Nursery and nursery products in Beijing, Tianjin, Shandong and Shanghai

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Project code 62534

Mei 2003

Report 2.03.10

Agricultural Economics Research Institute (LEI), The Hague

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Post, J.H. en X.Y. Zhang
The Hague, Agricultural Economics Research Institute (LEI), 2003
Report 2.03.10; ISBN 90-5242-825-5; Price € 10.- (including 6% VAT)
40 p., fig., tab.

The production and demand of nursery products is growing rapidly in China, particularly in big cities as Beijing, Tianjin, Shandong and Shanghai. The report describes the development and the prospects of production and demand of nursery products and the structure of the nursery sector in these regions. A distinction is made in required varieties. Attention is paid to business opportunities for foreign companies. Special information about regulations governing the import of nursery products is provided as well.

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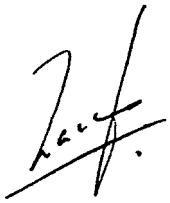
Preface

This report is written in the framework of the project 'Agribusiness and Food Industry in the Yangtze Delta and the Netherlands' and on request of the Directorate Industry and Trade of the Ministry of Agriculture Nature Management and Fisheries. Little knowledge is available about the fast growing production and demand of nursery products in the eastern part of China. This report aims to provide the Dutch nursery industry as well as Dutch policymakers with information and insights that may be useful for their own strategy or policy developments towards the Chinese market for nursery products.
The study was carried out by Dr. Xiaoyong Zhang and Jaap Post. The report is partly based on interviews and partly on contributions of nursery experts in China. Here we specially thank the experts Dr.HAN Jijiang of the Shandong Agricultural University and Dr. Zhang Zhixiang of the Beijing Forestry University, WANG Henzhi of Agricultural Committee of Tainjin Municipality and also Mr. Nick Hong of the Dutch Consulate in Shanghai for his assistance. Li Weimin of the Agricultural Economic Institute (IAE-CAAS) made the contacts with the Chinese experts.



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Summary

General
This report was written at the request of the Netherlands' Ministry of Agriculture, Nature Management and Fisheries. The aim is to provide a number of nurseries in the Netherlands with information on the market for nursery products in Beijing, Tianjin, Shandong and Shanghai. The report is based on information provided by Chinese specialists and on information obtained during a number of field interviews.

There is a huge and growing market for nursery products in China, resulting from the limited public green area in many cities and the growing demand for green area as a consequence of economic growth. A combination of the afforestation plans, the reduction of erosion and the improvement of the environment is enhancing the demand for nursery products. The household demand for nursery products is growing but remains limited.

Importers of nursery products need an import license from the State Administration for Quality Supervision, Inspection and Quarantine (AQSIQ) or the State Administration of Forestry (SAF). The inspection regime applied by AQSIQ depends on the type of nursery product. The SAF is responsible for quarantine measures for trade between provinces.

An important distinction has to be made between the northern and the southern part of China. The Yangtze river is regarded as the border between the two. In the southern part of China there are many varieties available, while in the northern part the number of varieties is limited. A policy aim of the SAF is to increase the number of varieties in the northern part. This therefore makes the northern part of China more interesting for Dutch nurseries. Beijing, Tianjin and Shandong are in the northern part and Shanghai is in the southern part.

For nursery products, climate and soil play an important role. In many parts of the north varieties have to be resistant to both cold and drought. In many parts varieties also have to be resistant to salinity. This is to a large extent due to the shortage of water in large parts of the north and to water being pumped from sinking groundwater resources.

There is a need for greenery techniques and equipment. There is also a demand for gardening tools. The range of equipment and tools made in China is limited and the quality is poor.

Beijing
The nursery sector in Beijing is growing rapidly but is still in an infant stage. However, a limited number of companies produce large quantities of nursery products. The production in Beijing is not sufficient to supply the growing market; many products are imported from other provinces. The Olympic Games have attracted companies from other provinces.

Beijing has a limited but increasing import of nursery products. The number of available varieties is limited. Most of the imports are carried out by private enterprises.

There is a demand for quality fruit-tree species. For greening there is a demand for evergreen trees and for tree varieties with coloured leaves and for trees, which do not produce pollen. Forestation products should have a strong resistance to cold and drought.

Tianjin

The supply of trees in Tianjin for the realization of large projects is insufficient. In particular the output of top-quality (first- and second-class) trees is low. More than half of all greenery trees have to be imported from neighbouring provinces. A special requirement is that trees must be resistant to salinity and drought.

Tianjin plans to launch five big greenery projects before 2005. One of these projects is to establish a botanic garden. Only two regions in China (Tibet and Tianjin) do not have a botanic garden.

Investments are partly financed by SAF funds and the city government. The remainder is financed on the district or county level.

Shandong

There is a huge demand for evergreen trees and fruit trees in Shandong province. In 2000 the planted area amounted to over 150,000 ha. There is a demand for varieties that are fast growing, less susceptible to insects, able to stabilize sand, and resistant to wind, drought, cold and pollution.

The most important suppliers are government-owned nurseries; often the local Forest Bureau or the local Construction Committee is the owner. This also applies to fruit tree nurseries. However private companies are becoming more important; some are foreign companies that cooperate with strong Chinese companies. On the demand side, the local government is the most important client.

Shandong is a net exporter of plants. The target markets are Beijing, Tianjin and cities in the northern part of China. The import from abroad is limited.

The local governments in Shandong plan a further increase in the green area per inhabitant, particularly because the Water Olympics 2008 will be held in Qingtao. The provincial government plans to afforest agricultural land in order to stop erosion, increase commercial forestry, etcetera

The Shandong government is actively stimulating the development of the nursery sector by providing land, establishing markets, setting up research institutes, etcetera

Shandong provides incentives for foreign companies, such as tax refunds etcetera However, in the course of time the policies for local and foreign companies will become more similar.

Shanghai

There is a huge market for nursery products in Shanghai. The government aims to increase the green area in the city from 7 m^2 to 15 m^2 per inhabitant, and to increase the municipality's green area from 10% to 30% in 2020. In the short term, particularly the area with fruit (currently 40% of the green area) will be increased. Land can be leased for long periods.

A major problem is the lack of professional management in production. There is no cooperation or coordination between R&D and market demand. There is a need to reduce costs and to improve the quality of the products.

In general, the marketing parties are the Agricultural and Forestry Bureau on the district level, and landscaping enterprises. For new projects a bidding procedure is followed. Generally speaking the winner has to buy most of the required products from other companies. More than half of the required products in Shanghai are bought in neighbouring provinces. Sometimes landscaping enterprises buy the required species through agencies.

The demand for equipment is rapidly growing due to the increase in green land. Much equipment is imported because it is unavailable in China and/or of poor quality.

There is a market for new varieties: species resistant to salt, species with coloured leaves and fruit trees that are not common in Shanghai. It is mostly the government that takes the initiative to introduce a new variety. Before a new product can be imported it has to be tested by a research institute.

Some foreign companies are already working in Shanghai. The Shanghai government is seeking international cooperation to modernize the industry and to improve the efficiency of the supply chain. Foreign companies interested in the Shanghai market must find a good local partner. In November 2003, a nursery product fair will be held in Shanghai.

1. Introduction

The green area in Chinese cities is expanding rapidly: from 160,000 ha in 1985, to 680,000 ha in 1995 and 865,000 ha in 2000. The public green area in cities increased between 1985 and 2000 from 14 m^2 to 41 m^2 per inhabitant. A further increase is foreseen in the current Five-Year Plan. This development is a result of the limited green area per inhabitant in the past, and of the growing demand due to the continuing increase in income per capita. The upcoming Olympic Games in Beijing and the World Expo (2010) in Shanghai have increased the demand for green area in the short term. Outside the cities, afforestation is important partly to improve the environment by reducing erosion and improving the retention of water. As a consequence, there is a huge and growing demand for nursery products. Dutch nursery enterprises are interested in the development of the Chinese market and in the market opportunities for Dutch companies.

This report describes some of the developments in Shandong province and in three big cities: Beijing, Tianjin and Shanghai. The report is based on a list of questions drawn up by Dutch nurseries, which was translated into a questionnaire developed in consultation with the Dutch Ministry of Agriculture, Nature Management and Fisheries. This questionnaire was presented to a number of Chinese experts. This report is based on the answers of these experts and on information obtained through additional interviews performed by the authors.

Section 2 provides a description of the regulations governing the import of nursery products. In the following sections, the developments per region (Beijing, Tianjin, Shandong, Shanghai) are described. The appendices present information about companies and provide other relevant information.

2. Regulations governing the import of nursery products

Three organizations are involved in regulating the nursery trade: the Ministry of Agriculture (MOA), the State Administration of Forestry (SAF) and the State Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). AQSIQ is the most important one for international trade. We will therefore explain it in more detail.

2.1 State Administration for Quality Supervision and Inspection and Quarantine (AQSIQ)

AQSIQ is a ministry level bureau responsible for entry-exit animal and plant quarantine, certification and accreditation, and standardization. It has five major departments:

- Department of Health Quarantine Supervision.
- Department of Animal and Plant Quarantine Supervision.
- Department of Inspection Supervision.
- Department of Import and Export Food Safety.
- Department of Inspection and Quarantine Clearance.

The department most relevant to the nursery trade is the Department of Animal and Plant Quarantine Supervision, which has four divisions: Plant, Animal, Permits, and Safety. The Plant division is responsible for supervising and quarantining entry-exit seedlings, fruits, grain and animal feed. The Animal division is responsible for animals and animal products. The Permit division inspects and issues import-export permits. The Safety division deals with lifting import bans on goods from certain countries or regions.

AQSIQ headquarters in Beijing is mainly responsible for administration and policy-making. AQSIQ has 35 operational Bureaux scattered throughout China. Each province has at least one local bureau while some provinces have more bureaux, for example Guangdong has three, in Guangzhou, Shenzheng, and Zhuhai. All local Bureaux have a similar organisation structure as that of Beijing headquarters. The AQSIQ is a central government organization and is managed separately from the local government.

As far as nurseries are concerned, three methods are relevant: the Quarantine Management Method for Imported Plant Propagation Materials, the Management Method for Isolation Quarantine Nursery for Imported Plant Propagation Materials, and the Quarantine Management Method for Imported Cultivation Substrate. These three methods were established by AQSIQ in 1999. The following descriptions are based on these three methods.

2.2 Examination and approval procedure

The examination and approval procedure of the importing nursery is carried out in several stages (see also Figure 1).

Import License
According to the Seed Law (2001), companies engaged in the nursery trade must apply for a nursery products import license. These licenses can be obtained from three institutions: AQSIQ, Ministry of Agriculture (MOA) and the National Administration of Forestry (SAF). AQSIQ is in charge of giving permission to import forbidden import items and cultivation substrate. SAF is responsible for the import of tree seeds, grass seeds, tree seedlings and trees. When the interview was conducted in September 2002, only ten companies had been granted a license by SAF. Among these are state-owned companies as well as private companies, including one American joint venture. The rest - including crops, flowers and vegetables - is the MOA's task.

Depending on the quarantine situation, these three institutions decide whether and if so how much China can import. However, before importers approach one of the above-mentioned organizations, they must obtain approval from a provincial Agricultural or Forestry Bureau. A company applying for registration has to meet a number of criteria, such as minimum amount of capital, management capacities, etcetera If a non-registered company wants to import nursery products, it has to do so through a registered company. The approval by SAF depends on the kind of products involved. According to international agreement, a three-category classification system is used:

a. rare or endangered species the import of which is forbidden;
b. species in which only limited international trade is allowed;
c. species without international trade limitations.

Import preparation
At least 15 days before the arrival of import products, importers must hand in their license to the relevant import port. For some serious diseases, quarantine officers may visit the country of origin to carry out an inspection.

Inspection
After products arrive at a port, AQSIQ inspectors check the products against the license, and sample for disease examination based on the information provided in the license.

Customs clearance
Products are released to the importer if no diseases are found. Otherwise, certain measures are taken, such as returning products, burning or smoking them, or restricting use to certain areas, depending on the seriousness of the diseases.

Isolation quarantine
When high-risk propagation materials are imported, they must be planted in a special isolation quarantine nursery. The inspection period lasts 1-3 years, depending on the propagation materials.

2.3 Local Bureaux

For the 35 local operational Bureaux, the executive standards are in principle the same. However, there may be some differences in terms of detailed operational procedures. Be-

low is an example of how AQSIQ's Beijing Bureau controls the import of nursery products.

Seven days before products arrive at Beijing airport, importers must apply for quarantine inspection to the Beijing Bureau and provide two documents: the official quarantine certification from the exporting country and a domestic nursery-products import license obtained from SAF.

Custom inspectors first check the products against the license. They also check the packaging (soil, seed, and other pollution sources) for damage during transportation.

After the spot inspection, products can be transported to the importers' glasshouses, which inspectors will visit to perform inspection and sampling.

In the plant laboratories under the Beijing Bureau, researchers conduct their tests in the following sequence:

a. Testing for pests on the national import-plant inspection list.
b. Testing the items according to bilateral agreement between countries.
c. Testing the items as suggested in the import licenses.
d. Testing items according to international practices.

The lab then provides the Beijing Bureau with a test report. If no disease has been detected, the nursery may cultivate the plants in the area designated in the license.

During the plantation period, the Beijing Bureau inspects the nursery products' performance for at least one growing season. If everything goes well during that season, the Bureau officially releases the nursery. Importers may now propagate the materials as they wish, and the Bureau will not interfere.

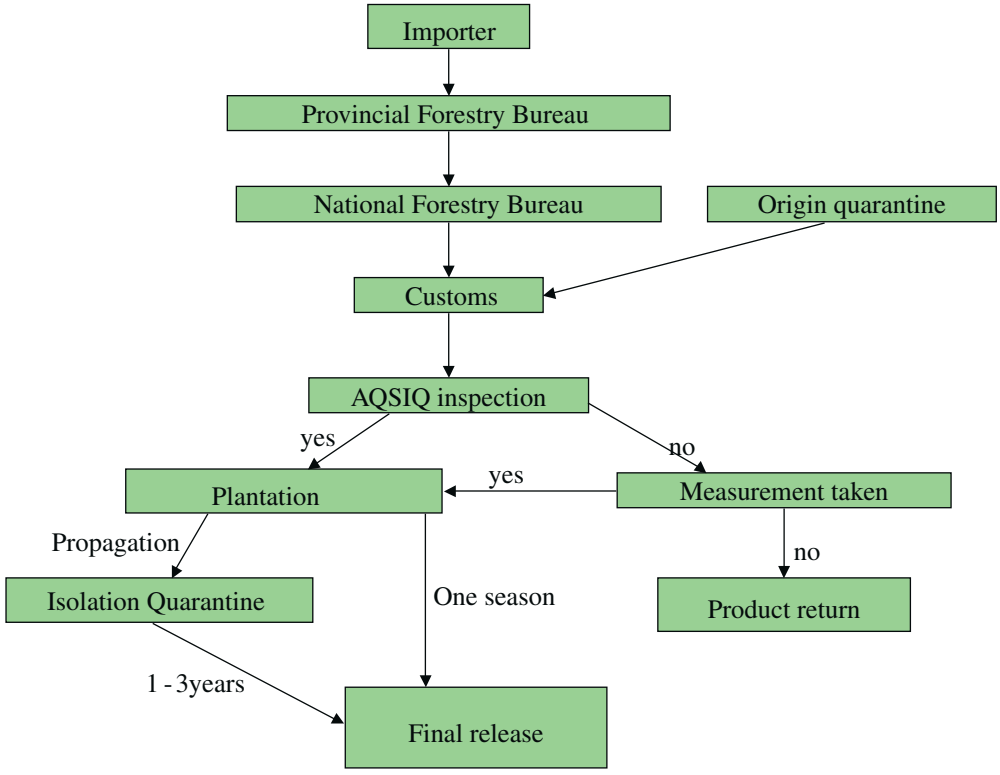

Figure 2.1 Flowchart of Tree Nursery Import Procedure

2.4 Two inspection regimes

China has two quarantine systems, one for the domestic trade and one for the import trade. While AQSIQ deals with import quarantine, MOA and SAF are responsible for domestic quarantine. The trade in seeds, seedlings, nursery products and trees between provinces and counties is subject to national quarantine rules, and local exporters must apply for export certification at their county (or above) Agricultural Bureau.

2.5 Programme 948

In the 1990s, the Ministry of Sciences and Technology in China launched an R&D programme, called 'Programme 948'. The objective is to support the introduction of foreign plant species into China. The programme covers fruit trees, plants for flowers and city greenery, grasses for animal feed, water and soil maintenance and ecological construction. Special attention is paid to the high value of new varieties and species.

A budget of US$ 300-400 million is available for tree nursery products. Universities and research institutes can apply to join the programme. If a research project is granted, the importation of the new varieties/species has to be carried out by a licensed private company. The researchers observe the new varieties and test their adaptability and performance. If the results are positive, the researchers advise the SAF to allow the new varieties/species to be introduced into China.

3. Beijing

Beijing consists of a flat and a mountainous area. The difference in height between the two areas is almost 2300 m. Because it is located close to the Gobi desert, Beijing often suffers from sandstorms. Beijing has two counties and sixteen districts. The agricultural area covers approximately 344,000 ha. In 2000, the city had over 11 million inhabitants. The public green area per inhabitant in 2001 was 9.9 m^2. The 2008 Olympic Games - which are being promoted as the 'Green Olympics' - will be held in Beijing. Before then, RMB 45 billion will be invested in creating a green Beijing.

3.1 Production

There are many nurseries in Beijing and production is increasing rapidly. Most of the companies are still in their infant stage. The Beijing Association of Greenery Enterprises was recently established. Its purpose is to organize the industry and to protect its interests.

The size of the nurseries varies from very small to large. Most, however, operate at a very small scale. There are more than 1000 nurseries in Beijing. Almost all greenery enterprises own a nursery but most of the profit these enterprises make comes from gardening and not from nursery products. The largest company is Beijing Northern Nursery (Da Dong Liu Nursery) with an annual production of more than a million nursery stocks. The larger ones normally employ a number of university undergraduates, who provide technical assistance during production. Many producers have set up business only in the last few years, when they saw that the nursery business is profitable. For an overview of companies, see Appendix 1.

As a result of Beijing's successful bid for the Olympic Games, many companies from other provinces have come to Beijing to establish branches, production bases and representative offices. For example, a company in Yunnan province (south of China) plans to set up an office in Beijing and to invest RMB 10 million in a demonstration base for nursery varieties from Yunnan. An American company has invested RMB 100 million in Beijing and plans additional investments amounting to RMB 2.5 million.

One of the production centres in Beijing is Changping district with a nursery area of 50,000 mu (1 mu = about 670 sq. m; 1500 mu = 1 sq. km). In Changping there are four nursery speciality townships. To encourage the nursery sector, the district government has invested RMB 2 million in the nursery sector.

3.2 Market

The suppliers in the Beijing market are not only the Beijing producers but also suppliers from other provinces (particularly the producers in Zhuo Zhou city in the neighbouring province of Hebei). These producers supply almost exclusively poplars and products for

city greening. The market in Beijing for nursery products for greening purposes was growing fast even before the upcoming Olympics boosted demand.

The market for young fruit trees is saturated. However, there is room in the market for new varieties. The main fruit products of Beijing are peaches, plums, pears, apples, oil peaches, dates, grapes, persimmons and chestnuts.

3.2.1 Varieties required

Many varieties are used for greening in Beijing. The experience is that the market for new varieties becomes saturated within just two years. Required for city greening are evergreen trees/bushes and tree varieties with coloured leaves. Prices for these products are relatively high. There is potential for tree species that do not produce pollen. The main varieties used in city afforestation projects are: pines, Chinese scholar trees, willows, elms, plums, glossy privets, XiaoBi, Huabei, lilac, peach, forsythia, cypress, eucommia, vines, poplars, poplars 107 & 108, Jilang 2, Zhonglin 46, willow 841, 842, 1010, 1011 & 1101, silk trees, Luan trees, Baila and Huoju. Important varieties for flowers are peony, Chinese peony, Chinese rose, azalea, etcetera.

For afforestation there is a demand for new, fast-growing trees, such as European and American poplars, poplars and Chinese scholar trees. However, prices fluctuate sharply: in 2000, a poplar 107 or 108 cost RMB 5-10, whereas in early 2002 it cost only RMB 0.7-1.0. For mountain afforestation, also oily pines, Huabei larches and cypress are used.

There is a demand for quality fruit-tree species, for example, American plums and Japanese persimmons. There could be also a market for European varieties.

The government does not pay much attention to the introduction of new varieties and species. When it wants to introduce certain varieties, research institutes provide it with a list of recommended species. Nursery experts are then invited to give their opinion. Most of these species are domestic. The annual budget for R&D in Beijing Municipality is around RMB 3 million and there are three research institutes. Beijing Horticultural Research Institute carries out research into both trees and bushes. Beijing Botanic Garden performs only tree research, while Beijing Flower Institute performs only flower research. There is no R&D at the district level.

Since there are only seven years to go before the Olympics, there is no time to introduce new varieties, except flowers and fast-growing trees. Therefore, substantial import is foreseen. Most of these imports will be done by private enterprises on the basis of projects. As regards quantity, there is an oversupply of nursery products for 2008, but limited varieties.

3.2.2 Market parties and contracts

The suppliers of nursery products are private nurseries and nurseries owned by Forest Authorities and City Afforestation Authorities. For city and road greening, private companies are becoming more important (in fact, they are already dominant) while the government-owned nurseries are losing ground. Large nurseries are emerging. Also farmers are using their land for nursery. So far, the market channel is not working smoothly.

Beijing has a long tradition of importing from other provinces. In light of the upcoming Olympics, companies and authorities from other provinces (e.g. Hebei) are trying to get a slice of the cake. In Hebei province, particularly the nursery production centre Shenzhou

wants to extend further into the Beijing market. The city's focus is on a large variety of nursery products (300 varieties) on a production area of 65,000 mu. Shenzou has also set up a nursery in Beijing covering 1100 mu. This company bought 100 nursery and flower varieties and cooperates with the Chinese Academy of Science to be able to guarantee the quality of its products.

Another province exporting to Beijing is Shandong. Two companies (Shandong Linju HuanMei Nursery and Shandong Dongying Hekou Kudao Shequ Gardening Company) export ordinary nursery stock to Beijing. The latter company also wants to invest in new production bases in Beijing.

For large greening projects, local planning committees prepare proposals and submit them to the local authorities. The Forest Authority or the City Construction Committee assesses such proposals. The projects have to fit in with the general plans. The Beijing Afforestation Committee of the Forest Bureau of Beijing and the Olympic Committee are responsible for the greening projects for the 2008 Olympics.

3.2.3 International and inter-provincial trade

Beijing has a long tradition of importing from other provinces. The initiative to import from abroad is taken more by the Chinese companies than by the foreign companies. However, many large joint ventures are also involved in importing. The import of nursery stock from abroad increased by 60% in 2001. However, the import is limited: for nursery stock and seeds, it amounted in 2001 to almost US$ 2.5 million. More than 70% of this was for city greening. Imports from abroad comprise mainly grass seeds for lawns and meadows, decorative trees and potted flowers.
To reduce sandstorms, Beijing has imported Sanye poplars and Tai grasses, etcetera These products have a strong resistance to cold, dry climates and help to stabilize sand.

3.3 Planning for the period until 2010

As stated, RMB 45 billion will be invested in greening Beijing. The following are three of the larger projects:

- a project for afforestation along both sides of the fourth ring-road with a total length of more than 65 km (1,300 ha);
- a project around 13 intersections with the fourth ring-road (700 ha);
- projects for the Olympic Centre and for a number of parks (Chaoyang Park, Shiliu Park, Side Park, Red Scout Park).

There are concrete plans for the areas to be planted and for each of the varieties. The total Olympic budget for environmental protection is US$ 10 billion. However, it is still unclear how much of this will be spent on greenery.

3.4 Provincial and local regulations and policies

The Beijing nursery industry was liberalized three years ago. Before 1999, the area greened each year depended on the availability of government money. Currently, although 20 km^2 of new urban greenery per year is planned, only 10% of it is managed by the government, mainly for the greenery of important highways (i.e. the third, fourth and fifth ring-roads). All other greenery projects are open to private greenery enterprises.

Beijing has 18 districts/counties and 130 communities. The district government retains part of the tax revenue for local infrastructure, which includes greenery. The municipal government is involved only in big projects. However, this is not a general rule. There are differences between regions; for example, in DaNian city (Liaoning province), city greenery management is centralized at the municipal level in the City Construction Bureau.

Since 2002, all greenery enterprises in Beijing must apply for a greenery license. So far, 330 enterprises have obtained such a license; a further 700 enterprises still have to apply. Applications must be submitted by the end of 2004. Of the 300 licensed enterprises, only 5% have the capacity to carry out large projects.

In 2003, the main task of the Gardening Bureau is to explore and utilize local tree species and to introduce a small number of species from outside Beijing. While over 300 tree species can be utilized in Beijing region, only 100 of them have been realized.

3.5 Opportunities for foreign countries

There are business opportunities for foreign companies; however, Chinese farmers and companies are becoming more competitive. In this respect also the availability of cheap labour is relevant.

There are some joint ventures with Dutch companies for the production of euphorbia, orchid and anthorium. Dutch companies provide the latest varieties. These are now specialized companies that have become leaders in the market. A number of opportunities can be distinguished:

- greenery techniques and equipment are needed. For example, the Gardening Bureau has bought a machine for fencing the roots of big trees but cannot manage it properly;
- family gardening is emerging. Many villas have been constructed in Beijing, but gardening tools are underdeveloped;
- Beijing is considering setting up two distribution centres for nursery products and flowers. One will be in northeast Beijing, where 7000 mu of land has already been allocated. The other will be to the southwest of the city, in Fengtai District. 5000 mu land is planned for the second centre, of which 30,000 m^2 will be under glass. The government is open to any sort of cooperation, for example, FDI or joint venture. It has emphasized the rich experiences of Dutch companies and hopes that they will participate in the operation.

4. Tianjin

Tianjin is on the coast to the east of Beijing. It covers an area of more than 11,300 km^2. Most of it is flat; the mountains in the north cover only 6% of the area. The agricultural area accounts for almost 486,000 ha. Almost 140,000 ha is forest including more than 10,000 ha of bushes. The planted area around the city amounts to almost 17,000 ha. In 2000, the city had over 9 million inhabitants. The public green area per inhabitant in 2001 was only 6 m^2.

4.1 Production

There are almost 6400 nurseries in Tianjin; together they exploit over 3,400 ha of land. Their production amounts to almost 158 million young stocks. The nurseries are owned by governments, collectives and private farmers. The governments' Forest Bureaux own 15 nurseries (6.6% of the total area). There are 192 nurseries (16.9% of the total area) collectively owned by townships. The majority of the nurseries are private enterprises (76.5% of the total area).

The production of fruit trees/vines is growing, although the production scale is small. The main fruits ones are grape and dates. Annually, 3 million grape vines and 1.5 million young date plants are planted. Grape production employs techniques such as ground heating, ABT rooting system and single shoot drafting. Young date stocks are produced in centralized beds. Tissue culture has been started.

Since 1986, Tianjin has been implementing a plan to develop three fruit production bases. Two years ago it launched two programmes: one for the development of sustainable date farms, the other for the production of grapes in the coastal and mountainous regions. A large number of special townships, special villages and special farms are developing. Fruits have become the major source of income in many villages. An example is Chading township in Hangu district; this township has 18 villages and an income from fruits of RMB 5,000 per person per year.

In 2002, the production of trees reached a record level of almost 43 million young trees, of which 13 million were needle-leaf trees, over 6 million were broad-leaf trees, over 5 million were commercial trees and over 18 million trees were for planting around the city.

Flowers have been produced in Tianjin for over 100 years; however, the majority of producers are still using traditional techniques. The production area is 1,100 ha and the output is RMB 158 million. The production area comprises almost 600 ha of decorative plants, about 250 ha of flowers (cut flowers, dry flowers, potted flowers), 19 ha of leafy plants, over 2 ha of potted landscape plants and 9 ha of grasses. It has a protected growing area of 70 ha including 40 ha of temperature-controlled glasshouses. Although the production of grass sod increased, the turnout ratio is low, the quality is bad and the efficiency is low. In 2002, only 62% of it could be sold and the price was only 20% of that for good quality grass sod. There are almost 6,200 small tree-nursery farms with a share of more

than 76% of the tree nursery area. The farms have high production costs and the quality of their products is low. These farms are not able to compete with the large, specialized farms in Laizhou (Shandong) and Shijiazhuang (Hebei). Not only farmers but also some enterprises produce flowers. There are now almost 80 flower production enterprises (of which 23 are large enterprises) and almost 1,100 farmers produce flowers. The investment in research is low.

4.2 Market

4.2.1 Varieties required

The variety of trees is limited because most of the soil in Tianjin is bad (low-lying saline/alkaline soil). The main products are poplar, willow, elm, scholar tree and pelargonium, which adapt easily to the local conditions. In the 1990s there was an important increase of ZhongLin poplar, Su willow, golden silk willow, triploid white poplar, thousand-head toon and Lu xi (Shandong) scholar tree.

The main fruit tree/vine products are dates and grapes. Such trees as apple, pear, apricot, chestnut and walnut are produced in smaller quantities. In particular can be mentioned rose-smelling grape, good quality wine grape, Pan Shan persimmon, TianJin chestnut, golden silk little date and Tianjin winter jujube. These products are grown on special production bases that have been set up since 1986. By now, there are 4,000 ha of rose-smelling grape in Han Gu area and Ning He County, making it the largest rose-smelling grape production area in China. In 2002 the nurseries produced more than 5 million young plants. The fruit producing area covers more than 55,000 ha, with an average production of over 6,000 kg/ha.

The special requirement for Tianjin is that plants must be resistant to salinity and drought.

Traditionally, almost all are green-leafed trees. The market for coloured-leafed trees is just starting. Poplar is the dominant species in Tianjin: it accounts for around 60% of the total. Poplar is fast growing and suitable for the local conditions. However, worries about diseases have forced the city to look for alternative species. Other major species include willow and scholar tree.

4.2.2 Market parties and contracts

There are many markets, but most of them are small. The majority are open markets with many intermediaries, insufficient market information and single products. Marketing is in a primitive, infant stage. The conditions for transport are poor. There is still a long way to go before a professional standard system, a quality system and a trading system are established. The production of fruit trees and greening trees is still in a phase of self-production and self-sale. There are no special markets and there is no mechanism for sector control.

The demand for afforestation and fruit trees is increasing; current demand is for around 12 million per year. However, there is no special plant market. Fruit trees are normally ordered by fruit farmers directly from special nurseries. Villages and townships order afforestation trees collectively from nurseries according to the targeted task of the local forest authority. In the current afforestation projects, more attention is being paid to

planting big trees and trees, which require only a one-time effort and pay off in the short term. There will be a big shortage of trees when the key afforestation projects are implemented. For greening trees, the output of nurseries of first- and second-class trees is low. The supply is sufficient for normal gardening and greening projects, but for trees for large projects the supply is insufficient. Around 3 million trees need to be bought from elsewhere.

4.2.3 International and inter-regional trade

Tianjin has a huge harbour and is located not far from Beijing. It is a relay station for south-north flower transport and for the export/import of nursery products. Flowers from the south have to be prepared for further transport to the northeast in order to decrease losses resulting from the long distance over which they are transported.

There is a shortage of trees for the implementation of large projects: around 3 million have to be imported from other places. The self-sufficiency rate of Tianjin nursery is low. Half of the greenery trees have to be imported from nearby provinces. Major exporters to Tianjin are Beijing, Hebei and Shandong. The special requirement for Tianjin is that plants must be resistant to salinity and drought.

4.3 Planning for the period until 2010

Tianjin's current Five-Year Plan (2001-2005) includes five greenery projects to be started before 2005:

- Hai river greenery
  This project is intended to green both sides of the Hai river. At the moment, local experts are carrying out a feasibility study.
- Outer ring-road greenery
  There is a 71-km long ring road around Tianjin. It is planned to develop a 500-m wide green belt alongside it. So far, a 100-m-belt has been completed.
- Rural-urban scenery zones
  The Tianjin government plans to build three or four scenery zones where the rural area meets the urban area. The theme will be ecology and water in Tianjin.
- Botanic garden
  Only two regions in China do not have a botanic garden: Tianjin and Tibet. The Tianjin government feels obliged to provide its citizens with a botanic garden. However, its realization will require a large investment and may take some time.
- Highway greenery
  Several important highways go through Tianjin. The Tianjin government has prioritised the greening of Class 1 and Class 2 highways.

4.4 Provincial and local regulations and policies

Since greenery is a public property, decisions have to be taken by the government, in this case, the Tianjin Forestry Bureau. After decisions have been taken at the city level, governments at the district or county level will coordinate and implement the planned projects.

As far as financial arrangements are concerned, the city government will contribute most of the finances and the districts or counties will provide the rest. In the end, local farmers will be mobilized to perform the work for limited subsidies, as farmers will benefit from the project, particularly when cash-crop trees are planted.

In recent years, the SAF has budgeted RMB 15 million per year for Tianjin. In addition the city government provides RMB 8 million. Thus each year the city government has RMB 23 million to invest, excluding contributions from financial resources at the district and the county level.

4.5 Opportunities for foreign countries

Some nurseries have imported tree varieties and selected a number of them for production. There are a number of projects seeking foreign cooperation. An overview of these companies is given in Appendix 2.

5. Shandong

Shandong is a coastal province south of Tianjin and about 500 km from Beijing. Almost 18% of the province is covered with forest. The agricultural area of Shandong covers almost 7.7 million ha (i.e. it is almost four times as large as that of the Netherlands). There are almost 90 million inhabitants. The public green area per urban inhabitant is 8.5 m^2, a little less than in Beijing (9.9 m^2). There are 91 counties. The province has three special economic zones.

5.1 Production

Large nurseries are located in Weifang, Yantai, Weiha, Dongying, Linyi and Heze. Many of these are 'dragon head' (leading) companies that have been established in the last 2-3 years. The companies provide farmers with nursery stock and techniques, and the farmers produce according to the requirements of these companies. For an overview of some nurseries, see Appendix 3.

The production of evergreen and other trees is increasing rapidly. In 2001, 20,000 mu of trees were planted, with poplars accounting for 75% of the total.

Fruit production is important in Shandong and particularly in the Jiaodong area. The total area of fruit trees (including nursery) amounts to 775,000 ha; the most important are apple (447,000 ha), mulberry (80,000 ha), pear (68,000 ha) and peach (77,000 ha).

The production of ornamental plants is booming. In 1998 the area of ornamental farmland was 140,000 mu, and is increasing by 10,000 mu a year. However, the production per ha is only a fraction of that in the Netherlands. Important varieties are peony, Chinese herbaceous peony, Chinese rose, rose and honeysuckle. There are more than 1,100 registered companies, two of which have more than 10,000 mu of land each.

5.2 Market

There is a huge demand for afforestation (of mountains and of land sensitive to erosion), for evergreen trees in towns and along roads, and for fruit trees. The potential market for evergreen trees is 23.3 million ha suited for forest and 26.7 million ha suited for a combination of agriculture and forest. For example, in 2000 more than 150,000 ha were planted; two-thirds of the trees planted were fruit trees. 34,000 ha were planted with trees for environmental protection, and 18,000 ha were planted for commercial forestry.

5.2.1 Varieties required

There is a big demand for poplars and large canopy trees. Because of a shortage in supply, the price is high during some periods. Young trees are less popular and are low priced. In the near future it is expected that there will be a demand for varieties with the following

qualities: fast growing, less susceptible to insects, wind-resistant, resistant to dry climate, resistant to cold temperatures, able to stabilize sand and resistant to pollution (e.g. willows and poplars). For example, Sibeiti (multidimensional) Chinese scholar trees, Hungarian thorn Chinese scholar trees, Mexican thorn Chinese scholar trees, Chinese catalpas and Jian trees; and for residential areas and alongside roads, willows, poplars, Chinese toon, French parasols, Chinese scholar trees, woody lotus, tang trees and plums. Evergreens and vines are also in demand. Also some rare species (e.g. gingko trees) are in demand.

5.2.2 Market parties and contracts

The suppliers of trees for lawns and green areas in cities are government-owned nurseries at the provincial and county level, collective nurseries and private nurseries. Some of the nurseries in the first (and most important) category are a subsidiary of the Forest Bureau or the Afforestation Department. The category of private nurseries can be divided into nurseries run by farmers and those run by companies, for instance a school or an institute. Sometimes these companies provide the farmers with seed or young stock.

Private companies are becoming more important. Some develop from specialized farms, which increase in size, some are diversified companies, and some are foreign companies that cooperate with strong Chinese companies.

On the demand side the local government is by far the most important client. An interesting example is the city of Weihai. In the spring of 2001, 450,000 evergreen bushes and 2 million flowering bushes were planted, covering an area of 240 ha.

City greening projects are mostly carried out by companies, which take the responsibility for design, planting and guarantee. To get a contract, it is important to have a good relationship with the leader or official in charge of the Bureau.

The suppliers of fruit trees are nurseries run by the Forest Department, agricultural research organizations, and private and specialized farms. Many farmers use the Internet for commercial activities.

5.2.3 International and inter-provincial trade

The import of nursery products, cut flowers and bulbs from abroad is limited. In the period 1997-2001 the average per year was almost US$ 800,000. The export value exceeded the import value (to a limited extent). The imported products came from the USA, France, Korea, Italy and Taiwan. Most imports arrive by air; a third arrive by boat.

As far as the cross-border trade of plants is concerned, in 2001 the phyto-sanitary authorities inspected 35 million plants, of which 25 million plants for export to other provinces. The total import from other countries in 2001 was 60,000 plants. Thus, Shandong is a net exporting province. However, it should be noted that the authorities do not inspect all cross-border trade and importers/exporters do not always apply for a certificate.

5.3 Planning for the period until 2010

Many large cities are planning to increase their green area. For example, Jinan (the capital of Shandong) plans to increase the green area per inhabitant to 8-10 m^2. The city aims to achieve this by developing several parks, green areas along streets, etcetera.

The city of Qingtao had a comparable plan (of 8 m^2 per capita in 2010), but it was revised after Beijing won the bid for the 2008 Olympics and it was decided to hold the Water Olympics in Qingtao. As a result, eight greening projects will be implemented, and the green area per inhabitant in 2008 will be 15 m^2.

The provincial government's current Five-Year Plan aims at increasing the reforestation of agricultural land and the revegetation of mountains. It includes plans to develop forests in order to stop erosion, to enhance the development of ecological forest (biodiversity) and to increase the area of commercial forest. The plans include afforestation with species resistant to pollution alongside roads and in residential and industrial areas. An example of an afforestation project is the Yellow River estuary in Dongying, where 78,000 ha are being planted, financed by the central and the local government.

There are plans not only on the demand side but also on the supply side. For example, the development of a new forest asexual fast propagation base by the Forest Bureau of Dongying in collaboration with a private company. The province is steering this development. When the project is finished, production will amount to 50 million plants each year.

5.4 Provincial and local regulations and policies

Many local governments develop incentive policies (e.g. providing land and coordinating land use, encouraging large farms, providing loans, establishing markets, granting exemption from market administration fees). An example is Qingzhou, where flower-growing land is planned collectively and farmers are encouraged to form collectives in order to obtain their inputs. A farm with more than 10 mu of flowers is called a Flower Speciality Farm, and a village with more than 300 mu of flowers is called a Flower Speciality Village.

To stimulate the nursery sector, the provincial government has set up pilot farms and research institutes. There are also many study clubs and sector organizations, and production and breeding bases have been set up for seeds and evergreen plants.

5.5 Opportunities for foreign countries

The market is huge and production is rapidly increasing. There are incentive policies for foreign companies. However, in the course of time the policies for local and foreign companies will become more similar. For foreign companies categorized as an 'advanced technology' or 'high-tech' company there is no restriction on the percentage of production that is sold on the domestic market. In addition, the provincial government of Shandong refunds taxes as far as it exceeds 15% of value added tax (VAT) during the first 5 years. As much as 100% of the VAT may be refunded for high-tech projects. Projects can be categorized as high-tech by the Science and Technology Committee. Foreign companies are allowed to lease land.

6. Shanghai

Shanghai is almost flat; the highest hills are only about 100 m above sea level. Chongming (an island in the Yangtze estuary) is in Shanghai municipality. There are 315,000 ha of agricultural land and over 16 million inhabitants. World Expo 2010 will be held in Shanghai.

Shanghai is an important industrial city, but is poor in terms of landscape. It is surrounded by rice fields, and there is no forest. At the end of 1990s, the amount of green per capita in Shanghai was 2 m^2, while the forestry coverage rate was 8%. In 2002, the amount of green per capita had reached 7.2 m^2 and the forestry cover 11%. This shows that great efforts have been made to increase the greening of Shanghai in the last few years. However, the green area per capita is still low compared to that in Beijing.

6.1 Production

A large number of farms are involved in nursery production. Some are joint ventures. In general, the scale of production is limited and the production techniques are traditional. The knowledge of farmers has to be improved, as often the quality of products is low, partly because of a too high density of plants. For most farmers, profits are low. The output of nursery products for forestation and of fruit trees is growing fast. This has related to the big demand for greening Shanghai.

A major problem for tree nursery industry in Shanghai - and to a certain extent for China as a whole - is the lack of professional management. There is no coordination or cooperation between R&D and market demand. There are limited varieties and species available to meet the demand in different locations and circumstances. Furthermore, there is an oversupply in terms of [nursery quantity = the number of nurseries?] in the market. Future competition should be focused on reducing costs and improving the quality of the products.

Fruit trees make up 40% of the present green area. The Shanghai government wants to increase this figure to 70%. This is important for the financing of the whole project because after a couple of years fruit production generates more income than commercial forestry. It also provides farmers with employment. The area of nurseries will also increase to meet the increasing demand for nursery products, and this area also forms a part of the green area.

It is possible to lease land for long periods. The normal lease period is 20 years, but it is also possible to sign a 30-, 50- or even 70-year lease.

6.2 Market

The demand for nursery products in Shanghai is huge. The area to be afforested is 50-100 km^2 per year. The total demand is for about 10 million plants per year. For each new project a bidding procedure is followed. The individual companies make a design, which has

to be approved by the Forestry Bureau. The winner of a project can only provide some of the needed products from his own nursery and not all of the required species. In general, most of the products have to be bought from other companies. Although the nursery area in Shanghai is increasing it can only meet 30% of the demand. The main suppliers outside Shanghai are in the neighbouring provinces of Zhejiang and Jiangsu.

The demand from private gardeners hardly exists. The number and size of private gardens is limited and usually the maintenance of these gardens is in the hands of real estate companies.

There is also a demand for equipment. As the amount of green land is increasing by 50-100 km^2 each year, the demand for equipment is rapidly increasing. Most of the demand is from:

- the government (particularly for maintenance);
- real estate companies (also for maintenance);
- project development enterprises.

Although equipment is produced in China, the quality is rather low. Much equipment is imported. This also applies to grass seeds most of which are imported from the USA.

6.2.1 Varieties required

Both large and small varieties are required. The quality of the available varieties often is low. There is room for new varieties as the available number of species is limited. There is a market for species that are resistant to salt, for species with different coloured leaves in the various seasons, and for fruit trees that are not common in Shanghai. The four most common tree/vine fruits are orange, grapes, peaches and pears. In recent years, a hundred new varieties of grapes and dozens of new varieties of orange have been introduced.

Before a new variety can be imported it has to be tested by a research institute. This applies both to new varieties from foreign countries and to those from other provinces. For the most important fruit crops there is a research institute. It is mostly the government that takes the initiative to introduce a new variety.

The selection of species for afforestation is made in cooperation with the SAF.

6.2.2 Market parties and contracts

The marketing parties are in general the Agricultural Commission on the district level and landscaping enterprises. Enterprises need a license in order to bid for projects. The number of enterprises with a license is limited: for afforestation projects, 40 companies have a license and for city greening projects, 200 have a license. This last category of projects is divided into three classes on the basis of the size of the project. Some of these 200 companies have a license only for small or only for small and medium-sized projects.

The winning enterprises buy 70% of the species needed from nurseries inside and outside Shanghai; this is partly because their own number of varieties is limited. Sometimes the landscaping enterprises buy the required species through agencies. In November 2002 a fair for nursery products was held in a hall in Shanghai. More than 100 companies participated in this fair. A second fair will be held in November 2003, but this time in the open air.

6.2.3 International and inter-provincial trade

Shanghai is the 'dragon head' of the greenery industry in eastern part of China. The annual demand for tree nursery products is 10 million units. More than half comes from the six neighbouring provinces (Zhejiang, Jiangsu, etcetera). Companies from Taiwan and Canada are already working in Shanghai.

6.3 Planning for the period until 2010

While the proportion of green area in such cities as Tokyo, New York and other metropolitan areas in the world is more than 30% (for Guangzhou, over 50%), for Shanghai it is only 10%. Shanghai's objective is to achieve the greenery level of cities in middle-income countries, with an indicator of 15-m^2 greenery per person in downtown Shanghai. For a number of reasons, the government wants to meet international standards related to, for example, air quality, the diversity for the population, etcetera The government's ultimate goal is to enlarge the green area from 10% to 30-35% for the municipality as a whole, including the rural area. The intermediate goals are 20% in 2005, 25% in 2010 and 30% in 2020. These goals will require an increase in green land of 60 km^2 per year. The fact that the World Expo will be held in Shanghai is an incentive to reach the goal set for 2010. For the realization of this goal a number of projects have been developed, including:

1. Greening the inner ring road (250 m wide zone).
2. Greening the outer ring road. The outer ring road is 97 km long and the municipality is planning to green a 500-m-zone along the outside of it. So far, only a 100-m-zone has been greened; the government covered all the costs incurred. For the remaining 400 m (total 52 km^2), a different approach will be applied: instead of direct investment, the government will provide incentives to stimulate the participation of private sectors. Private companies can lease farmland for greenery purposes for as long as 30 years. The government will pay the lease for the first 10 years. When the private companies' contracts expire, they must leave behind a piece of green land. In fact, 80% of the 52 km^2 has been arranged. The participants include volunteers, professional greenery enterprises and real estate developers. Several joint ventures are involved as well, for example with companies from Japan, Taiwan and Germany.
3. Other projects:
    - Development of four green zones around Shanghai; these have a main function in the development of a green zone.
    - Greening the eastern part of Chongming Island.
    - Changing the function of the island between Chongming and Shanghai to that of an ecological island.
    - Planting trees alongside other roads, rivers, the coast, in industrial zones, etcetera.
    - Furthermore, in order to relocate citizens living in the downtown area, the Shanghai government is planning to build nine satellite towns each in the style of a different country. The 'German' town is located in Jaoding, where Volkswagen is manufactured. The 'Dutch' town is located in the Guan Gao Qiao Zone, where a deep-sea harbour resembles Rotterdam harbour. Others include Spanish town, North America town, etcetera.

6.4 Municipal policies and regulations

The government at the municipal, district and township level provides the resources for the realization of the ecological greenery, which accounts for 40% of the planned area. Another 40% of this area is available for private sectors (e.g. real estate companies) to develop cash-crop forests. The remaining 20% is available for farmers to increase the production of fruit and nursery products. Farmers are compensated for the loss of income by a subsidy of RMB 300 per year for three years if they change from crops (e.g. rice production) to cash-crop fruit or nursery production. Farmers are also stimulated to develop less intensive land and livestock products.

Shanghai is seeking international cooperation on two matters: modernizing the outdated nursery industry and improving the efficiency of the entire nursery supply chain. Furthermore, the government is encouraging closer collaboration between nursery R&D institutes and private enterprises.

6.5 Opportunities for foreign countries

A foreign company interested in the Shanghai nursery markets must first find a good local partner. It must also recruit an experienced local agent who has his/her own local network. Testing by a research institute is mandatory before a new variety can be imported. Most of the grass seed is imported from the USA.

There are also market opportunities for greenery equipment. With the increase of green land, the market for equipment will increase. We visited several gardening centres where only imported machines and equipment are available, mainly from Germany, Japan, Canada and Australia. The major customers include government agencies that take care of green spaces, enterprises for project development, real estate developers and individual households.

In 2002, a business group from Germany visited Shanghai twice to seek cooperation opportunities in the nursery industry. Each year, greenery study groups from Shanghai visit Europe, mainly Germany.

Appendix 1. Selected Nurseries in Beijing

1.1 Beijing Dadongliu Nursery (Beifang nursery base)

Address: Beijing Chang Ping District, Da Dong Liu Town

This company belongs to the Beijing Forestry Bureau. The nursery has two production areas: the 'south' and the 'north' field. The north field used to be the location of the First and Sixth Mechanical Industry Bureau, and the south field used to be the location of the National Statistics Bureau and the Government Agency Management Bureau. The two fields are not connected and lie 2.5 km apart.

The nursery now has 163 workers, including the manager and technical workers (1 high-level, 10 middle-level and 19 primary-level professionals).

The products comprise 60 kinds of deciduous shrubs, including white-skin pine, oil pine, Hua Mountain pine, snow pine, cloud fir, side cypress, hair white poplar, salix babylonica, golden-branches salix babylonica, Chinese hackberry, golden branches, dragon feet pagoda tree, yuan bao maple, silk tree, ginkgo, European-American poplar (including 107, 108, 109 and 110), parasol tree, er qiao, white yulan, purple yulan, rose of Sharon, golden-sliver tree, Tian Mu Qiong Hua, Tie Geng crab-apple, oriental cherry, red-leafed Xiao Bi, golden-leafed Xiao Bi, golden-leafed glossy privet, arrow henep, begonia, purple vine, Chinese wiataria, smoke tree and yellow poplar, as well as more than 60 kinds of deciduous shrub and more than 20 kinds of flowers, such as euphorbia, flamingo, peony, long-life chrysanthemum, green giant etcetera The nursery not only produces all kinds of nursery stocks, but also performs contract work for gardening projects.

This year, the North National Forest Pilot Base of the National Community Plan invested RMB 60.79 million in our nursery. A 30,000-m^2 glasshouse, a culturing factory and a comprehensive factory are almost ready. In the near future, the base will become a complex with businesses, R&D and piloting. It will have a preclusive, exemplary and travelling function. The base will produce 16 million trees in Beijing, and in the north, northwest and centre of China. It will support the greening of Beijing, the north of China and other areas in developing commercial forests, and in beautifying and greening the city.

1.2 Beijing Environmental Service Ltd.

This company is located in Shi Jing Shan district, 20 km from the centre. It has 370 mu of land, fixed assets of RMB 23.43 million, 270 workers, 16 subsidiaries and a turnover of RMB 20 million. Its main business is the production and sale of flowers and trees, greening projects, service rental and other businesses, such as transport, reapers, construction and entertainment. It began its flower production in the 1970s, making it among the first in China.

The company has over 400 mu of nurseries, including 20,000 m^2 of glasshouses, 130 m^3 of storage rooms for cut flowers, and 240 m^2 of tissue culture rooms. It can produce

500,000 culture tissues every year. The products are mainly yellow poplar, glossy privet, Xiao Bi, etcetera It can produce 200,000 cut flowers, 30,000 potted flowers and complete RMB 2 million's worth of greening projects. It also makes flower arrangements for 10 hotels (turnover of over RMB 5 million). In 1994, it was one of the flower enterprises established by the Chinese Flower Association. In 1997 it was among the top members of the Association. In 2000, it was certified as a national afforestation enterprise of second grade.

The company has a wide range of products. Its annual production is 800,000 units, including 80,000 Chinese roses, 100,000 hui trees and 40,000 m^2 of grasses.

Large-leaf yellow poplars: 300,000 trees including 200,000 adult and 100,000 young trees with a canopy of 0.8-2.5 metres. This is the largest nursery in Beijing. It provides services to central governments, military complexes and many important projects in Beijing.
Golden-leaf glossy privet: this is one of the mostly widely used greening plants in cities, and is indispensable for making colour strip patterns. The company produces 150,000 units of adult glossy privet on a production area covering 30 mu. These are widely used in Beijing and by suburban organizations and companies for greening projects.

Red leaf Xiao bo: this is one of the key varieties of the company. We have established a complete system from seed collection, pattern design and final products. Annual production is 100,000 units and the company has a very good reputation.

Greenery projects
The company's annual turnover of RMB 2 million is derived from approximately 60 greening projects. The main projects are Dong Shui Xi Dian greening projects (1990-1995), National Security greening projects (1994-1998), Lu Gu developing area (1996-1999) and Wu Ling Shang Zhuang (1999-2000).

Research and extension
The company is actively involved in research and extension. Since 1985, it has carried out nine programmes for Beijing City, the State Administration of Forestry, and Beijing Forest Bureau. It has performed five successful research projects, including research on Chinese juniper grafting, the storage of cut Chinese pinks, cut-flower growing gels, and the cultivation of cut roses. The company has imported 117 foreign varieties, including cut Chinese roses, Chinese pinks, Yinpinghong and Yinmaihaiyu.

Address: Beijing Shan Jin Shan district Ping Guo Yuan

1.3 XuChang Jiang Bei Flowers and Trees Ltd.

Tel: (010) 89301395
The company was established in 2000 and has 1000 mu of land. Its fixed assets amount to RMB 6 million. It is a collective enterprise. There are modern culture rooms and over 5.5 million trees in the nursery.

Products
Poplars: 107, 108, 109, 110, Ji Lang 2# (1.5 million).
Zhong Lin series: 46, 2001, etcetera (250,000).
Jin Si willows: 841, 842, 1010, 1011,1101 (over 1.5 million).

Woody flowers: plums, yellow poplars, glossy privet, Xiao Bi, lilacs (1.65 million trees).
Afforestation trees: silk trees, golden rain trees, Ba La, Huo Ju, junipers, etcetera (500,000)
Chinese scholar trees (100,000).

Address: Beijing Fang Shan district Shi Lou town Shi Lou village, 102400
Website http://www.xfmm.com.cn
E-mail:y_zyi@sina.com

Appendix 2. Selected Nurseries in Tianjin

1.1 Tianjin Ji Xian Xiao Tun Nursery

The nursery is located east of Hu Li Zhuang village, Li Zhuang Zi Xiang, very near to National Highway 102, in the neighbourhood of Tianjin ring road and Baoding-Pingxiang Road. It is 2 km from both Tianjin-Jinan railway and Tianjin-Jinan highway (which is still under construction), 90 km from Tianjin City to the south and 78 km from Beijing to the west. The transport infrastructure is very convenient.

The climate is warm, the land is semi-wet and the weather is determined by seasonal winds. The annual average temperature is 11.5 C, the highest is 41 C and the lowest is -18 C. The average rainfall is 600-800 mm; most falls in June, July and August. The unfrosted period is 198 days. The soil is brown type, with a good condition and a neutral pH.

Ji Xian is one of the key counties in the second and the third 'san bei' protection forest and a key county supported by forestation projects around Beijing and Tianjin. In 1997, it became a pilot county in the National Council's national programme of development of mountainous areas. In 1999, the National Planning Committee put it on the list of key areas for national ecological projects. The demand for trees is quite high and the output is fairly constant. Ji Xian is now one of the largest tree producing counties in the Beijing / Tianjin area. Ji Xian has 1300 ha of nurseries. In addition, there are many more nurseries alongside National Highway 102.

Xiao Tun Nursery has 20 ha of land. Its annual production is 484,000 young plants, including 111,000 garden bushes, 68,000 grafted plants, 15,000 needle-leaf trees, 260,000 broad-leaf trees and 30,000 afforestation trees.

To suit the local conditions, a number of afforestation trees are produced: poplar 107, 108, 110, 84K & 2025, triploit white hair poplar, golden branches willow, golden branches Chinese scholar tree, dragon feet scholar tree, elm, smoke tree, Yuan Bao maple, torch, ginkgo, thousands-head toon, golden rain tree, pllargonium, silk tree, snow pine, white-skin pine, oil pine, Huang Mountain pine, dragon spruce, side juniper, dragon juniper, He Nan juniper, Shu juniper, Dan Dong juniper, The main cash-crop trees/vines are: grape, apricot, peach, plum, pear, jujube, apple, chestnut, berry, eucommia, etcetera Evergreen bushes, which could be chosen, are yellow poplar, glossy privet, rose, azalea, rose, euphorbia, flamingo and iris.

1.2 Tianjin Forest Tree Demo Base

The Base is located in the township of Majiadian (Baodi district, Tianjin) and lies in the centre of the Beijing-Tianjin-Tangshan triangle. It is 85 km from Beijing to the west, 73 km from Tianjin to the south and 70 km from Tangshan to the east.

The annual average temperature is 11 C and the effective accumulated temperature above 10 C is 4,000-43,000 C. Unfrosted period is 185 days. The average rainfall is 600 mm; most falls in July and August. The total sunshine in one year is 2770 hours.

There is a plan to develop a demo base on the river alluvial plane with rich soils, deep earth and smooth surfaces. The soil in the project area is mainly wet tidal soil, mainly sand soil and medium/neutral soil. The organic content is above 1.6%. The plants are mainly northeastern vegetation types. There are mainly chrysmatlle, bean and rose. There are more grassy or herbaceous plants than woody or xylophytal plants.

Current production situation

Construction will begin in 2002. The planned area will cover 78.2 ha. After it is finished in 2003, it will produce 1 million young trees for sustainable forestry, 500,000 shoots, 2.4 million tissue cultured stocks, 50,000 fruit trees and 50,000 potted plants.

Appendix 3. Selected Nurseries in Shandong

Company 1	Daze Mountain Huadong Horticultural Field of Pingdu City, Shandong		
Address	Dazeshan Town Hall, 266713, Pingdu City, Shandong		
Contact Person	Hou Shu-Cheng	Educational level of the contact person	
Basic Situation	Situated in Da Ze Shan town – the hometown of the Chinese grape. It possesses hundreds of excellent fruits from scientific research organizations in China (standard garden 1 km^2, nursery 3 km^2). More than 10 new varieties from China and all over the world are planted each year (introduced by Li Yu from the Chinese Science Institute of Plants). Computers are used for high-tech control in order to obtain good varieties.		
Telephone, fax	0532-5371625 (office□□ 0532-5377004□home□□13806421523 (cell phone)		
Email	shucheng@public.qd.sd.cn		
Core business	Nursery, farming technique guidance, training, planning of nursery, etc.		

Product	Varieties	Output	Price in 2002
Grapes	America Zao Hong Ti (early Harvest), Shi Fu Luo Sha (Hua Xing 1), Jing Xiu Xiang Fei Rose, Hei Mi, Wu He Tomosson (seedless, green grape), Hu Tai 8, Eastern Ju Xuan, Jing You, Red Diamant, Beauty Finger, Phoenix 51, Ju Feng, Ze Shan 1, Da Li Mei Gui Xiang etc.	3.8 million	
Peaches	Shu Guang, Yan Guang, Hua Guang, Chinese long-life peach, Wu Yue Huo, Zao Fang Wang, Zao Hong Zhu, Xin Chuan Zhong Dao, Yuan Dong white peach, An Dong Shui Mi, Hong Xue Shui Mi, etc.	2.8 million	
Apples	Yan Fu 1, Red Gala, 2001 Fuji, Teng Mu 1, Royal Gala, Song Ben Jin etc.	2 million	
Pears	Xin Gao, Crystal, Feng Shui, Ai Hong, Xin Xing, Green Diamant, Hu lu pear, Fu Yang pear etc	500,000	
Plums	America Brown 3, Da Shi Zao sheng (early harvest), Black Diamond, Australia long plum etcetera	500,000	
Big cherries	Italian Zao Hong (early harvest), Red Light, America Ju Zao Hong (early harvest), Ukraine big cherry, Zuo Teng Jin	200,000	
Others: apricot, persimmon and pomegranate young stocks.			

Company 2	**Shan Dong Yang Guang Ltd.**		
Address	Ji Nan city Dong Wai Huan Lu 4000, 250013		
Entrepreneur, contact person		Education level of contact person/entrepreneur	
Basic information	It is a 2nd grade company of Shandong. This company is specialized in research, production and trade of evergreen plants and nursery stocks. It carries out and maintains gardening projects. There are 43 technicians and managers, 28 of whom have an education higher than college level. The company has a 200 mu nursery for research and production. There is a Papaya Institute, a Rose Institute and a Ginkgo Institute. It is situated in the eastern part of Jinan City, has 300 mu of land, convenient transport and a beautiful environment.		
Telephone, fax	tel.□0531-8769907 cell phone□13031725381 Fax□0531-85544427		
E-mail	Guanghe800@sina.com		

	Varieties	Output	Price in 2002
Deciduous trees	Five-pointed maple, persimmon, Chinese catalpa, Yellow Mountain golden rain tree, silk tree, Chinese hackberry, salix babylonica, smoke tree, torch tree, ginkgo, etcetera 80 kinds		
Evergreen trees	Cloud fir, snow pine, dragon cypress, small dragon cypress, Shu Chinese juniper, sea paulownia, yellow poplar, Gui Jia Dong qing, Sa Jin cypress, Da Ye Nv Zhen, etcetera 20 kinds		
Deciduous shrubs	Rose, rose of Sharon, Forsithia suspensa, winter sweet, lilac, oriental cherry, Hai Zhou Chang Shan, treasure plum, yellow prick plum, Hong Rui Mu, Jin Ye Nv Zhen, Hong Ye Xiao Nie, Chinese rose, rose, Jin Yin Mu. 40 varieties		

Company 3	Shandong Nursery Bases of Forest Department		
Address	JiNan City North Garden Road 206, 250100		
Entrepreneur, contact person		Educational level of entrepreneur/contact person	
Basic information	A subsidiary of the Forest Department. Pure varieties, reliable quality, service and consultancy. Stocks, adults trees, seeds, tissue cultured and test-tube cultured.		
Telephone, fax	□0531□8966248 □0531□8963948-3748□cell phone□013806410722		

Products	Varieties	Output	Price in 2002
Grape	Seedless grape from USA, Red grape (Red earth), Black grape etc.		
Cherry	Ukraine big cherry, America black cherry		
Oil peach	Zao Hong Zhu, Dan Mo Hong etc		
Peach	Chinese long-life peach		
Dates	Zhan hua winter dates		
Others	Red apricot plum, kernel used apricot (the cap of king dragon)		
Flowers: cut rose - bishop			

Appendix 4. Selected Nurseries in Shanghai

Shanghai Minhang Horticulture Company

Address: Mihang Economic Zone, Luchuan Lu 315
Tel: 0086 21 64 62 46 47
Fax: 0086 21 64 30 23 87

The company was founded in 1995 by Mihang United Development Co., Shanghai Gardening Construction Co. and Minian Horticultural Co. It is located in the Mihang Economic & Technological Development Zone, where 20 of the world's top 500 companies have a branch and/or factory. There are 31 staff members, of whom 10 are professionals. The operation covers four main areas: design and implementation of greenery projects; nursery and flower production; greenery maintenance and storage leasing.

One of the current projects is the construction of a 40-ha ecological park in Minhang District. This park has three theme areas: water plant park, Western plant park and agro-horticultural park. The first two theme areas are nearing completion while the third is still under construction. The agro-horticultural park occupies 17 ha of land. It is intended to develop business in flowers or nursery products (fast-growing). The company welcomes any forms of cooperation (FDI, joint venture) and particularly hopes to attract the Dutch interest.