SHANGHAI: TRENDS TOWARDS SPECIALISED AND CAPITAL-INTENSIVE URBAN AGRICULTURE

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1. Introduction

The Chinese are famous for their highly intensive urban cropping systems and to this day many of their large cities are largely self-sufficient in food from adjacent land areas administered by the city (Girardet 1999).

Shanghai, located in the delta of the Yangtze River, is the largest industrial and commercial city of China. The total area of Shanghai covers 6340.5 km$^2$, of which 13% is urban area and 87% rural. In the past ten years, Shanghai has been expanding rapidly, in 1994-95, for example, the built-up area increased by 22.4 km$^2$. Today, 13 million people live in Shanghai. The average population density is about 2,059 people/km$^2$, the highest density being in Nanshi District with 58,233 people/km$^2$. In order to reduce the population pressure in the town centre, the administration implements a policy of moving people to the fringes of the town, together with industries and facilities.

The Shanghai area is low and flat, with 50% of the land 4-5 m above sea level, the rest being even lower. Shanghai has a high density of watercourses and a rather high groundwater table. The subtropical climate, sufficient rainfall (1,143.4 mm/annum) and the soil make very suitable conditions for agriculture.

Shanghai has entered the fast lane of urbanisation, but the city administration also realises that the city will not be able to develop without agriculture. Agriculture in Shanghai contributes only 2% of the Gross Domestic Product (GDP) and the productivity increase is slower than in other economic sectors. The administration is aiming for a considerable level of agricultural production within the city in order to ensure a stable food supply for the urban population. To prevent more transfers from agricultural to non-agricultural land, strict regulation has been initiated. Currently, 80% of the arable land is protected under the Agricultural Protection Law. The government pursues capital-intensive agricultural development with a high degree of mechanisation and intensive use of land, labour and inputs. Today, the total amount of government investment in urban agriculture is five times higher than ten years ago. The objectives of the agricultural programmes are to maintain social stability, increase mechanisation
and to increase production intensity. In addition, urban agriculture is seen as a way to reduce air pollution by maintaining green open spaces and by offering an opportunity for recreation.

2. **Urban agriculture in Shanghai**

About 8.5 million people in Shanghai have a job, 3.6 million of these in the agricultural production sector. The total number of farmers is 2.7 million people, or 93% of the population of the rural areas around Shanghai (13% full-time farmers, 80% part-time farmers). Profits in urban agriculture in Shanghai are low. Competition for labour with other economic sectors is increasing. The production costs in the Shanghai area are on average 15% higher than in rural vegetable-producing areas. Increasingly, producers from other regions supply the Shanghai market, causing the prices to drop.

The main reasons for the higher costs are relatively higher labour and land costs. The strategy to reduce the price differences aims to increase output and to lower production costs per unit by applying new technologies and generating higher added value through improved production quality. Thirdly, agricultural production services are improved in order to reduce production costs. The relative advantage of lower transport costs in Shanghai is difficult to quantify, as it depends on the distance and modes of transport. It was this strategy to lower the production costs that led to a reduction in the price difference between rural production areas and Shanghai, from 20% to 15%.

2.1 **Cereal production**

It is a policy target for Shanghai to be self-sufficient in some cereals and to produce at least 2 million tons of grain per year. Cereal production is therefore given priority, and makes up 65% of the total production in Shanghai. In 1997, cereals were grown on 365,780 ha or 66.2% of the total area sown. Total cereal production was 2.4 million tons, of which 40% was wheat, with an average yield of 6.5 ton/ha. Wheat is produced in the summer. In the fall, mainly rice is produced, which amount to about 60% of the total cereal production.

Because growing summer grain crops such as wheat in the Shanghai area are not economically profitable, the area under cereal production declined from 512,307 to 343,951 ha over the period from 1979 to 1995.
Distribution Map of Shanghai Urban Agricultural Production

Key:

- Central City
- Vegetable, Flower and Grain Production Area
- Grain, Livestock, Aquatic and Vegetable Production Area

Ratio: 1:500000
In Shanghai greenhouses are used to prevent contamination of crops by air and soil pollution (Picture Shanghai Modern Agriculture Development).
However, the total production remained at about 2 million tons on account of an increased yield per hectare (from 5.1 t/ha to 6.4 t/ha).

2.2 Vegetable production

Vegetable production covers more than 10,000 ha under continuous production and 2,700 ha under seasonal production. Before the 1990s, continuous vegetable production was concentrated in the suburbs within a radius of 20 km around the city centre. Since 1990, the vegetable production area has gradually moved out as the city has expanded. In 1996, 75% of the land under vegetable production (8,700 ha) had been moved to the outskirts. Only 10% of vegetable-production land will remain in the periurban area of the city; the rest will be located at 30-60 km from the city centre.

The already mentioned increased competition and higher production costs have caused the self-supply for vegetables in Shanghai to drop from 100% to 60%. The annual vegetable production in Shanghai is about 1.3 million tons, or 4,000 tons per day.

Vegetable production in Shanghai is relatively specialised. The number of greenhouses is increasing and now covers 26.7% of the total vegetable production area. The government actively promotes new technology in 287 horticultural farms. A 700 ha greenbelt has been established in which 18 kinds of vegetables and fruit are produced.

2.3 Livestock production

Livestock production has also been gradually moved from the suburbs to the outer area of Shanghai. At the moment, there are 547 large-scale pig farms, of which 88 have more than 10,000 pigs. There are more than 100 broiler chicken farms with a production capacity of over 100,000 birds each and 120 egg production farms with more than 10,000 chickens each. There are also 150 dairy farms, each with more than 100 head of cattle. Pork, chickens and eggs produced by these farms account for half of total commercial production, and milk for 80%. Pork and poultry cater for more than half of the total supply to the city. Respectively, 100% and 90% of the milk and eggs consumed in Shanghai is produced within the city limits.
Apart from food crops and livestock, there are several enterprises engaged in producing turf grass covering in total 143 ha, and there are 43 floriculture farms producing 290 million tons of cut flowers a year (33% of the total production in China). The average size of these farms is 3 ha.

3. Trends in agricultural production systems

The urban agricultural production process has been reorganised, with small-scale household production giving way to large-scale farms. The policy is to organise the production chain vertically, integrating production, processing and marketing. In the past few years, ten large and 200 medium-sized agricultural production and processing companies have been set up. In this vertical chain, the intention is to increase the added value. On average, marketing and processing add 1.5 times the value to the original products. Marketing is mainly done by the 21 vegetable wholesale markets in Shanghai. In addition, there are 270 farmers’ organisations for vegetable transport and sale.

In Shanghai, the trend is moving towards specialised production systems in order to benefit from economies of scale and to increase production levels through increased specialisation. However, there are still small-scale household farms with mixed production of cereals, vegetables and animals. To support the process of specialisation, townships have established agricultural service groups that provide farmers and various managing organisations with pre-, mid- and post-production services.

Most of the tasks in urban agriculture, such as ploughing, irrigation, weeding and harvesting, have been mechanised, and computers are increasingly being used to monitor the production processes. The degree of mechanisation is relatively high, reducing labour requirements in agriculture. For example, yields per hectare of wheat and have rice increased 5-10%, while the labour productivity has doubled. Around 10,000 ha of land have been drained and 12,400 ha are now irrigated by a low-pressure pipe-irrigation system.

With an increased standard of living, questions are being raised in Shanghai as well, regarding the quality of agricultural products and the need to avoid crop contamination and environmental pollution by farming practices. The first solution is technical. Crops are grown in closed greenhouses in order to avoid uptake of pollution by the plants. Tests show that, in these greenhouses, crop contamination as well as indicators for pollution of soil, water and air are significantly lower than in open-land production. The second strategy is a move
towards organic farming. In Qianwei Village, for example, 67 ha of land are used for low-input vegetable production. All the organic waste of the production is used to produce bio-gas, reducing the use of non-renewable energy. All crop residues are composted and applied to the fields, reducing the need for chemical fertilisers. Biological methods are used to control weeds, pests and diseases. The third strategy is to plan sites for agricultural development in non-polluted areas far away from sources of pollution. An example of this is in Congming County, where the biggest green-food production base in Shanghai is currently being constructed.

3.1 Urban agriculture, recreation and environment

Urban agriculture plays a role in recreational activities. A popular Chinese activity is to visit parks and gardens. Every spring in Shanghai, hundreds of thousands of citizens visit agricultural areas for sightseeing purposes. Some entrepreneurs are actually considering building agricultural holiday resorts in the suburbs of Shanghai. Apart from individual sightseeing, several festivals are organised like the Peach Flower and the Osmanthus Flower Festivals. The function of these festivals is to advertise the products, to promote trade and to provide leisure to urban citizens.

Shanghai has limited green areas and boasts only 40 parks. The total available green space per person is 1.15 m$^2$, which is far below the Chinese average of 4 m$^2$, not to mention the world average of 50 m$^2$. To address this situation, among other things, the structure of the agricultural land is being adjusted without affecting its nature. Urban agriculture together with open green space management is to be included in the overall city development plans.

4. Constraints and outlook for urban agriculture

The main constraints to urban agriculture are the increasing pressure on land and the consequently dwindling land resources for agriculture. From 1978 to 1995, the available arable land in Shanghai decreased from 360,000 to 290,000 ha. From 1992 to 1994, the amount of arable land decreased by another 26,000 ha. However, since the Agricultural Protection Law in 1998, the loss of agricultural resources has been brought under control.
Other constraints include the relatively low income from agriculture and the relatively higher costs compared to other agricultural production areas, as well as the environmental problems of Shanghai. The strategy pursued for the development of urban agriculture is further mechanisation and technical innovation. For this, modern biological and information technologies must be applied.

The production should be market-oriented and should provide self-sufficiency to the suburbs around Shanghai as well as contributing to the provision of cereals and fresh food to the city. Increasing, importance should be attached to healthy and safe food. Ecological and cultural functions are supplementary to the economic development objectives.

1 Shanghai Modern Agriculture Development Company
References


