Production of Flower Bulbs and Bulbous Cut Flowers in Japan - Past, Present, and Future

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Abstract

A large share of the *Lilium* genetic resources introduced into Europe originated from Japan. At first, these various species were collected in the wild, but several of them became difficult to find as the demand for them increased. Consequently, commercial production commenced in the various locations where those species were found. By 1937, some 40 million bulbs were exported by Japan. This number had decreased to 22.9 million by 1972 and to 1 million by 2001. On the other hand, the number of imported bulbs has increased rapidly as various import quarantines have been relaxed. In 2001, Japan imported 173.7 million lily bulbs and we now produce some 34.8 million lily bulbs for domestic consumption. In contrast, Japan produced ±100 million tulip bulbs per year from 1964 to 2000. This stability was the result of breeding new cultivars and improving cultural and production methods. However since 2000, domestic production of tulip bulbs has decreased to 82.5 million per year. Tulip bulb exports peaked in 1964, with 25.7 million shipped from Japan. Since then there has been a gradual decrease in tulip bulb exports. As with lilies, the decrease in domestic tulip production was caused by the abolition of quarantine rules and the resulting outside competition. An increase in tulip bulb imports has been caused by similar economic realities, with 259.5 million tulip bulbs imported in 2001. We now export only 1.6 million lily and tulip bulbs, and import 646.1 million bulbs, mainly lily and tulip. The production of bulbs in Japan will not increase in the future because of high production costs, the aging of bulb producers, and the lack of successors for the farms. On the positive side, the domestic production of bulbous cut flowers has increased in response to consumer demand, although this demand has been fed by increased use of imported rather than domestic bulbs.

HISTORY AND DEVELOPMENT OF LILY BULB PRODUCTION

Lilies Native to Japan

There are 130 species in the lily genus, all originating from the Northern Hemisphere. Fourteen species are native to Japan, six of which are endemic to this country; *Lilium auratum*, *L. japonicum*, *L. rubellum*, *L. alexandreae*, *L. pratephyllum* and *L. nobilisimum*. The most important horticultural species, *Lilium speciosum* and *L. longiflorum* are native not only to Japan but also to Taiwan and China, although the main distribution was from Japan. The remaining six *Lilium* species native to Japan are *Lilium dauricum*, *L. callosum*, *L. concolor*, *L. maculatum*, *L. medeoloides* and *L. leichtlinii* var. *maximowiczii*.

From among the native Japanese lilies, Kaempfer introduced *L. japonicum*, *L. speciosum* and *L. maculatum* into Europe through his publication of 1712. Subsequently, Thunberg introduced specimens of *L. speciosum* and *L. longiflorum* in 1794. Living samples of *L. japonicum* and *L. maculatum* were introduced in 1804 and of *L. longiflorum* in 1819. In 1832, a bulb of *L. speciosum* introduced by Siebold flowered in Belgium.
Export of Wild-harvested Lily Bulbs

Export of wild-harvested lily bulbs from Japan started in the 1870’s, the top 3 species being *L. auratum*, *L. speciosum* and *L. lancifolium* (of Chinese origin). The top export species was *L. auratum* since it was the most abundant lily in Eastern Japan and the trading was mainly from Yokohama. *L. speciosum* was mainly concentrated on Koshiki Island, in Kagoshima prefecture and far from Yokohama. The export of *L. speciosum* increased steeply after this area became involved in the bulb trading industry. Export of *L. longiflorum* followed.

As demand for wild-harvested lily bulbs increased, the quality of the bulb decreased, with irregular bulb size and injury during shipment becoming more prevalent. To improve quality, wild-harvested bulbs were nursed on a farm for one year before shipping, and the export of such bulbs gradually increased.

Development of Lily Bulb Production and Trade

After the establishment of lily production, *L. longiflorum* became the most predominant exported bulb, since this species was the most demanded in Europe and the United States. Approximately 30 million bulbs were exported in 1928 of which 78% were *L. longiflorum*, 15% were *L. speciosum* and 6% were *L. auratum*.

The peak year for lily bulb export since trading began was 67 years ago, in 1937, when 40 million bulbs were exported. During World War II, exports dropped sharply and *L. longiflorum* and *L. speciosum* were used to make coffee substitute and quality starch, respectively. After the war, 1972 was the top export year at 22.9 million bulbs. Since then the number of exported bulbs has gradually decreased and recently has dropped sharply.

The most popular species among the exported bulbs, *L. longiflorum*, is traditionally produced on Oki-no-Erabu-Island (North Latitude 27, subtropical, average temperature 22°C), 537 km away from Kagoshima.

A plot of the number of traded bulbs per year since 1870 is shown in Fig. 1.

Lily Bulb Production in Japan

The area for production and number of bulbs produced are shown in Fig. 2. The proportion of the bulbs exported was notably high before and after World War II until the economy of Japan recovered. As the economy grew, the domestic demand for bulbs increased and production of *L. longiflorum* ‘Hinomoto’ and *L. maculatum* shared the top position. Import of Dutch bulbs increased rapidly after the isolated quarantine on flower bulbs was abolished in 1988. As a consequence, the production area and number of bulbs produced for domestic use had decreased to 189 ha and 35 million, respectively by 2001. In the last 10 decades, the period soon after World War II and the year 2001 were the only times that the area for lily production was below 200 ha.

HISTORY AND DEVELOPMENT OF TULIP BULB PRODUCTION

The tulip was introduced into Japan between 1861 and 1863 and production began in the 1910’s in Niigata and Toyama prefectures, where the climate was suitable for tulip cultivation. The peak year for tulip bulb export before World War II was 1940, when the number of bulbs shipped from Japan was 6.9 million. The production area at this time was 75 ha in Niigata and 22 ha in Toyama.

Fig. 3 shows the area for production and number of tulip bulbs produced after World War II. In 1945, the production area was 16 ha. But after 10 years it had recovered to 221 ha and 6.3 million bulbs were exported. The number of exported bulbs exceeded 10 million in 1958 and reached 25.7 million in 1965. Thereafter, the number was maintained at around 20 million for a number of years. In 1973, the free-exchange rate system was implemented, increasing the value of the yen and affecting export to the United States. However, tulip bulb production was supported by domestic uses for cut flower production and gardening, and the production area was maintained at around 500 ha. Since 1993, because of the rapid increase in imports from the Netherlands, the aging of producers, and the lack of successors to maintain the farms, the production area has continued to decrease.
In 2001, the production area was 394 ha and 82.5 million bulbs were produced. The number of producers was 690 in 2001.

**BULB PRODUCTION AND TRADING**

The area devoted to bulb production increased rapidly after World War II and reached 2,159 ha in 1973. After this the production area started to decrease, fluctuating around 1,500 ha until 1990, then steeply declining to 883 ha by 2001. The number of bulbs produced increased until 1973, then decreased markedly to 261.5 million in 2001 (Fig. 4). This decrease was because of the rapid increase in imports from the Netherlands, and the lack of successors to replace producers reaching retirement age. On the other hand, the average production area per producer increased slightly and was 0.3 ha in 2001 (Fig. 5).

The large effect of the 1988 abolition of the Isolated Quarantine on the Dutch bulbs can be seen in the reversal of the trends in the number of imported and exported bulbs since 1988 (Fig. 6).

Table 1 shows the current status of bulb production in Japan.

**PRODUCTION OF BULBOUS CUT FLOWERS**

Lily and tulip are the only species for which cut flower production, turnover, and production number have been monitored regularly by the Ministry of Agriculture, Forestry and Fisheries since 1960. Monitoring of gladiolus, freesia, Dutch iris, and daffodil cut flower production started in 1983 and ended in 1995 (Fig. 7). Therefore, except for lily and tulip, the current production of the main species of bulbous cut flowers can only be estimated. The order of these species, from highest to lowest in number of cut flowers produced and turnover, is estimated to be lily, tulip, freesia, gladiolus, daffodil, and iris. In 2001, 2,110 ha was devoted to bulbous cut flower production and 594.6 million stems were produced. The current status of bulbous cut flower production is shown in Table 2.

**ABOLITION OF THE ISOLATE QUARANTINE AFFECTED JAPANESE PRODUCTION OF BULBS AND BULBOUS CUT FLOWERS**

Prior to 1988, selected bulbous species were required to be cultivated for one year in isolation to inspect for the presence of diseases. This isolate quarantine was a big obstacle to countries wishing to introduce flower bulbs into Japan. In response to strong requests from the Dutch government, the regulation was abolished for some tulip cultivars in 1988, and then for lily in 1989, Dutch iris and hyacinth in 1991, and crocus, freesia, and gladiolus in 1994. Even amaryllis was eventually exempted from quarantine, resulting in almost unregulated import from the Netherlands of most varieties of the major species.

In addition to the Dutch bulbs, the regulation was abolished for lilies and tulips from New Zealand in 1999 and for Chilean lilies in 2002. The quality of Dutch bulbs is very high with 1) less disease, 2) later withering or death above ground level (allowing for a longer bulb growing period), and 3) lower cost resulting from mass production. With the abolition of the quarantine and the high quality of Dutch bulbs, Japan became an importer rather than an exporter of bulbs and the industry was thrown into confusion by the free trading system.

Among the species for which the quarantine was abolished, it was the exemption of lily and tulip that had a fatal effect on the production of bulbs and bulbous cut flowers in Japan.

1. Except for *L. longiflorum*, the use of lily bulbs has shifted entirely from domestic bulbs to Dutch bulbs. The shift was made because there were big differences between the products of the two countries in the number of varieties, price, and uniformity. Furthermore, Dutch producers had developed the freezing storage technique, which allowed them to supply bulbs year around. Bulbs produced using the freezing storage technique often suffered from leaf burn and/or decreased bud numbers, but recently the problem of year around supply has been solved by the availability of fresh bulbs from New Zealand that are harvested in June. Once the reasonable Chilean bulbs are added to the market, the production of cut flowers for late autumn and winter will be stabilized by
the supply of bulbs produced in the Southern Hemisphere. Bulbs produced in the Northern Hemisphere would be then mainly used for cut flower production for spring and summer. After abolition of the quarantine, import of over 170 million Dutch lily bulbs increased the popularity of Oriental hybrid and Asiatic hybrid lilies. As a result, the turnover of lily cut flowers, previously in fourth place rose to third place in 1997.

2. After abolition of the quarantine, domestic tulip production increased for a while, but recently it is decreasing sharply. This is because the Netherlands offered more varieties, and superior quality and uniformity, at a cheaper price. The only disadvantage of the Dutch bulbs was that they were not available for early cut flower production (from November to December) because of the harvesting period in the Netherlands. The delayed supply of Dutch bulbs was dividing the sales trend of bulbs in Japan, with domestic bulbs being used before and Dutch bulbs after the New Year. Since the import of bulbs from New Zealand started in 2003, it is now possible that the entire cultivation season of bulbous cut flowers will be supplied with imported bulbs.

The retarding culture is supplied with imported bulbs that are frozen for a long period after planting (Ice Tulip and/or Eskimo Tulip), although there are some problems with high prices and physiological damage from the freezing.

The import of more than 200 million Dutch tulip bulbs per year after abolition of the quarantine increased the demand from cut flower production and gardening. Cut flower production peaked at a turnover of JPY6,600 million ($66 million) and 107.3 million stems in 1996. Since then, cut flower production has been decreasing slightly.

Tables


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<thead>
<tr>
<th>Item</th>
<th>All Bulbs</th>
<th>Lily</th>
<th>Tulip</th>
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<tbody>
<tr>
<td>Production Area (ha)</td>
<td>834</td>
<td>189</td>
<td>394</td>
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<tr>
<td>Turnover (x 100 million yen)</td>
<td>47</td>
<td>14</td>
<td>14</td>
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<tr>
<td>Number of Producers</td>
<td>2,840</td>
<td>790</td>
<td>690</td>
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<td>Number of Bulbs Produced (x 10,000)</td>
<td>16,150</td>
<td>3,480</td>
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<td>Average Production Area (ha)</td>
<td>0.311</td>
<td>0.239</td>
<td>0.571</td>
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<tr>
<td>Number of Bulbs Exported (x 10,000)</td>
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<td></td>
<td></td>
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<tr>
<td>Number of Bulbs Imported (x 10,000)</td>
<td>64,612</td>
<td>17,370</td>
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<table>
<thead>
<tr>
<th>Item</th>
<th>All Bulbs</th>
<th>Lily</th>
<th>Tulip</th>
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<tbody>
<tr>
<td>Production Area (ha)</td>
<td>2,110</td>
<td>880</td>
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<tr>
<td>Turnover (x 100 million yen)</td>
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<tr>
<td>Number of Cut Flowers produced (x 10,000)</td>
<td>59,460</td>
<td>19,890</td>
<td>8,880</td>
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<tr>
<td>Number of Producers</td>
<td>5,190</td>
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<td>1,120</td>
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</tbody>
</table>
Figures

Fig. 1. Numbers of lily bulbs exported and imported.

Fig. 2. Bulb production area and number of lily bulbs produced.
Fig. 3. The area of production and the number of tulip bulbs produced.

Fig. 4. Bulb production area and number of bulbs produced.
Fig. 5. Number of growers and average of production area.

Fig. 6. Number of bulbs imported and exported.
Fig. 7. Area for bulbous cut flower production.