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**Expansion of Asparagus  
Production and Exports in Peru**

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**Abstract**

Peru is the one of the most important exporters of asparagus in the world. Its export volume of fresh asparagus is ranked number one, and its export volume of preserved asparagus number two, globally. The objective of this paper is to provide an overview of the recent trends in asparagus production and exports around the world and to analyze factors in the development of the Peruvian asparagus industry.

The production of asparagus has spread geographically. The center of its production used to be in the principal consuming countries, such as France, Germany and the United States. Afterward, it spread to neighboring countries such as Spain and Mexico where production factors such as climate and labor costs are favorable. After the rise and fall of Taiwan as a major preserved white asparagus exporter, China and Peru replaced its position. Finally, in recent years, Peru expanded its fresh green asparagus exports to the U.S. market by taking advantage of the increasing demand for fresh vegetables and supplying produce in seasons when neither U.S. nor Mexican producers can harvest.

In addition to the changing factors in the international market, there are several factors in the development of the industry: high yields of produce due to favorable climatic and soil conditions; the introduction of the drip irrigation system, which enabled desert cultivation; the integration of production and exports, which is indispensable for fresh produce exports; and the collective efforts of the industry with help from the public sector.

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# La expansión de la producción y las exportaciones de espárragos en el Perú

## Resumen en español

Actualmente, el Perú es el exportador número uno de espárragos frescos y el número dos de espárragos en conserva del mundo. El objetivo de este documento es revisar la evolución de la exportación del producto en el mundo, y el desarrollo de la industria esparraguera en el Perú.

La producción y la exportación han sido expandidas geográficamente. Primero, los países consumidores tales como Francia, Alemania, Holanda y los Estados Unidos eran los principales productores. Después, la producción se expandió a los países vecinos, tales como España, Grecia y México, donde el clima y el costo de mano de obra son más favorables para la producción. Finalmente, gracias al desarrollo de la infraestructura y la tecnología logística, la producción del espárrago llegó a expandirse a los países de China y el Perú, muy lejanos de los mercados de Europa y los Estados Unidos.

El desarrollo de la industria en el Perú se puede dividir en tres épocas, y existen los factores de expansión de la industria esparraguera en cada uno de éstas. La primera es la época de la introducción en los años 1950. En esa época, las plantas procesadoras fomentaron el cultivo de la planta a los pequeños y medianos productores para asegurar la materia prima para las plantas. El clima con la mínima varianza de la costa norteña peruana favoreció el cultivo del espárrago.

La segunda es la época de la expansión de la producción de espárragos blancos para la conserva en los años 1980 y 1990. Los factores de la expansión son:

- El retiro de Taiwan del mercado internacional. Taiwan era el exportador más grande de espárragos en conserva en los años 1960 y 1970, pero el cultivo disminuyó rápidamente por su industrialización. China y el Perú aprovecharon esta oportunidad para expandir su producción y exportación.
- La introducción de la técnica de la irrigación por goteo. Con esta técnica, el cultivo en el desierto con gran escala llegó a ser posible.

La tercera es la época de la expansión de espárragos verdes para las exportaciones frescas en la década de los años 1990. Los factores de la expansión son:

- El aumento del consumo de espárragos verdes en los Estados Unidos.
- El ingreso del mercado nicho en los Estados Unidos, especialmente en los meses de setiembre a diciembre.
- Conclusión del acuerdo ATPA (Andean Trade Preferente Act) con los Estados Unidos y su renovación como ATPDEA (Andean Trade Preferente and Drug Eradication Act). Con los acuerdos, el Perú tiene el acceso preferencial al mercado en ese país.
- Integración de producción y comercialización con las empresa agrícolas. La exportación de los productos frescos requiere coordinación sofisticada de producción y comercialización. Los productos tienen que ser procesados y refrigerados inmediatamente después de cosecha. La época de la cosecha tiene que ser maximizado para aprovechar el nicho en los mercados. La información del cultivo y procesamiento tiene que ser certificado para que los supermercados acepten sus productos. Para esta integración, la liberalización de la economía facilitó el ingreso de las empresas en la producción agrícola a través de la liberalización del mercado de terreno agrícola.
- Esfuerzo colectivo de la industria. Los productores y exportadores cooperaron a través de organizaciones de la industria, tales como Instituto Peruano de Espárragos y Asociación Civil Frio Aéreo con ayuda del sector público (PROMPEX) y cooperación internacional (USAID).

## **Introduction**

In the second half of the 1980s, the export of preserved white asparagus<sup>1</sup> expanded rapidly, followed by the export of fresh green asparagus in the second half of the 1990s. Now, Peru is the number two exporter of preserved asparagus after China, and the number one exporter of fresh asparagus in the world.

The purpose of this paper is to provide an overview of the expansion of asparagus exports from Peru and the factors behind the development of the asparagus industry in Peru. Section 1 explains the basic characteristics of asparagus as a crop and commodity. The global trend in production and export is then reviewed with agricultural and trade statistics. These statistics show that the production of asparagus has expanded from European countries, where it is mainly consumed, to countries far removed from the market such as China and Peru. Section 2 focuses on the production and exports from Peru. The review of statistics is followed by a brief history of the development of the asparagus industry in the country. The development of the industry can be divided into three periods: the introduction of asparagus production in the 1950s, the expansion of preserved white asparagus for export in the 1980s, and the expansion of fresh green asparagus for export in the 1990s. The factors of the expansion are analyzed in each period. The conclusion summarizes the findings of this paper.

### **1. World-wide production and export of asparagus**

#### **Asparagus as a crop and commodity**

Asparagus is a perennial plant which belongs to the lily family. The first harvest is usually two to three years after planting. If properly cared for, the harvests can last for 15 years or more. A typical agricultural calendar for asparagus in Nagano Prefecture, one of the major production areas in Japan, is as follows (Nousangyoson Bunka Kyokai 2004). Preparation of the seed bed starts in March, and seedlings are planted in the field in May. Spears are left to grow into ferns in the first year, and nutrition is stored in the roots. In the fall, withered ferns are cut, and the harvest starts

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<sup>1</sup> Preserved asparagus includes canned and bottled asparagus; it does not include frozen asparagus.

in April of the second year. The harvest periods are for 20 days in the second year, 40 days in the third year, and two months in the fourth year and thereafter. After the harvest, spears are left to grow into ferns and repeat the cycle. This is a calendar for open fields, and it varies depending on production area and method. In other areas such as Chiba Prefecture where asparagus is planted in greenhouses, there are two types of harvest<sup>2</sup>. One is a normal harvest in February for about a month, and the other is a prolonged harvest from March to September. In the prolonged harvest, some spears are left to grow into ferns while young spears are harvested. This prolonged harvest is widely practiced in Japan in order to obtain better yields and continuous cash flow for farmers.

There are two types of asparagus: green and white. They are from the same plant, but spears of white asparagus are harvested before they receive sun light. In general, the ridges of white asparagus fields are heaped with about 25 centimeters of earth, and white asparagus is harvested at the moment the tip breaks the soil. In addition to green and white asparagus, new varieties, such as violet and violet/green, have been planted in recent years.

Harvested asparagus is classified according to length, diameter, condition of tips, etc. There is an international standard of asparagus classification determined by Codex, which has three grades: Extra, Class I and Class II. In general, longer and straighter asparagus with larger diameters and tightly closed tips are considered better in the market.

Asparagus is sold fresh, preserved or frozen. In general, green asparagus of higher grades, i.e. Extra and Class I, is sold fresh. Short or thin green asparagus is often processed and frozen<sup>3</sup>. Some green asparagus is processed and preserved. White asparagus is often sold fresh during the harvest season in the spring, especially in Europe. Most white asparagus produced outside of European countries is preserved and exported. In general, North Americans prefer green asparagus, while Europeans prefer white asparagus.

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<sup>2</sup> The information is based on a field visit with asparagus farmers on March 28, 2006 in Tomisato city, Chiba Prefecture, Japan.

<sup>3</sup> In recent years, short and thin fresh green asparagus tips from Thailand are sold as “mini asparagus” on the Japanese market.

## **Principal producers**

Chart 1 shows production of asparagus in major countries of production around the world. Because green and white asparagus are not classified separately in the production statistics, it shows production of both kinds<sup>4</sup>. According to this chart, in the beginning of the 1960s, asparagus was mainly produced in the United States and Europe. Besides France and Spain in Chart 1, Italy and Germany were also principal producers. In the second half of the 1960s, Taiwan suddenly emerged as a major producer, and became the number one producer in the world in the middle of the 1970s. In addition to Taiwan, Mexico and Spain started to increase their production, while production in the United States and France stagnated. In the 1980s, while the production in Taiwan suddenly dropped due to the rapid industrialization of its economy, the production in Peru started to increase. Although production data on China during this period is not available, export figures imply that it also started to expand asparagus production. By the middle of the 1990s, China became by far the largest asparagus producer in the world. In 2004, 1,331,955 metric tons of asparagus was produced around the world, out of which China's share was 44.1%, followed by Peru (14.3%) and the United States (7.7%) (See Chart 2).

## **Principal exporters**

Asparagus as a commodity is classified under two trade codes: fresh or chilled asparagus (HS 070920) and preserved asparagus (HS 200560). Trade figures for frozen asparagus are difficult to find because it is classified with other frozen vegetables under one code (HS 071080).

Table 1 shows principal fresh asparagus exporting countries and their volumes from the 1960s to the 2000s. In the 1970s, the major exporters were France, the Netherlands, the United States and Mexico. In the 1980s countries such as Spain and Greece expanded their exports, followed by Peru and Thailand in the 1990s. In 2004, the principal exporters and their shares by volume were: Peru (34.0%), Mexico (17.6%), the United States (10.0%), and Spain (9.0%). The principal destinations (importing countries) of fresh asparagus and their shares in 2004 were the United States (41.8%),

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<sup>4</sup> The source of the data is FAOSTAT. However, the data on China and Taiwan is based on data from the USDA (2003, 2005a) and the Statistical Office of Taiwan, respectively, because FAOSTAT data apparently overestimates production in China, and data for Taiwan are not available on FAOSTAT.

Germany (13.3%), Japan (7.8%), France (6.4%) and Canada (6.2%). Note that while the United States imported 92,405 tons of fresh asparagus, it exported 21,126 tons, making it a net importer by 71,279 tons.

Trade figures for preserved asparagus that can be compared across countries are only available from the end of the 1990s as shown in Table 2. The principal exporters are China, Peru, European countries, New Zealand and South Africa. Their shares in 2004 were 58% for China, 24% for Peru, 5% for the Netherlands and Germany and 3% for Spain. The principal importers of the product and their share in 2004 were Spain (33.9%), Germany (21.7%) and France (13.4%). Spain and Germany were principal exporters and importers at the same time. While Spain imports from China and Peru, it also exports to France. Likewise, Germany imports from China and the Netherlands, and exports to France and Spain.

Exports of preserved asparagus from major countries, namely Taiwan in the 1980s and China and Peru after the 1990s, are observed in trade data from each country (Chart 3). This chart clearly shows that China and Peru replaced Taiwan as a major provider of preserved asparagus in the world market. At the beginning of the 1980s, Taiwan exported around 80,000 tons of preserved asparagus. However, exports declined rapidly after that. In 1987, Taiwan's export volume was surpassed by China, and equaled by Peru. In the 1990s, while Taiwan's exports had almost disappeared, China and Peru had become the number one and number two exporters of preserved asparagus in the world.

### **Trends in production and trade**

The trends in production and trade of asparagus observed above indicate two important points. One is the geographical expansion of the production. Until the mid 1960s, asparagus was produced in countries where it was consumed. The United States and European countries, especially France and Germany, produced asparagus to satisfy their internal demand. Then, the production expanded to neighboring countries with favorable production conditions, such as warmer weather and lower labor costs. Those countries expanded their production in order to export to neighboring countries. These countries were Mexico for the U.S. market, and Spain and Greece for the European market. The emergence of Taiwan as a principal exporter of preserved

asparagus from the 1960s to the 1980s is also a part of the geographical expansion of production. Because of its remoteness from major markets in the United States and Europe, it concentrated on providing preserved asparagus. However, the rapid industrialization of its economy caused it to cease producing asparagus for export. Its position as a principal exporter of canned asparagus was taken over by China and Peru as we observed in Chart 3. In addition, because of the recent development of international logistics of fresh fruits and vegetables, these countries started to export not only preserved asparagus, but also fresh or chilled asparagus for the international market.

The other point is the persistent production in major consuming countries. Although production of asparagus in major consuming countries has stagnated, it has not disappeared. We can presume that there is a strong preference for national produce over imports during the harvest season in consuming countries. Chart 4 shows the monthly volume of fresh asparagus received by the wholesale market in Japan classified by origins. When the supply from domestic producers is very low during October to February, most fresh asparagus received by the market is imported. However, during the harvest season in Nagano and Hokkaido, two of the principal asparagus production areas in Japan, their supply dominates the market. Even though the price of imported fresh asparagus is 30 to 40% lower than the average price on the market, the demand for expensive national produce is strong. This is due to the higher quality of national produce over imports.

However, we should not underestimate the significance of imported fresh asparagus. As shown in Chart 5, only 23% of fresh asparagus imported goes through the wholesale market in Japan. The rest is distributed outside of the wholesale market. In 2004, imported fresh asparagus accounted for about 40% of the domestic supply.

## **2. Expansion of asparagus production in Peru**

From the statistics examined in Section 1, we know that Peru first expanded the production and export of preserved asparagus in particular in the 1980s. This was followed by the expansion of fresh asparagus production in the 1990s. Now it is the number one fresh asparagus and number two preserved asparagus exporter in the world.

This section takes a close look at the process of the expansion by examining national statistics and providing a brief history of the development of the asparagus industry in Peru.

### **Production and export**

Table 3 shows data on asparagus production and exports in Peru. Asparagus production for export started in Peru in the 1950s, and the production area was between 500 and 1,500 hectares until the end of the 1970s. In 1980, the production area and volume were 1,500 hectares and 4,400 tons, respectively. Almost all of the exported asparagus was preserved asparagus at that time, and the volume and value were 2,600 tons and 3.3 million dollars, respectively. Denmark was the most important destination of the product until the mid 1980s.

Production and exports started to expand rapidly in the 1980s. During the late 1980s, the production area increased by 20 to 30% every year. Together with the increase in yield, the volume increased by up to 50% a year. In 1990, total production in the country reached almost 58,000 tons over 9,000 hectares, with the export of canned asparagus reaching 24,000 tons and 27 million dollars. The export of fresh asparagus also started at the end of the 1980s. By 1990, the country exported 3,400 tons or 4 million dollars.

In the 1990s, although the expansion of asparagus production stagnated temporarily due to climatic abnormality and the effect of the Asian economic crisis, the production level reached 20,000 hectares and 170,000 tons by the year 2000, doubling over 10 years. Exports also expanded rapidly during the decade. The volume of preserved asparagus exports increased by 70 % over 10 years, reaching 40,000 tons and 82 million dollars. The main destination of the product was European countries such as Spain, France and the Netherlands. The export of fresh asparagus expanded spectacularly. It reached 37,000 tons and 54 million dollars, increasing more than tenfold over 10 years, closely approaching the volume and value of preserved asparagus exports. Around 80% of the fresh asparagus is exported to the United States.

The figures for 2004 show that the production level was at 18,500 hectares and 193,000 tons. The export of preserved asparagus was 40,000 tons and 79 million dollars, while that of fresh asparagus was 72,000 tons and 140 million dollars. While

the export of preserved asparagus, which is mainly for Europe, dropped at the end of the 1990s and stagnated afterward, that of fresh asparagus, which is mainly for the United States, kept expanding, surpassing the exports of preserved asparagus in 2002. In 2004, the export value of fresh asparagus was almost twice that of preserved asparagus.

In order to understand the expansion of asparagus production and exports in Peru, this section is going to examine a brief history of the development of the asparagus industry in Peru. The development of the industry can be divided into three periods. The first period is the introduction of asparagus from the 1950s to 1970s. The second period is the expansion of white asparagus production from the 1980s to the middle of the 1990s. The third period is the expansion of green asparagus from the middle of the 1990s to the present.

In addition to the difference of the periods of development between preserved white asparagus and fresh green asparagus for export, there is a geographical difference in the production of asparagus. In Peru, there are two major asparagus production areas. One is the northern coastal area, “the North,” around the city of Trujillo. In this area, white asparagus for preserving is the main product. The other is the southern coastal area, “the South,” around the city of Ica. In this area, green asparagus for fresh export is the main product. As discussed below, asparagus production first spread in the North with white asparagus, and then expanded to the South with green asparagus.

## **2-1 Introduction of asparagus in the 1950s<sup>5</sup>**

The asparagus production for export of preserved asparagus was first introduced in Peru in the northern coastal area in the 1950s. The Ganoza family, which was the owner of a fruit juice processing company founded in 1942 called Compañía Industrial Trujillo S.A. (CITSA, known as its brand name of LIBER), started to produce white asparagus on its own farm in order to produce preserved asparagus for export. Until the late 1970s, this company and Cadena Envasadora San Fernando S.A.<sup>6</sup>, another asparagus processing company, were the only producers of preserved asparagus. The processing companies not only received their supplies of asparagus from their own farms, but also solicited local small and medium scale producers to

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<sup>5</sup> Information in this section is based on Elías Minaya 1994, Capítulo II.

<sup>6</sup> Later, it changed its name to Sociedad Conservera S.A. (SOCONSA).

produce white asparagus for them. In the promotion campaign, the companies provided the farmers with seeds, initial capital to introduce the crop, agricultural machinery to use and technical assistance.

There were many small and medium scale asparagus producers at that time. In 1978 there were 66 asparagus producers in the basin of the Virú River in the North, where asparagus production was concentrated at the time. Among these producers, 30% had less than 5 hectares, 38% had between 5 to 10 hectares, and 32% had more than 10 hectares. The proportion of the size of the producers changed little when the number of producers reached 368 in 1985 (Elías Minaya 1995 p.159).

The dominance of small scale producers in asparagus production did not change until the end of the 1990s, especially in white asparagus production in the North. According to the asparagus census in 1998, producers with less than 5 hectares amounted to 42.9% of the agricultural units and accounted for 16.1% of the area among white asparagus producers in La Libertad department, which is the center of asparagus production in the North. Producers with 5 to 10 hectares accounted for 36.9% of the number and 25.6% of the area, while ones with more than 10 hectares accounted for 20.2% of the number and 58.3% of the area (Ministerio de Agricultura 1999). Here, we can find persistence of small scale producers in white asparagus production.

### **Factors of expansion in the North**

Elías Minaya (1995, p.147) pointed out five factors behind the expansion of asparagus production, especially among small farmers in the North. The first factor is the promotional campaign for asparagus production held by processing companies, which is mentioned above. With the promotional campaign, small scale farmers who had neither the capital nor the necessary knowledge were able to introduce the crop. Since the productive land in the area was limited to the river basin where irrigation water was available, processing companies had no choice but to ask existing small scale farmers to adopt the crop. However, this situation would change later with the introduction of a new irrigation technique by agricultural companies. The second factor is that the crop can produce higher profits compared with other traditional crops such as maize, beans and cassava. The third factor is the favorable climatic and soil conditions for asparagus. In the northern coastal area, the annual variance of the

temperature is very small. Monthly average temperatures are between 18.4 and 22.3 degrees centigrade (minimums are between 15.8 and 19.3 degrees and maximums are between 20.9 and 23.4 degrees). Because of this calm and stable climate throughout the year, it is possible to harvest twice a year, instead of once a year like in other major production areas such as the United States, Europe and China. In addition to the stable climate, absence of rain makes farm work easier, and sandy soil is suitable for asparagus production. However, the absence of rain limits the production area to irrigated fields. The fourth and fifth factors that were pointed out by Elías were decision making by small scale farmers and urbanization. After the land reform in the 1970s, many agricultural workers who used to work on large farms obtained small parcels and became independent farmers. With their adoption of an urbanized style of life, they decided to cultivate crops that were in strong demand on the market.

In addition to the factors that Elías pointed out, there is also the industrial development around the city of Trujillo which contributed to the expansion of preserved asparagus production in the area. Trujillo is the third largest industrial city in the country after Lima and Arequipa. The city is very close to major agricultural areas in the northern coastal region of the country. The proximity of the industrial and agricultural base facilitated the development of agro industry in the region.

## **2-2 Expansion of white asparagus from the 1980s to the middle of the 1990s**

Although the production statistics do not specify if asparagus is white or green, considering the fact that there is no record for fresh asparagus export until the mid 1980s and around 90% of export by volume was preserved asparagus until the end of the 1980s, we can assume that the majority of asparagus produced in Peru by the end of the 1980s was white asparagus for export in a preserved state.

The expansion of asparagus production in Peru can be attributed to the following factors, each of which corresponds to a specific period. First, the expansion from the end of the 1970s to the middle of the 1980s is due to the change in the international market environment, in which Taiwan, one of the major providers of preserved asparagus, withdrew from the market as mentioned above. Taking advantage of this opportunity in the market, four new canned food processing plants

were established in the Trujillo area between 1979 and 1984. Although some were built to produce canned tuna products, they also processed asparagus.

The second factor of expansion is the introduction of drip irrigation at the end of the 1980s. The climate of the coastal area of Peru is arid with average precipitation of 150 mm per year. Therefore, agriculture was once possible only in river basins where irrigated water was available. Although groundwater is available in some areas, it is not feasible to cultivate crops in large scale in desert areas with ground water and conventional irrigation technique because of the cost of fuel required to pump the water. In 1989, a chicken farming company in the region imported the drip irrigation system from Israel<sup>7</sup>. With this system, tubes with very small holes are installed along with rows of crops. Water is pumped through these tubes, dripping and directly reaching the crops. Compared with the conventional irrigation technique, in which water from the canal flows into the field and runs through its surface, this drip irrigation system has many advantages. The biggest advantage is water saving. With this system, loss of water is minimal because water is absorbed by soil where there are crops. Therefore, groundwater can be used efficiently. Also, use of this irrigation system can save some labor. Because only crops receive water, not many weeds can grow, eliminating weeding work. Finally, because some fertilizers can be applied to the water controlled by computer at the pumping station, there is less work involving manual application of fertilizers by workers.

However, most small asparagus farmers were not able to introduce the system because of the high cost of around 5,000 dollars per hectare. Asparagus processing companies that had their own farms were not interested in the system either because they could buy raw materials from small farmers. Therefore, the chicken farming company that imported the irrigation system established a subsidiary for asparagus production. The company installed the irrigation system in the desert, where there used to be chicken farms, and started to test many varieties of asparagus. After a few years of selection of asparagus varieties that were best suited for the area, the company built a processing plant and started full scale production on 200 hectares in 1994. The yield of asparagus easily exceeded 20 tons per hectare, reaching 40 tons per hectare in some lots in its peak. The success of this company facilitated the introduction of the

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<sup>7</sup> Information in this section is based on an interview with an asparagus production/export company in the Trujillo area in October 2005.

drip irrigation system by other medium to large scale producers in the area.

The third factor behind the expansion of asparagus production, especially after the 1990s, is the entry of companies into the industry. After the Agrarian Reform at the end of the 1960s, private companies were not allowed to own large areas of agricultural land. However, during the liberalization of the economy in the 1990s, the restriction of land ownership was also liberalized. In addition, the Peruvian government promoted investment in agriculture by giving tax incentives. Therefore, processing companies that used to purchase all raw materials from small and medium producers founded their own asparagus farms as large as several hundred hectares and started asparagus cultivation to supply raw materials to their processing plants. Instead of relying 100% on raw materials from farmers, the processing companies preferred to have their own farms to secure a portion of their raw materials in order to fulfill orders from clients.

The fourth factor behind the expansion, which is related to the third, is the completion of the large scale irrigation project in the area called Project CHAVIMOCHIC. The project was to build a mother canal which intakes water from Santa River and connects the four river basins of the Chao, Viru, Moche and Chicama rivers. By the end of the 1990s, the second of the three stages of the project was completed. In the first auction of the irrigated land that took place in 1997, about 7,000 hectares of land was sold to the private sector (Landeras Rodriguez 2004). Not only asparagus processing plants, but also some individuals who decided to invest in agricultural production bought these new lands. The size of each farm was between 50 to 500 hectares. Using the drip irrigation system and water from a mother canal, the desert outside of Trujillo City was turned into a green production area within a few years. It was called a *mar verde* (green sea) in the desert.

### **2-3 Expansion of green asparagus production in the late 1990s**

Although the export of fresh asparagus from Peru is recorded since the mid-1980s, it was in 1990 in which the export volume and value exceeded 10 percent of its total asparagus exports. After the gradual expansion in the mid 1990s, the export volume of fresh asparagus increased rapidly from the end of the 1990s. Between 1997

and 2004, it grew from 17,823 tons to 72,038 tons, quadrupling in just seven years. In 2002, the export volume of fresh asparagus exceeded that of white asparagus. In 2004, the export of fresh asparagus was 78% more than preserved asparagus by volume and 76% by value. Thus, the main asparagus exports from Peru shifted from preserved white asparagus to fresh green asparagus.

Although the statistics do not specify whether the fresh asparagus exports were green or white, most fresh asparagus exports from Peru are of green asparagus. According to the report by IICA (2004), at the end of the 1980s, a group of farmers in Ica department with help from the U.S. Agency for International Development (USAID) introduced some crops such as melon, paprika, green beans and asparagus in order to test their potential for export to the U.S. market. They chose asparagus and formed an asparagus producers association called APEI (Asociación de Productores de Espárragos de Ica). APEI first planted asparagus on 13 hectares in 1987, and the operation rapidly expanded to over 1,000 hectares by 1992 (Marañón 1993). The asparagus production in Ica increased throughout the 1990s, expanding to 9,000 hectares by 2001. Currently about a half of the total asparagus production area in the country is in the South. Because of some climatic factors, such as the large difference in temperature between summer and winter, and greater amounts of sunlight in the harvest season, fresh green asparagus for export is mainly cultivated in the South, while white asparagus for export in preserved condition is mainly cultivated in the North. In the following sections, the factors behind the fresh asparagus expansion in Peru will be analyzed.

### **Preference for fresh vegetables**

As mentioned above, almost 80% of fresh asparagus exports go to the U.S. market. The most important factor behind the expansion of fresh asparagus production in Peru can be found in the demand for the products. Chart 6 shows the composition of asparagus consumption in the United States. The consumption is divided into three categories: fresh, preserved (canned) and frozen. This chart shows that consumption of fresh asparagus rapidly increased in the second half of the 1990s. In recent years, consumers prefer to consume fresh vegetables, if they are available, rather than preserved vegetables. Together with technological advances of fresh produce transport and increased availability of air transport, this change of preference among consumers

created a potential market for Peruvian fresh asparagus.

### **Entry to niche market**

The second factor behind the expansion of Peruvian fresh asparagus export is its entry into the U.S. niche market. A niche market is defined as a market with potential demand that is not supplied because of certain reasons such as unavailability of products, small market size, etc. Charts 7-1 and 7-2 show the U.S. monthly import of fresh asparagus by origin in 1989 and 2004 (USITC). In 1989, the U.S. market imported around 16,000 tons of fresh asparagus, of which 12,000 tons were from Mexico, mainly in February and March. The share of fresh asparagus consumption derived from imports was 24.4%. Because the harvest inside the United States is mainly during the period from May to July, the market demand in off season was met by imports mainly from Mexico.

Compared with asparagus imports in 1989, the trend in 2004 shows two major differences. One is the great increase in imports. The total imports of the year reached 92,000 tons, and the share of consumption derived from imports rose to 69.6%. The other is the origin of the produce. While the imports from Mexico amounted to 34,000 tons, those from Peru amounted to 56,000 tons. While Mexico has been the major provider of fresh asparagus for the U.S. market from January to March, Peru established itself as a dominant provider from September to December. Peru provided asparagus during the months in which neither Mexican nor U.S. producers can harvest asparagus. Through the entry into this niche market, Peruvian fresh asparagus exports rapidly increased. Perhaps the increased availability due to the entry of Peruvian asparagus facilitated the consumption of fresh asparagus among the U.S. consumers as shown in Chart 6.

The preferential trade treaty is an additional factor behind the expansion of Peruvian fresh asparagus exports to the U.S. market. In 1991, the United States signed the Andean Trade Preference Act (ATPA). It reduced U.S. tariffs on eligible products from Bolivia, Colombia, Ecuador and Peru. The act went into effect in 1993, and the ATPA beneficiaries were exempted from the U.S. tariff on imported fresh asparagus, which is 21.3% from February to June and 5% during the rest of the year. It gave a price advantage to Peruvian asparagus over Mexican asparagus, the tariff rate of which

is 4.6% in January and 6.6% from February to June<sup>8</sup>. ATPA has been extended as the Andean Trade Preference and Drug Eradication Act (ATPDEA) and is effective through the end of 2006<sup>9</sup>.

### **Integration of production and export by companies**

The third factor of the rapid increase of fresh asparagus export is the integration of production and export by agricultural companies. As mentioned above, asparagus processing companies purchased land in the 1990s in order to secure raw material for their processing plants. Some of them switched part or all of their production from white to green, and started to export fresh asparagus. Other agricultural companies started their businesses focusing on production and export of exclusively fresh produce, which includes green asparagus, grapes and avocados.

For the expansion of fresh produce export, this integration of production and export is very important. There are three reasons why it is important, and the reasons become clear when fresh produce export is compared with preserved produce export, in which farmers and processing plants divided their roles of production and processing/export.

First, the integration improves the freshness of produce, especially in the post harvest stage. In the case of preserved asparagus export, the freshness of the asparagus needs to be maintained until it reaches the processing plants, where it is washed and cooked. In the case of fresh asparagus export, the freshness needs to be maintained until it reaches the final consumer. After the harvest, asparagus needs to be pre-cooled at collection points, and then taken to the processing plants and cooled down in a refrigerated chamber as soon as possible. Since asparagus is harvested at least twice a day, frequent trips are necessary to transport the harvest to the plants. The large scale production by processing plants usually has an advantage in terms of the cost of trips because the processing plant is usually located inside the farm, or close to the farm, and the large volume of the harvests provides savings in the per unit cost of transportation.

Second, because the Peruvian fresh asparagus export targets a specific niche of the market, the production must be coordinated to be maximized during certain

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<sup>8</sup> The tariff rate on Mexican fresh asparagus is for 2004. It will be gradually eliminated by 2008.

<sup>9</sup> The United States and Peru agreed on a free trade agreement in 2005. It is expected to take effect before the expiration of ATPDEA.

periods of the year. For the U.S. market, it is from September to December. For other markets, which Peruvian exporters are trying to enter in order to diversify their markets, the periods are much shorter. For example in the Japanese market, the niche for Peruvian asparagus is for a few weeks between the end of imports from Australia until mid December, and the start of imports from Mexico in January<sup>10</sup>. The coordination of production becomes easier when production and export are integrated in the same company. This coordination was not very important for preserved asparagus export because once the produce is processed, it can be preserved for long periods of time.

Third, the integration of production and export enabled systematic control of safety of the produce. In recent years, consumers around the world have come to pay great attention to the safety of imported foods due to increased incidences such as high level of pesticide residue, bovine spongiform encephalopathy (BSE) and bird flu. Farmers and exporters are required not only to maintain the safety of their produce, but also to assure consumers of it. One of the ways to assure the safety is to obtain certificates based on standards such as Good Agricultural Practice (GAP) in cultivation and Hazard Analysis Critical Control Point (HACCP) in processing. The basic ideas for these standards is to prepare documents that specify cultivation and processing practices that guarantee the safety of crops and foods, and to keep records of such practices at each stage of cultivation and processing. Obtaining certificates based on these standards is a great advantage for exporters because they can assure clients of the safety of their produce. Some supermarket chains in Europe purchase only from exporters that have these certificates.

Obtaining these certificates is costly because of the high cost required to comply with norms specified by the standards, and the high cost for examinations by certifying organizations. For example, in order to comply with norms, farmers must install latrines with washbowls. Therefore, the acquisition of such certificates is limited to agricultural companies with large scale farms and processing plants, or large scale farms that sell their produce to agricultural companies.

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<sup>10</sup> This information is based on Japanese wholesale market statistics and an interview with a buyer in a Japanese supermarket in April 2006.

### **Collective efforts for industrial promotion**

The fourth factor behind the expansion of fresh asparagus exports in Peru can be attributed to the cooperation of public and private sectors and collective efforts to promote the industry. The Peruvian export promotion agency called PROMPEX (Comisión para la Promoción de Exportaciones, Commission for Promotion of Exports) has played an important role in the development of the industry. One of its important achievements is helping to organize producers and exporters in the asparagus industry. Together with these industry associations, PROMPEX promoted Peruvian asparagus in foreign markets and studied the current situation of competitors such as China. Two of the associations PROMPEX helped to organize are IPE and Frío Aereo.

Peruvian Institute of Asparagus (Instituto Peruano de Espárragos: IPE<sup>11</sup>) is an industry association comprised of asparagus producers and exporters. The institute is a non-profit organization founded in 1998 with help from PROMPEX. Some examples of its activities follow. IPE participated in the negotiations for the extension of ATPA (renewed as ATPDEA), which gives preferential tariffs for Peruvian asparagus in the U.S. market. Also, together with the National Service for Agrarian Sanitation (Servicio Nacional de Sanidad Agraria: SENASA) of the Ministry of Agriculture of Peru, the institute developed a project of Integrated Pest Management for asparagus. In addition, in order to improve the quality of produce, the institute elaborated technical norms for asparagus, and norms for good agricultural practice. Both of them were adopted by the Peruvian authority. Furthermore, it helped to create an association of importers of fresh asparagus in the United States. This association helps IPE to promote Peruvian asparagus in the U.S. market, as well as to solve problems concerning Peruvian asparagus imports in the United States (IICA 2004).

Another collective effort of the industry is the foundation of a civil association called Frío Aereo (cold air). It was established in 1998 with help from PROMPEX. It consists of exporters of perishable produce such as vegetables, fruits and flowers. The main service the association offers is logistics of perishable products inside the terminal of Lima International Airport under a controlled (cold) temperature. Before Frío Aereo started its service, it took up to four to five hours after unloading produce

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<sup>11</sup> It is now called Peruvian Institute of Asparagus and Vegetables (Instituto Peruano de Espárragos y Hortalizas: IPEH) and includes producers and exporters of asparagus and other vegetables such as artichokes and peppers.

from a refrigerated truck to the departure of the airplane. Perishable produce was often left in open air for hours. Currently, the clients of Frío Aereo unload their produce in its refrigerated chamber inside the airport terminal. Once the plane is ready to load, the operator of the association loads the produce onto the airplane. This logistics service reduced the transition time to a maximum of 90 minutes, and the produce is left in open air only up to 20 minutes. This service minimizes the deterioration of the quality of fresh produce. The foundation of the association closed the cold chain of fresh asparagus export from Peru. In addition, Frío Aereo offers information services related to logistics. It records information such as the quality of products and their temperature upon arrival, transit time for loading for each airline, prospects of the amount of shipment of certain products, etc. This information is shared among its members and helps them improve their production and logistics planning. Besides the above, the association has negotiated for collective procurement of shipping materials to lower the cost for exporters<sup>12</sup>.

## **Conclusion**

Currently, Peru is the number one and number two exporter in the world for fresh and preserved asparagus exports, respectively. This paper provides an overview of the expansion of asparagus exports from the country and attempts to analyze the factors behind the expansion.

Asparagus production for export in preserved condition was first introduced in the North in the 1950s. The opportunity emerged in the international market due to the withdrawal of Taiwan as a major provider, and processing plants were founded one after another, leading to the spread of production among small and medium scale producers.

The production and export of white preserved asparagus further expanded as a result of various factors. First was the introduction of a water saving drip irrigation. Agricultural companies, which were permitted to hold large scale land after the liberalization of economy, purchased uncultivated land and irrigated land through a government project. They introduced this new irrigation technique to produce

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<sup>12</sup> The information about the activities of Frío Aereo is from an interview with its general manager on September 2005, and IICA (2004).

asparagus on a large scale.

However, the increase of preserved asparagus export from China put a downward pressure on price, and the prospects for preserved asparagus exports from Peru became uncertain at the end of 1990s. This was when the shift of exports from preserved white to fresh green asparagus occurred in Peru. The export volume and value of fresh asparagus surpassed that of preserved asparagus at the beginning of the 2000s.

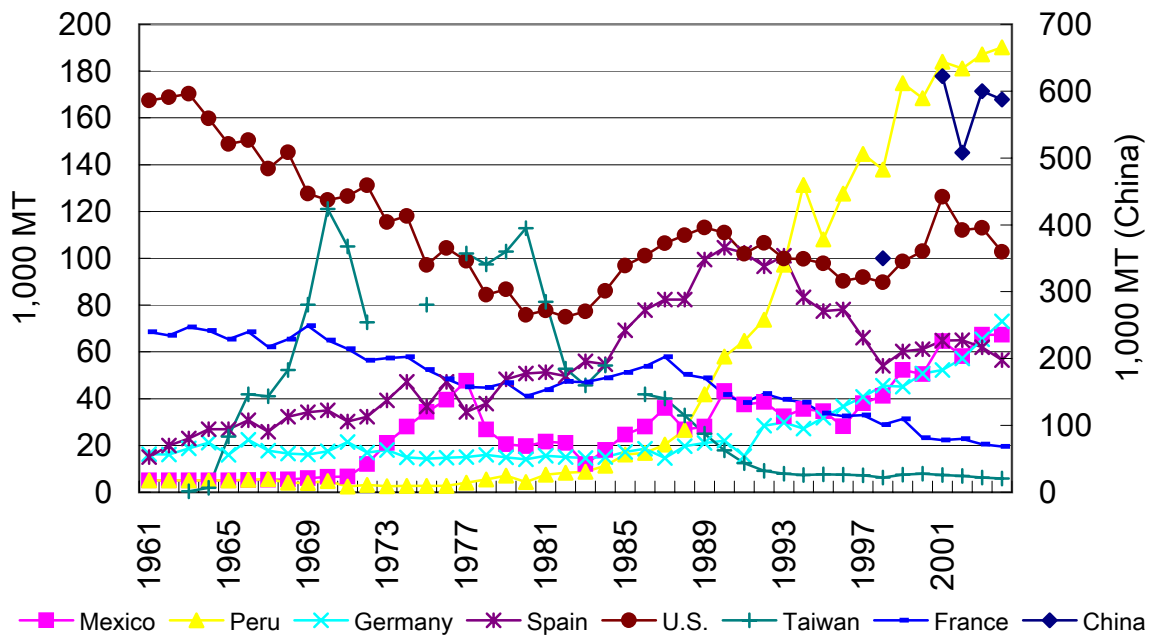
There are several factors behind the expansion of fresh asparagus exports. The first is the change in preference among U.S. consumers. Compared with preserved and frozen asparagus, the consumption of fresh asparagus has expanded since the end of the 1990s. The second factor is the entry of Peruvian fresh asparagus into the niche U.S. market. The export of Peruvian fresh asparagus to the U.S. market is concentrated during the period from September to December, when neither U.S. nor Mexican producers can harvest the produce. The third factor is the integration of production and export by agricultural companies. In order to export fresh produce to overseas niche market, precise coordination of production, processing and logistics for export is required. In addition, it is crucial to assure the safety of produce. Agricultural companies that increased in number during the 1990s in Peru have the capacity to accomplish this coordination. Furthermore, collective efforts among public and private sectors to promote produce in overseas markets and improve the production and logistics infrastructure helped to increase the competitiveness of the asparagus industry in Peru.

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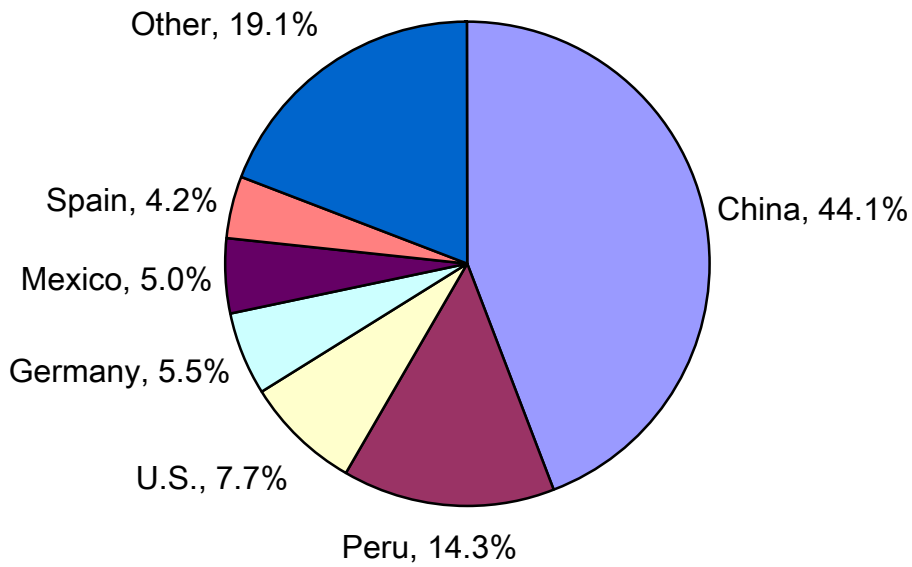
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Chart 1 Asparagus Production by Principal Producers



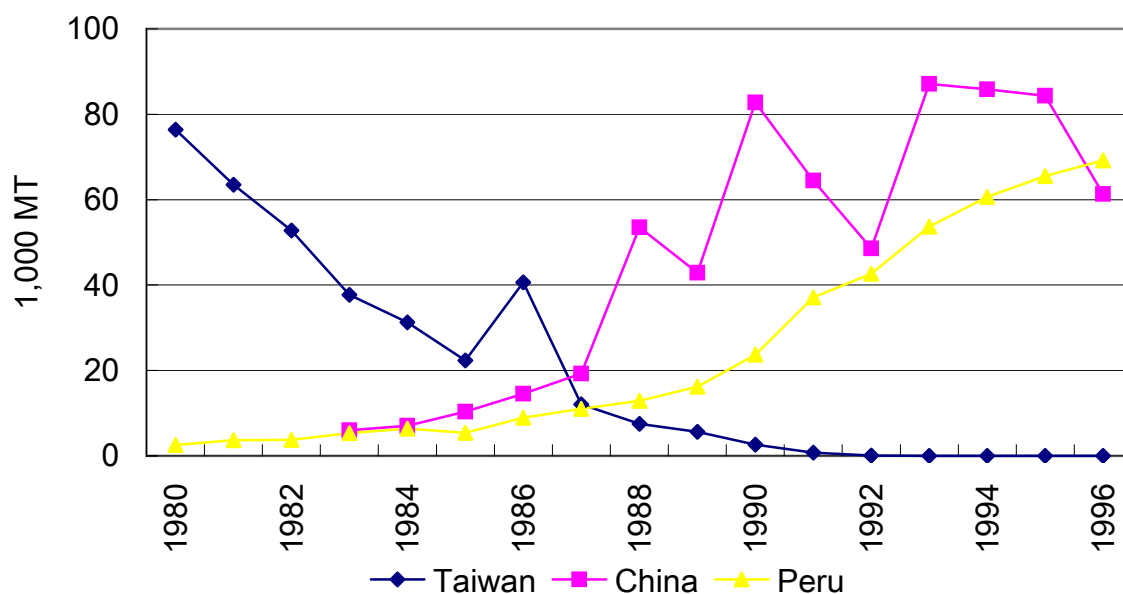
Source: FAOSTAT, for China, USDA (2003), USDA (2005a), for Taiwan, Statistical Office (1985, 1993, 2001).

Chart 2 Shares of Asparagus Production in 2004



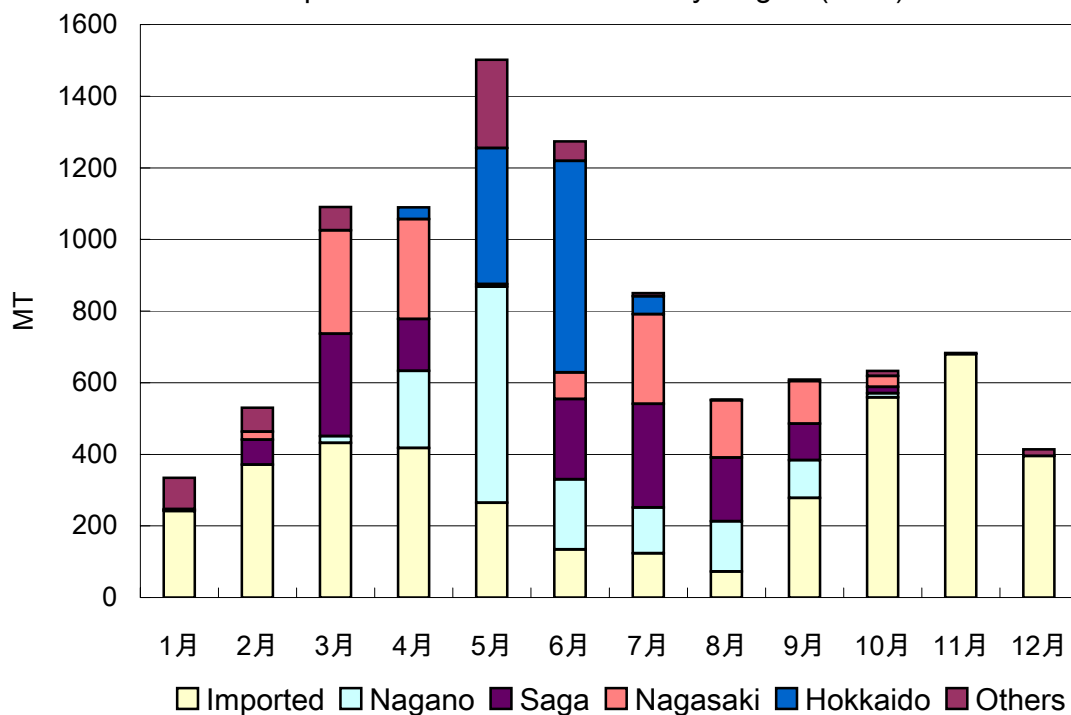
Source: FAOSTAT, for China, USDA (2005a).

Chart 3 Preserved Asparagus Export from Taiwan, China and Peru



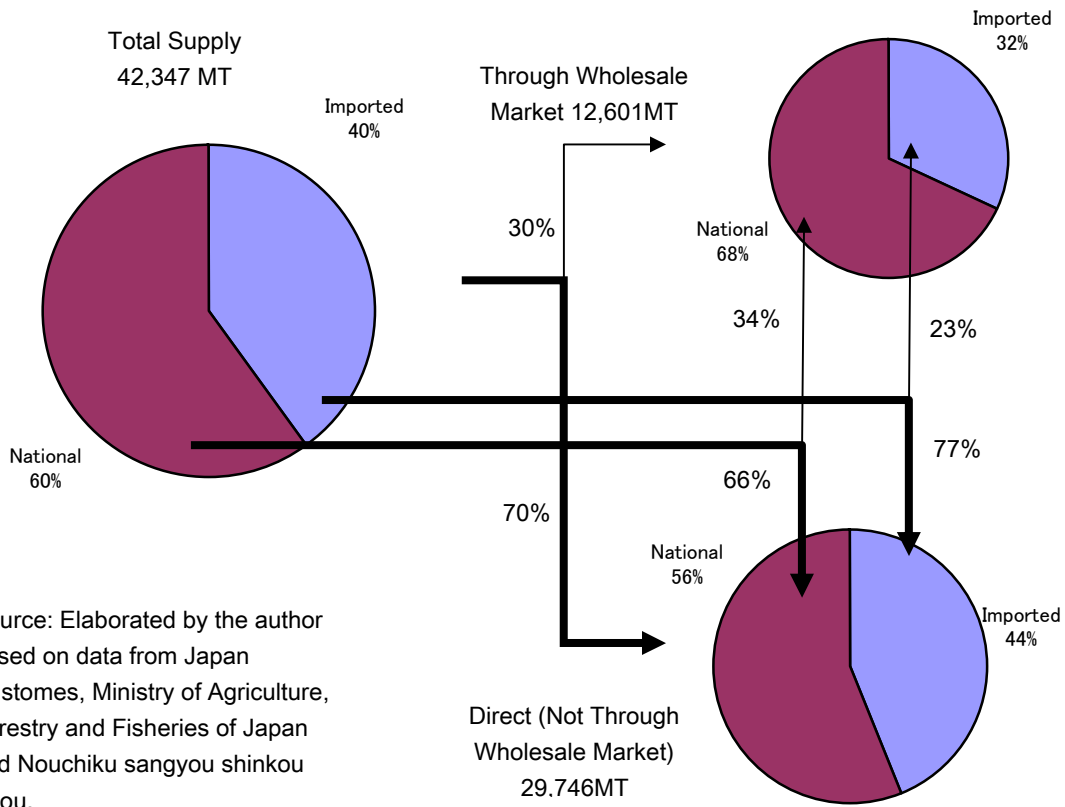
Sources: Taiwan: Statistical Office (1985, 1993, 2001). China: Almanac of China's Foreign Economic Relations and Trade, various years. Peru: Ministerio de Agricultura (1995), La Horticultura en el Perú 1974 - 1994, INEI, various years.

Chart 4 Arrival of Fresh Asparagus in Japanese Wholesale Markets by Origins (2004)



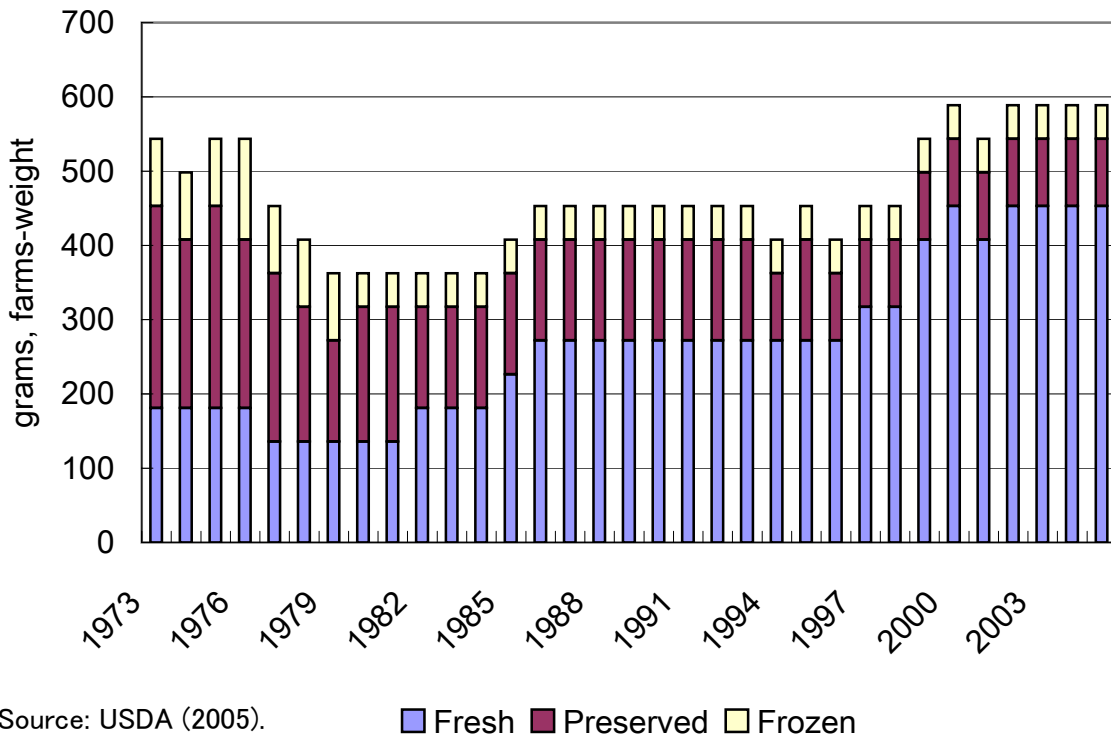
Source: Nougyou sangyou shinkou kikou.

Chart 5 Supply by Distribution Channels



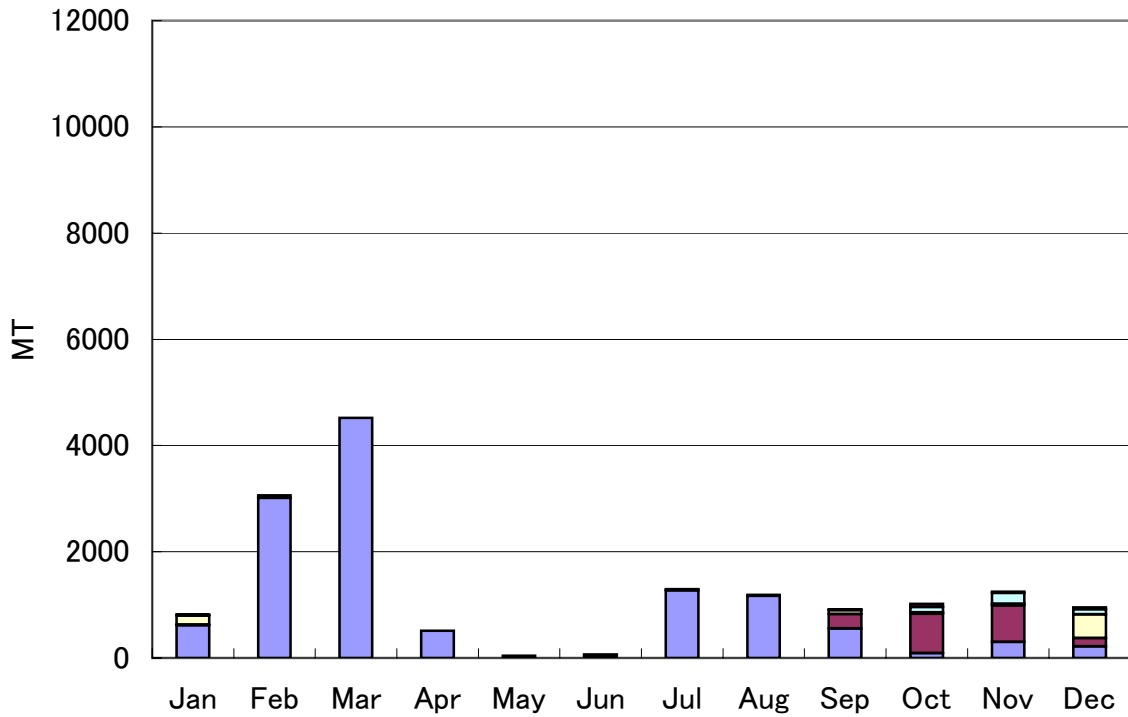
Source: Elaborated by the author based on data from Japan Customs, Ministry of Agriculture, Forestry and Fisheries of Japan and Nouchiku sangyou shinkou kikou.

Chart 6 Per Capita Asparagus Consumption in the United States



Source: USDA (2005).

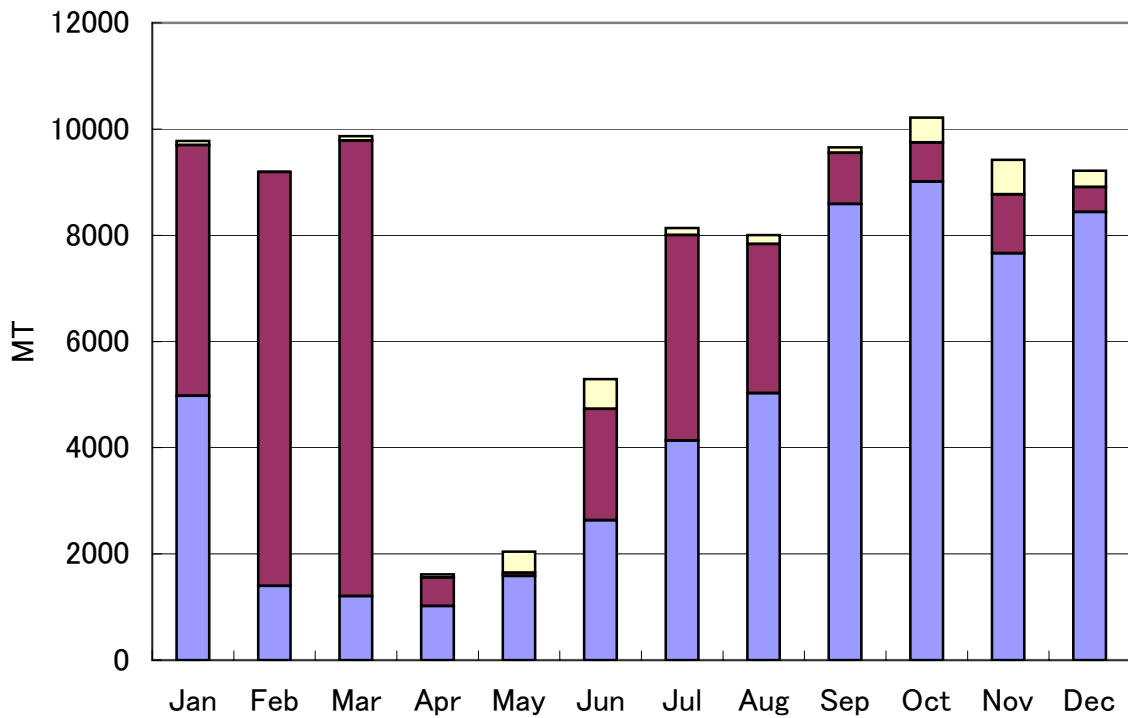
Chart 7-1 Monthly US Import of Fresh Asparagus 1989



Source: USITC

■ Mexico ■ Chile ■ Peru ■ New Zealand ■ Others

Chart 7-2 Monthly US Import of Fresh Asparagus 2004



Source: USITC

■ Peru ■ Mexico ■ Others

Table 1 Fresh Asparagus Export of Principal Exporters (MT)

	1961	1970	1980	1990	2000	2003
Peru	0	0	461	3,378	37,009	67,089
Mexico	409	2,683	3,309	14,526	43,856	47,657
U.S.	0	3,212	7,439	19,568	23,252	23,656
Spain	0	12	409	18,483	19,184	19,005
Greece	0	0	327	9,115	15,902	8,920
Thailand	0	0	0	2,180	3,822	6,980
France	5,683	10,096	10,242	9,222	5,709	6,448
Neitherland	3,643	4,294	3,173	5,971	6,833	6,260

Source: FAOSTAT

Table 2 Preserved Asparagus Export of Principal Exporters (MT)

	1998	1999	2000	2001	2002	2003	2004
China	78,813	77,632	83,537	95,921	106,665	103,778	97,482
Peru	36,142	39,724	40,475	42,111	43,632	42,747	40,547
Neitherland	16,273	16,943	11,147	27,435	18,807	17,238	8,160
Germany	6,914	6,547	8,102	9,460	8,918	8,109	7,735
Spain	4,555	3,367	3,851	3,594	4,005	4,368	4,675
Belgium	0	789	353	404	497	275	4,303
Denmark	107	75	385	36	206	2,807	2,553
New Zealand	2,042	1,219	1,733	1,084	1,522	1,283	1,292
South Africa	3,226	2,380	2,881	1,480	1,928	1,040	1,178

Source: Global Trade Atlas

Table 3 Production and Export of Asparagus in Peru

	Harvested Area HA	Production MT	Yield MT/HA	Export			
				Preserved		Fresh	
				Volume MT	Value \$1,000	Volume MT	Value \$1,000
1961	1,000	5,000	5.0				
1962	1,000	5,000	5.0				
1963	1,000	5,000	5.0				
1964	1,000	5,000	5.0				
1965	1,000	5,000	5.0				
1966	1,195	5,313	4.4				
1967	1,180	5,635	4.8				
1968	955	4,084	4.3				
1969	940	3,930	4.2				
1970	820	4,836	5.9				
1971	570	2,446	4.3				
1972	555	3,133	5.6				
1973	410	2,634	6.4				
1974	430	2,723	6.3				
1975	460	2,715	5.9				
1976	465	2,745	5.9				
1977	693	4,171	6.0				
1978	976	5,466	5.6				
1979	1,363	7,079	5.2				
1980	1,512	4,428	2.9	2,583	3,279		
1981	2,351	7,575	3.2	3,649	4,361		
1982	2,361	8,292	3.5	3,724	4,610		
1983	2,443	8,800	3.6	5,332	6,169		
1984	2,497	11,393	4.6	6,379	8,513		
1985	3,108	16,150	5.2	5,361	5,939	364	565
1986	4,119	16,796	4.1	8,935	8,563	72	131
1987	4,802	20,344	4.2	11,021	13,908	193	386
1988	5,938	26,646	4.5	12,890	18,956	978	1,561
1989	8,256	41,904	5.1	16,119	20,696	386	
1990	8,997	57,996	6.4	23,652	26,647	3,378	4,209
1991	10,706	64,663	6.0	37,121	44,727		
1992	12,965	73,676	5.7	42,618	53,880	6,536	8,361
1993	17,671	97,322	5.5	53,690	60,083	11,901	14,047
1994	17,705	131,387	7.4	60,638	61,778	11,916	17,448
1995	20,126	108,138	5.4	65,535	77,220	13,270	22,437
1996	22,582	127,598	5.7	69,221	91,764	15,511	26,515
1997	16,619	144,654	8.7	69,862	91,304	17,823	31,925
1998	15,972	137,943	8.6	36,142	77,780	17,332	35,736
1999	18,653	174,863	9.4	39,724	87,281	26,982	47,171
2000	20,984	168,356	8.0	40,489	81,547	37,009	53,798
2001	19,038	184,061	9.7	42,111	81,170	41,288	63,585
2002	18,981	181,165	9.5	43,632	85,080	52,777	84,691
2003	18,255	187,178	10.3	42,747	81,315	66,844	107,865
2004	18,500	190,142	10.3	40,547	79,179	72,038	139,653

Source: Harvested Area and Production from FAOSTAT, Export Volume and Value from INEI, Ministerio de Agricultura, and Global Trade Atlas (after 1998).

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