies of several major export enterprises and flower and plant cooperatives to improve the market bargaining power of external sales and internal communication and coordination functions. Yunnan flower industry's independent export model makes it have full control of competition, with actual buyers being only a few foreign importers in a monopoly market. Due to unequal conditions, pricing power is often controlled by buyers. This is very harmful to the sustainable development of flower enterprises in Yunnan. The country should establish a business-oriented flower and plant industry service association to provide inside information and other services, adjust production according to changing international market rules, and reduce economic risks for flower and plant farmers. It would also stabilize and ameliorate the economic risks of flower and plant farmers through uniform export standards and the formation of uniform diplomatic relations. China should stabilize international sale prices of flower and plant products to protect the interests of the farmers and realize the sustainable development of the exports.

The industrial service association can actively seek government support and establish logistics bases overseas such as in Japan and Thailand. After the "Yunhua" (Yunnan flower) arrives in the importing country, the distribution base will process various bouquets and pot plants according to customer requirements and will sort, package, and transport them according to the importing country's logistics standards. The base would add value, maintain value, and ensure timely delivery. It would also strengthen the inherent competitiveness of exported flower products. Moreover, the distribution base would be an information-gathering center for overseas flower and plant markets, providing timely feedback to domestic producers on the latest market information and popular flower and plant varieties.

CONCLUSIONS

The characteristics of the Japan's flower and plant industry are that production is shrinking; imports are decreasing in quantity and are rising in prices; and consumption is decreasing. Among the challenges of the stagnation of the flower and plant industry are a drastic decrease in the number of producers and a slump in consumption. The consumption of flowers and plants has decreased due to the decline in household income. In addition, the decrease is greater among young people. Regarding trends in leisure activities, tourism and leisure activities are increasing, while gardening is decreasing. In response to this stagnation, the "Flowers and Plants Promotion Act" was enacted in 2014. In 2015, the Ministry of Agriculture, Forestry and Fisheries announced the "Basic policies for revitalizing the flower industry and floral culture." Furthermore, it was reviewed in April 2020, and new basic policies were announced. These measures can be referred to as the Japan's flower and plant industry revitalization strategy, which also include the spread of floral education, the expansion of exports, the wet and cold chain, and the spread of flower sales with a guaranteed long-life.

Flower and plant production is expanding in China. The production area is growing at an annual rate of 8.0%. In terms of production, pot plants, seedlings and flower trees are growing. Exports, mainly of pot plants, are also growing significantly. The problems facing the China's flower and plant industry are the unstable income due to price fluctuations in distributed small-scale production, and the inadequate development of new varieties. As Yunnan's growth strategy, it strengthens the research and development of new varieties, improves the logistics system, promotes cooperation between flower and plant cooperatives and large enterprises, and establishes a business-oriented industrial service association.

The above revitalization and growth strategies cannot be solved by the flower and plant industry itself. In the case of Japan, the production and export of flowers and plants are part of the general agricultural problem. Consumption of flowers and plants is also related to how floral culture is positioned under stagnant income and a declining population. In the case of China, the economic growth rate is declining, and the economy is transitioning from high growth to a "new normal," that is, from investment- to consumption-oriented growth. Among them, we are concerned about how floral culture and the flower and plant industry develop. Expanding imports and exports of flowers and plants is key to both Japan's revitalization strategy and China's growth strategy, and a favorable trade environment between Japan and China is a prerequisite.

Note: This paper covers the flower and plant industry up to 2019, so issues under the new coronavirus pandemic from 2020 are not considered.

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