Changes in Medicinal Crop Production in the Urban Shadow of Beijing Metropolis under Agricultural Structure Adjustment: A Case Study of Zhengzhang Village, Hebei Province, China

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Abstract: The purpose of this study was to clarify changes in agricultural production, especially medicinal crop production in Zhengzhang Village, located in the urban shadow of Beijing Metropolis under agricultural structure adjustment. In addition, an analysis is carried out of the reasons that have caused these changes. Through this study, prospects of the developmental trends of agricultural production and farm management in farm households in the urban shadow of Beijing Metropolis are discussed. The P. R. of China (China) started to implement agricultural structure adjustment in 1999. Especially, to face the effects brought by China's entry to the WTO, the Chinese government strengthened the quality control of some agricultural products, which constitute part of China's agricultural structure adjustment. Zhengzhang Village has a tradition of medicinal crop production. Since the introduction of the Reform and Opening Policy, in order to gain more income, farm households have actively developed the business of cultivating and processing medicinal crops. But since 1999, due to the lack of capital to improve processing circumstances, some farm households had to abandon the medicinal crop processing business. Almost simultaneously, some farm households short of agricultural labor abandoned medicinal crop cultivation and transferred to food crop cultivation which provided low but stable income. As a result, in Zhengzhang Village under agricultural structure adjustment, medicinal crop production is diminishing, and income polarization among farm households is becoming obvious. These changes can be mainly attributed to government policy adjustments. Other factors, such as market force, social situation and globalization, also played important roles. This study carried out a detailed field survey of land use and farm management in farm households.

Key words: agricultural structure adjustment, urban shadow of Beijing Metropolis, profitability of agriculture, medicinal crops, Zhengzhang Village

Introduction

Previous studies and purpose of this study

In 1978, China adopted its Reform and Opening Policy, thus realizing economic development and social progress in some areas. However, peasants' incomes were still low and there was a substantial gap between the incomes of urban and rural residents. After China's entry to the WTO, with the increasing importance of agricultural products of high quality and low price, the domestic agricultural industry was affected to some extent.

Many studies have been carried out on agriculture and rural areas in China (e.g., He 2000; Jiang 2001; Xu et al. 2002). But these studies were carried out from the standpoint of national administration which focused on industrial structure and gross agricultural production. Sensitivity was weaker in those areas that can be considered much closer to peasants' lives, such as the form and profitability of agricultural management. In Japan, some researches were carried out on the topic of the Chinese agricultural structure adjustment. For instance, concerning Sichuan Province in South-West China, Inamura et al. (2004) pointed out that in China, large-scale agricultural production focusing on commercial crops were appearing due to urban infrastructure development. Focusing on the analysis of the changes in peasants' incomes, Sato
(1998) researched regions in Eastern China such as Shandong Province and Anhui Province through field surveys. The income structure was analyzed and it was concluded that a certain amount of non-agricultural business played a decisive role in a household’s income. Concentrating on North-East China as a main production area for food crops, Motoki (2005) analyzed the changes in land use, especially the development potential of food crop production.

In Northern China, where Beijing (the capital city) and Tianjin (an important commercial city) are located, the central government’s policy was accomplished quickly. As for research on changes to urban fringe areas and urban shadow areas, reports are available as well. Wang (2000) proved that changes in inner fringe areas of Beijing City were not only caused by external factors such as policy adjustment, but also by internal reasons. Wang (2006) illustrated the relationship between resource use patterns and government policies in the rural area of Beijing City from the viewpoint of political ecology in China’s economic growth. But these two studies both analyzed external affects brought to rural areas by modifications in government policies. What were lacking were other important factors such as the market economy and the globalization process. Based on investigations to Luquan County which is located in the urban shadow of Beijing Metropolis, Imamura et al. (2004) described in detail the actual situations caused by the diversification of agricultural production as well as agricultural structure adjustment. But it is difficult to find any detailed information or proper analysis from the standpoint of individual farm households in this research.

Up until now, only a few studies have been available concerning changes in medicinal crop or medicinal plant cultivation in the urban shadow of Beijing Metropolis. For instance, Yang (1987), Kou et al. (2002) and Zhao et al. (2002) all described the historical development of the production of medicinal crops in this area. Konoshima (1990) analyzed the distribution feature of medicinal plants from the viewpoint of regional geography. But all these studies did not do any analysis of the relationship between the changes in medicinal crop production and the regional economy.

In 1999, in order to establish a competitive agricultural industry and to increase peasants’ incomes, the Chinese government implemented its agricultural structure adjustment. Therefore, agricultural structure adjustment in agriculture industrialization and the commercialization of agricultural products were developed greatly in the urban shadow of Beijing Metropolis. Furthermore, after China’s entry to the WTO in 2001, rural areas were more and more affected by the globalization process. Through illustrating changes in medicinal crop production, including medicinal crop cultivation and processing in Zhengzhang Village, this study clarifies the developmental trends of agricultural production, including medicinal crop production in the urban shadow of Beijing Metropolis. The reasons causing the above changes are also discussed in this study. Because it is very difficult to collect statistical data at the local level in China, this study analyzes the changes in Zhengzhang Village based on field surveys.

**Agricultural structure adjustment and medicinal crop production in China**

Before 1978, peasants were engaged in agricultural production under compulsory requirements from the government. Since the Reform and Opening Policy of 1978, the Production Responsibility System, which paid more attention to productivity, was introduced to rural areas in China. The Production Responsibility System was, with the precondition that land was still owned by the collective, to divide and allocate land to peasants. The agricultural reforms gave peasants self-decision rights, which motivated their enthusiasm for agricultural production. With the popularity of irrigation technology and fertilization, agricultural productivity was greatly improved, which resulted in stable increases in incomes of rural residents (Figure 1). But in principle, development in rural areas is much slower than that in urban areas. After 1992, the Market Economic Systems were applied in China and the economic reforms expanded the market economy. The income difference rapidly became larger between the classes living in urban areas that could enjoy economic development and classes living in rural areas (Ministry of Economy, Trade and Industry, Japan 2003). In 2003,
the annual average Disposable Income of an urban residence was 3.5 times the annual Net Income of a rural residence (Figure 1). Problems of agriculture, rural areas and peasants have become the most important task facing the Chinese government.

One of the reasons why peasants’ incomes were restrained was the change in supply and demand for agricultural products. For a long period before 1999, the Chinese government kept motivating peasants to produce food crops such as rice, wheat and corn. Therefore, the planted area of food crops prevailed in the total planted area of crops (Figure 2). From the China Agriculture Yearbook 2000, it was found that annual food crop production during the period of 1996 to 1999 exceeded 0.5 billion tons. In other words, average production per person exceeded 400 kg. Agricultural products such as food crops were over-supplied, and so the market became favorable for the buyers (Zhu 1999). To cope with this situation, the Conference of Central
Committee Chinese Communist Party on Rural Affairs was held in 1998 and new guidelines were adopted on strategic adjustments to the agricultural structure. The key policy of taking yield increase as the first priority since the establishment of China in 1949 was adjusted. Targets became multiple: not only was a stable production of agricultural products including food crops pursued, but also rational distribution of crops and type choices were inspired through using regional advantages (Yan 2004).

The agricultural structure adjustment adopted after 1999 was mainly focused on increasing peasants’ incomes. Thus, the reorganization of regional agriculture was introduced to improve profitability. In urban inner fringe areas, the land that had been cultivated with food crops was exchanged for more profitable horticulture such as vegetables and flowers (Wang 2000, 2006). In urban shadow areas, based on the Regulation on Protection to Basic Farmland, farmland was strictly prohibited to be used for commercial or industrial purposes. The central government could, through the stabilization of the producer price of food crops, protect the enthusiasm of peasants’ production and maintain the stability of food crop production. In addition, peasants were allowed to cultivate suitable high-profit oil crops, fruits, and medicinal crops after consideration of the regional natural and geographical conditions, history and technical advantages.

As raw material for crude drugs, medicinal crops have a long cultivation history in China (Konoshima 1990). From 1954 to 1984, sales of medicinal crops were monopolized by the government, so the cultivation and trade of medicinal crops was under government’s strict control. The monopoly system was revoked in 1984, after the cultivation of medicinal crops as a type of commercial crop was greatly expanded in rural areas. Planted area of medicinal crops in China in 2003 was 1,284,000 hectares, which was an increase of more than 50% from 2000 (Ministry of Agriculture, China 2004). The increase in planted area can be mainly attributed to the higher profits brought by medicinal crop cultivation compared to food crop production. Figure 3 compares the average gross profits per hectare of medicinal crops with food crops such as corn and wheat. Since 1984, with the loosened control in trade of medicinal crops, the supply-demand relationship became the main factor affecting the crude drug market. Especially, after the Market Economic System was applied in 1992, the price of medicinal crops used to have frequent significant fluctuations. As a result, gross profits from medicinal crop cultivation would frequently and unavoidably fluctuate. In any case, the minimum gross profit from medicinal crops is 2 to 3 times that of food crops, and sometimes it can even be as high as 10 times (Figure 3).

In its effort to entry to the WTO, China was challenged in its production of crops of higher quality and safety. It became an important task in the agricultural structure adjustment to improve the quality of agricultural products and to establish a globally competitive agricultural industry. The Chinese government promulgated laws and regulations that covered cultivation, processing and the trade of agricultural products. For instance, some laws and regulations promulgated after 1999 are related to medicinal crops such as Good Manufacture Practices for Drugs (GMP), Good Supply Practice for Drugs (GSP) and Good Manufacture Practices for Chinese Crude Drugs Production (GAP).

The study area, Zhengzhang Village, is located in Anguo City, Hebei Province. Anguo City possesses the longest cultivation history and largest planted area for medicinal crops in the urban shadow of Beijing Metropolis, while Zhengzhang Village is one of the villages having the highest yields of medicinal crops in Anguo City. In addition, with strengthened quality control from the government, some GAP cultivation zones were appointed in Zhengzhang Village, with the application of fertilizer or pesticide strictly restricted (Anguo City Agriculture Bureau 2002). Therefore, it is possible to reflect the developmental trends of medicinal crop production in the urban shadow of Beijing Metropolis by illustrating the changes in medicinal crop production in Zhengzhang Village.

The Study Area

Zhengzhang Village is at a distance of 250 km from both Beijing and Tianjin (Figure 4). The climate of Zhengzhang Village is characterized by
high temperatures and humidity in summer and low temperatures and dryness in winter. Its annual average temperature is 12–13°C, and rainfall concentrates in July and August (Baoding Weather Bureau 2005). In April 2005, there were 997 farm households with a total of 3,990 people in the village.

The area of the village was around 347.4 hectares, and its arable land around 312.7 hectares, which was 90% of the total area of the village. In 1999, with the effectiveness of the Regulation on Protection to Basic Farmland, arable land in the village was subdivided into Basic Farmland and Normal Farmland. As Zhengzhang Village belongs to a rural area, the minimum percentage of 95% of Basic Farmland is requested by the government (Figure 4). This is higher than the national average of 80%. Farm households are dense in the south-east part (Densely Settled Area), where Villagers’ Committee, school and markets are also located.

In the southern part of the Densely Settled Area, there still exist some private plots, which were historically called Zi Liu Di (Figure 4). From the 1950’s to mid-80’s, influenced by the Peoples Commune Movement, the agricultural system featured collective production. Zhengzhang Village, as a member of the Zhengzhang Production Brigade, changed all its arable land to be collective-owned (Anguoshi Di-fangzhi Bianzuan Weiyuanhui 1996: 231–233). From 1959 to 1961, due to natural disasters, China was seriously affected by food shortages. Therefore in 1962, the Chinese Communist Party put forward the Working Guideline for Peoples Communes in Rural Areas (60 Items). Based on the 60 Items, a very small amount of arable land, still owned by the collective, was allocated to farm households as private plots. Peasants were permitted to cultivate at their own discretion on these private plots (Chen et al. 1991).

It is shown by the survey that in 1960, some collective-owned arable land near the Densely Settled Area was appointed as private plots. On average, each household obtained 0.013 hectare of land, so vegetables could be planted to cope with food shortages. In 1979, with the adoption of the Production Responsibility System in Zhengzhang Village, the right to use most collective-owned arable land was transferred to peasants without regard to sex or age. As usage rights had been transferred to peasants, the land
was considered as individual land instead of rented arable land. On such individual land, farm households could make their own choices concerning production management. By the end of 2005, each peasant obtained an average of 0.087 hectare of arable land.

### Agricultural Production and Farm Management in Zhengzhang Village

#### Agricultural production and land use

At present, agricultural production in Zhengzhang Village focuses on food crops and medicinal crops. Other crops such as vegetables or peanuts are planted in small amounts merely to meet household consumption. Figure 5 shows the agricultural calendar in Zhengzhang Village.
Normally, farm households start cultivating "spring planted medicinal crops" in early April. Specifically, in Zhengzhang Village, about 40 types of medicinal crops such as Danshen (*Salvia Miltiorrhiza Bunge*), Ziwan (*Aster tataricus L.* f.), Shanyao (*Dioscoreae Rhizoma*), Shashen, Baizhu and Fangfeng, etc. are cultivated. The sowing of corn begins one to two months later than that of "spring planted medicinal crops". In Zhengzhang Village, there are two methods for corn cultivation. One is to sow after harvesting the winter wheat in June, which is called the "summer corn" cultivation method. The other, introduced after 1990, is to sow among intrarow spacing of the winter wheat in May. In this way, winter wheat can improve its ability to resist wind. As the corn can be sowed one month earlier than traditional "summer corn", this new method is called the "spring corn" cultivation method. June is the sowing season for "summer planted medicinal crops" such as Niuxi and Dihuang (*Rehmanniae Radix*). From September 20th, for an entire month, is the harvesting season for corn and the sowing season for winter wheat. Most medicinal crops are perennial crops, and most of them are harvested in September, regardless of whether or not they are "spring planted medicinal crops" or "summer planted medicinal crops". Sometimes, to deal with market price fluctuation, the harvest time for some medicinal crops may be shifted. Occasionally, the harvest of medicinal crops is postponed for seed production purposes.

The field survey was carried out in early May 2005 on the land use situation in Zhengzhang Village and a Land Use Map was prepared accordingly (Figure 6). Most of the arable land is cultivated with wheat, which accounts for 83.0% of the investigated area (calculation from Figure 6). There is plenty of wheat in the northern part of the Densely Settled Area. Historically, the cultivation of wheat in Zhengzhang was accomplished manually with only the help of a few implements. Recently, to increase efficiency, some farm households started using combines to sow and harvest. Farm households voluntarily merged blocks of wheat land to make better use of mechanization. Thus, working efficiency was greatly improved.

After wheat, medicinal crops were the most cultivated plants, accounting for 12.4% (calculation from Figure 6). Compared with food crops, medicinal crops need frequent management and are mainly cared for manually, due to the lack of specialized machinery. Therefore they are mainly cultivated near the Densely Settled Area or the roadside where transport is convenient. In the investigated area, there is also some unused land. Such land, according to farm households, is either post-harvest or pre-cultivation land for medicinal crops. As the market prices of some medicinal crop types chosen by farm households fluctuate greatly, it is normal to postpone sowing medicinal crops in some areas. After harvest, to meet market demands it is also normal to do specialized processing of medicinal crops before selling them. Some experienced farm households even try to increase profits by adjusting the growth cycles of medicinal crops.

In the Village, some saplings were planted (Figure 6). It was shown through the field survey that the market price of saplings increased
with the sponsorship of a nationwide Afforestation Movement in 1995 for the purpose of environmental protection. Therefore, some farm households started planting saplings on arable land. But these planting efforts in Northern China caused an oversupply of saplings. Because saplings could not be sold, some farm households had to replace them with crops. Some saplings were left by households trying to cut costs and hold out for a rise in prices.

In the southern part of the Densely Settled Area, there remained some private plots (Figure 6). Before the adoption of the Production Responsibility System, arable land was divided into different blocks by levees and was allocated to collectives of farm households. The blocks were then subdivided into sub-blocks and allocated to farm households. Figure 7 shows the current land use situation in one block as an example. Sub-blocks are about 30 to 60 m² on average, which is too small for machine operation. Since the land is close to the Densely Settled Area, it
is mainly cultivated with vegetables and medicinal crops for seed production purposes. The roadsides are planted with low-value products such as pulses or potatoes to discourage trespassing by passers-by.

Based on the field survey carried out on land use, it was discovered that the planted area of wheat is 6.7 times that of medicinal crops (calculation from Figure 6). It is also known that from mid-May until the last 10 days of June, the post-harvest wheat land is used for the cultivation of corn and peanuts. In summary, the prevalent use of planted land for food crops is obvious in Zhengzhang Village.

Farm management in farm households

To know the actual situation of farm management in Zhengzhang Village, a field survey was carried out in 25 farm households. Based on the information obtained from the Villagers’ Committee about the situation of farm households, the field survey both considered diversification of the types of farm management and the differentiation of production scales.

From the viewpoint of types of farm management, these 25 farm households are classified as cultivation type (households No. 1 to 20 in Figure 8) and mixture type (households No. 21 to 25 in Figure 8). Mixture type households refer to households that engage in both cultivation and processing. The basic feature of a cultivation type household is food crops and medicinal crops. Usually, one year is divided into two periods, the first from the beginning of summer to autumn, which will involve the cultivation of corn and medicinal crops, and the other from autumn to the following summer, which will involve the cultivation of wheat and medicinal crops. The planting of vegetables is only for household consumption in small amounts and is diversified. Peanut planting, as well, is done only for household consumption of oil.

There are altogether five mixture type households among all households under survey. All of these five are processing traditional medicinal crops such as Huangqi (Astragali Radix), Fangfeng and Shashen. Household No. 22 has long term cultivation cooperation with partners from both Gansu and Shandong Provinces, where 33.5 hectares of land is cultivated with medicinal crops for sale. It also rents the abandoned Huangqi exchange market as a workshop for processing. Household No. 21 rents a crop warehouse in the village for use as a processing workshop during the non-busy farming seasons. Workers hired by households No. 21 and 22 all come from Zhengzhang Village. The hired laborers are about 40 (household No. 21) or 60 (household No. 22) in number. The salaries of workers are determined by their job description and personal experience. The average salary is 15–20 Yuan/day for male workers and 12–15 Yuan/day for female workers. Households No. 23, 24 and 25 mainly do the processing at home, and laborers come from inside the households.

In terms of agricultural labor resources, the problem of young male labor shortage exists in 25 farm households. Since 1985, the Family Registry System that used to restrict population flow was loosened in order to allow the economic development of rural areas and to increase peasants’ incomes. Thus, it created the possibility for
### Changes in Medicinal Crop Production in the Urban Shadow

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Figure 8. Current situation of Zhengzhang Village in connection with farm management (May 2005).

Notes:
1. Agricultural laborer: ● Young male laborer; ○ Young female laborer; ▲ Δ Older than 60 years old.
2. Rent: – Land lent to others; + Land rented from others.
3. Household incomes does not include non-agricultural incomes.
Source: Field survey made in May 2005.
agricultural laborers to flow into urban industry. This phenomenon of the drain in agricultural labor is also obvious in Zhengzhang Village. Among the 25 farm households, with the exception of No. 21, 22 and 25, all households possess non-agricultural laborers. As most non-agricultural laborers are young males, within the investigated 25 farm households, there were 92 regular agricultural laborers in total, among whom 69 were female or older than 60 years old (Figure 8).

The problem of the shortage of young male laborer in cultivation type households is more serious than that in mixture type households (Figure 8). Of course, some mixture type households such as No. 21 and 22 also have an agricultural labor force shortage, but hiring workers can solve this problem. In some households with an abundant labor force, there is the potential of expanding the planted area of medicinal crops. For instance, Households No. 16, 19, 20 and 25 are doing crops cultivation both on their individual land and land rented from other households in the village. To be specific, No. 16 is managing an orchard while the other 3 households are cultivating medicinal crops. Normally, renting land is done through oral contract, and the lessee is liable for the payment of the agricultural tax for the lessor. Currently, the agriculture tax in Zhengzhang Village is about 630 Yuan per hectare of land. Some households seriously short of young male laborers can only carry out food crop cultivation. Households No. 1, 2 and 21 even used to rent out their individual land to others as they were short of agricultural labor.

Figure 9 shows the planted area and types of medicinal crops cultivated by 25 farm households; 23 of them are cultivating medicinal crops,
especially Shashen, Fangfeng, Danshen, Shanyao and Baizhi. Due to a serious fluctuation in the market price of medicinal crops, some large-scale production households such as No. 20 and 25 are doing multi-type cultivation to minimize market risk. On the other hand, among small-scale production households such as No. 1–10, most of them are cultivating Shashen and Shanyao. This is because Shashen can bring a more stable income compared to other medicinal crops (Figure 3). And Shanyao can be used for household consumption in the event of a failure to sell in the market.

There exist big income differences among the 25 farm households, especially the differences between cultivation type households and mixture type households. From the above analysis, it can be concluded that medicinal crop processing can bring a high income to farm households. And because of the higher profits brought by medicinal crop cultivation compared to food crop cultivation, among cultivation type households, households that have a larger planted area of medicinal crops have higher incomes.

Changes in Medicinal Crop Production in Zhengzhang Village

It was shown from the field survey carried out in May 2005 that there were about 50 types of medicinal crops being cultivated in Zhengzhang Village. The top 10 crops in terms of planted area are Shashen, Danshen, Fangfeng, Shanyao, Baizhu, Ziwan, Niuxi and Baizhi, Gualou and Jiegeng (Schizonepetae Herbal). It is also known that the sowing season of medicinal crops can be classified into a season for "spring planted medicinal crops" and a season for "summer planted medicinal crops". The sowing season of "spring planted medicinal crops" such as Shashen and Fangfeng is April to May. The sowing season of "summer planted medicinal crops" such as Niuxi and Dihuang is June (Figure 5).

In Zhengzhang Village, the planted area of "spring planted medicinal crops" is larger than that of "summer planted medicinal crops". This is because the sowing season of "summer planted medicinal crops" is concurrent with the harvesting season of wheat. It is very difficult to arrange basic management in the initial stage of "summer planted medicinal crops" during the busy farming season for food crops.

Medicinal crop cultivation in Zhengzhang Village started before 1949. After 1958, it gradually declined due to the Peoples Commune Movement. Since 1978, a series of reforms have been adopted to loosen government controls on cultivation, processing and trade of crops, and to encourage farm households towards free agricultural production.

The cultivation of medicinal crops in Zhengzhang Village restarted with the cultivation of Huangqi in the early 1980's. Most of the land in the village is sandy loam with good drainage and abundant organic material, suitable for Huangqi cultivation. Many farm households accumulated experience in the cultivation of Huangqi. Anguo City, where Zhengzhang Village is located, is well known for Huangqi production. Its production accounts for 25% of the national total production in China (Anguo City Agriculture Bureau 2002). As Huangqi is widely used as crude drugs, its price is high and stable in the market.

From 1980, Huangqi production became the priority of agricultural production in Zhengzhang Village. In 1984, Huangqi cultivated in Zhengzhang Village was honored as the Excellent Agriculture Product by Hebei Provinicial government. In the same year, the biggest Huangqi exchange market in Hebei Province was constructed (Baoding City Peoples Government 2003: 26). This Huangqi exchange market attracted producers and brokers from Anguo City, Northern China and other areas of China. In 1990, the planted area of Huangqi was about 133.3 hectares. This was more than 90% of the total planted area of medicinal crops (148.1 hectares) in the village (Figure 10).

Since 1995, the problem of Replant Failure has become obvious. It is normally understood that two reasons might cause Replant Failure. One reason is the accumulation of a pathogenic fungus which ultimately causes deterioration in soil fertility. The other reason is the lack of trace elements which reduces the disease-resistance of Huangqi (Yang 1987: 93). To solve this problem, the concept of crop rotation between Huangqi and other crops as well as the application of soil antiseptics were introduced. As it takes at least
eight years for soil to totally recover from Replant Failure, it was costly to use antiseptics for soil sterilization. Huangqi cultivation was completely suspended in Zhengzhang Village in 2000 (Figure 10).

In 1999, with the introduction of the agricultural structure adjustment concept in China, medicinal crop cultivation was a preferred method in Zhengzhang Village to increase income. Therefore, when Replant Failure of Huangqi became a serious problem, government supervision encouraged farm households to replace Huangqi cultivation with other medicinal crops. Consequently, a greater variety of medicinal crops were cultivated in Zhengzhang Village. In 2000, the planted area of medicinal crops was more than 130 hectares in the village. But by 2005, when the field survey was carried out for this study, the planted area had decreased to less than 50 hectares (Figure 10). Through the field survey, two reasons were recognized as causing reduction in medicinal crop cultivation.

The first reason is related to the agricultural labor force. The cultivation of medicinal crops needs more agricultural labor force than the cultivation of food crops. Figure 11 shows labor consumption of each 0.1 hectare of land over a period of ten days. The land is cultivated respectively by Shashen, winter wheat and corn. Usually, May 1st–10th is the sowing time of Shashen. But preparations such as land choice, tillage and fertilization have to be started from October the year before. Six months after the sowing in May, in November, saplings of Shashen are dug out and buried in sand. Then in March of the following year, the buried saplings are re-planted, and harvest will take place six months later. In total, it takes 23 or 24 months from preparation for cultivation until the final harvest of Shashen. Within the same time period, wheat and corn can be harvested twice respectively through crop rotation. Most of the work involved during Shashen cultivation has to be accomplished manually. In addition, peeling and washing processes are needed before Shashen can be sold in the market. Therefore, the labor consumption for Shashen cultivation for each 0.1 hectare is three times the labor consumption for the crop rotation of wheat and corn (Figure 11).

Due to the flow of agricultural labor to urban industries, some farm households were short of young male laborers. Especially in 2002, with the promulgation of the GAP by the State Food and Drug Administration, some GAP cultivation zones were appointed in Zhengzhang Village, where fertilizer and pesticide application was restricted. As medicinal crop cultivation is more labor-consuming, some farm households short of agricultural labor force had to abandon medicinal crop cultivation.

The second reason is related to the market prices of medicinal crops and the producer price of food crops. In 2002, Severe Acute Respiratory Syndrome (SARS) spread quickly in China. A lack of an effective SARS antibiotic caused all the crude drugs12 that were considered to give some resistance to SARS to become popular. Considering the market demand and rising prices, some farm households in Zhengzhang Village expanded their cultivation of medicinal crops in 2003. But SARS was effectively brought under control in the latter half of 2003. Thus, crude drug demand dropped back to a normal level, which led to an oversupply in medicinal crops as raw material. The market price of medicinal crops kept dropping from mid-2003 to mid-2004 (Liu 2005). In Zhengzhang Village, as medicinal crops failed to sell in the market, many farm households suffered large economic losses. Simultaneously, the producer price of food crops rose due to the involvement of the government.

During the process of the agricultural structure adjustment, peasants were encouraged to cultivate crops that were more profitable. Some
Figure 11. Comparison of labor time for Shashen, winter wheat and corn (0.1 hectare).
Source: Field survey made in May 2005.
peasants reduced the planted area of food crops because of the low producer price. Consequently, the planted area of food crops kept dropping after 1999 (Figure 2). To motivate food crop production, the central government adopted some policies from 2002 to increase producer prices. From October 2003, in Anguo City where Zhengzhang Village is located, farm households cultivating food crops, such as wheat or corn, could get 210 Yuan per hectare from the government (Anguo City Agriculture Bureau 2005). As a result, more and more farm households in Zhengzhang Village voluntarily reduced medicinal crop cultivation and replaced them with food crops.

In Zhengzhang Village, changes also occurred in the processing business of medicinal crops. It was learned from the Villagers’ Committee that by the end of the 1990’s, 70% of farm households in Zhengzhang Village were carrying out medicinal crop processing. In 2003, based on international standards, the Administration of Anguo City adopted an approval and examination system to regulate the medicinal crop processing. The target of this system was to maintain global competence in locally processed medicinal crops. All farm households carrying out medicinal crop processing must meet the compulsory requirements set by this system, which is referred to as GMP of Anguo City. GMP of Anguo City is very strict in all aspects. For instance, producers are required to have a university education and be able to pass a health examination. Conditions for processing workshops are also required, such as air ventilation, humidity control, sterilization of processing equipment, etc. (Anguo City Drug Administration 2003). The problem in Zhengzhang Village is that most farm households carrying out medicinal crop processing do not have enough capital to improve the conditions of production or to hire professional labor. From 2003, more and more farm households had to give up the medicinal crop processing business.

Among the 25 farm households surveyed in Zhengzhang Village, except for No. 3, 10 and 17, all cultivation type households were carrying out medicinal crop processing prior to 2003. They had to give up the processing business because they could not reach the standard set by GMP of Anguo City. But households No. 21 and 22, with the support of enough capital, managed to maintain a processing business through the improvement of production conditions. By 2005, around 40 farm households managed to maintain processing businesses in Zhengzhang Village, which is less than 10% of the number in 2000. Being affected by the globalization process, the government is strengthening quality control of medicinal crop processing, and it is therefore very difficult for households being short of capital to squeeze into the processing market.

**Conclusion**

The aim of this study was to clarify the developmental trends in agricultural production, in particular that of medicinal crops, in the urban shadow of Beijing Metropolis. Analysis was also made of the changes in medicinal crop production in Zhengzhang Village under the agricultural structure adjustment.

Since the Reform and Opening Policy, agricultural policies focusing on food crop production were loosened. In the urban fringe of Beijing Metropolis, affected by rural urbanization and commercialization, farmland was often ruined or diversified for other uses. At the same time, commercial crops were gradually replacing food crops (Wang 2000). In urban shadow areas, such as Zhengzhang Village, where this research was carried out, profitable commercial crop cultivation such as medicinal crops was operating on a large-scale. At the same time, the processing of these crops was becoming a high added-value business. In Zhengzhang Village there appeared to be a large number of mixture type households, involved in both the cultivation and processing of medicinal crops.

The government’s agricultural structural adjustment of 1999, which strengthened quality control, meant that most farm households in Zhengzhang Village had to abandon the medicinal crop processing business. Only a few farm households, with sufficient capital, managed to continue in the processing business. The result has been a huge increase in the cultivation type households and a very small number of mixture type households. Simultaneously, a reduction of households involved in medicinal crop cultivation also appeared. A polarization of the production
Changes in Medicinal Crop Production in the Urban Shadow

Differentiation of farm households

Due to capital shortage

Mixture type households: With sufficient capital, maintaining processing business.

Cultivation type households: Cultivation focusing on medicinal crops

Since 1985

Drain of agricultural labor

Due to labor shortage

Since 2005

Controlled producer price of food crops

2003-2004

A weak market of medicinal crops

In order to obtain stable income

Due to labor shortage

Cultivation type households: With neither sufficient capital nor abundant labor, engaging in cultivation focusing on food crops.

Government policy

Market forces

Social situation

Globalization

Figure 12. Changes in medicinal crop production and related factors in Zhengzhang Village.

scale also appeared, which mainly existed between a few farm households with an abundant agricultural labor force and the majority of the other farm households short of labor force. Figure 12 shows the relationship between the changes in medicinal crop production in Zhengzhang Village and the related factors defined in this study.

The first factor playing a primary and direct role in the changes in Zhengzhang Village has been government policy, which has controlled the producer price of food crops and has strengthened quality control. Inevitably, most farm households had to abandon their main source of income, the processing business, under pressure from compulsory approval. The government had failed to consider the capital difficulties of these farm households. Though, clearly, the government was rightly concerned with complying with international standards of production in order for China to be able to compete with the agricultural products of the world, the effect of these regulations has been very severe on many farm households.

The second significant direct factor has been the changes in the social situation. Due to the large difference in wage levels between urban and rural areas there has been a huge flow of agricultural labor to urban industries. This has caused a shortage of the agricultural labor force, and with the deterioration of this shortage, more and more farm households had to give up cultivation of profitable medicinal crops. Therefore, the problem of the shortage of labor force became a bottleneck in increases of household incomes in Zhengzhang Village. This study strongly challenges the widely accepted common notion in China that a big-scale rural population is a bottleneck in China's agricultural development.

The third factor is the effect that market forces have had on agricultural products. As mentioned in this study, after weak market de-
mand after SARS was brought under control, farm households decreased their scale of the cultivation of medicinal crops. This fact demonstrates the influences on agricultural production by market forces in Zhengzhang Village.

The last factor that caused changes in medicinal crop production is globalization. This factor deserves special emphasis in this conclusion. In Zhengzhang Village there were a few farm households that sold medicinal crops to pharmaceutical companies in Japan and the Republic of Korea. From this point of view it can be said that international trade or globalization is occurring, though its influence on the community as a whole is very small. From another point of view, however, globalization is playing an important indirect role in Zhengzhang Village. After China’s entry to the WTO in 2001, the Chinese government was challenged by having to compete with high quality, safe foreign agricultural products. The Chinese government had to adjust its policies to maintain a competitive position in the world market for Chinese agricultural products. This series of new policies had a decisive influence on Zhengzhang Village. The effects of globalization in the rural coastal areas and in rural urban fringes are direct and easy to see. Though the effects on urban shadow areas, such as Zhengzhang Village, are less apparent, the indirect influences of globalization cannot be ignored.

Besides maintaining a competitive position for Chinese agricultural products in the world market, the other main target of the agricultural structure adjustment in China is to increase peasants’ incomes. From the country’s overall perspective, after 2000, agricultural incomes, which had been stagnant for some time, gradually rose (Figure 1). But this is not the picture for all rural areas of China. Specifically, for example, in Zhengzhang Village, only a small proportion of farm households have been able to maintain a continuous increase in income. These households are either carrying out large-scale medicinal crop cultivation with the support of an abundant agricultural labor force or are carrying out a processing business with the support of sufficient capital. Under the agricultural structure adjustment, the potential for even greater income polarization is becoming obvious.

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**Notes**

1. In this paper, three words with similar or close definitions are used. These are “medicinal crop”, “medicinal plant” and “crude drug”. “Medicinal plant” is a botanical term which refers to the plant growing in the wild. “Medicinal crop” refers to the same plant which has been cultivated. “Crude drug” refers to the medicinal crops or medicinal plants after they have been processed.


3. Disposable Income refers to the remaining household income after deductions of compulsory tax and social insurance. Net Income refers to the total value of household consumption (calculated in cash), agricultural reproduction and agricultural production expansion.

4. Effective from January 1, 1999, it is based on the Land Administration Law of the P.R.C., which was last amended in 1998. According to this Regulation, farmland is classified into Basic Farmland and Normal Farmland. It is strictly prohibited to develop “Basic Farmland” for commercial or industrial purposes. Restrictions to the development of Normal Farmland are not very strict.

5. GMP (effective from January 1999) provides compulsory guidelines for the processing of medicinal crops. GAP (effective from June 2002) strictly restricts the applications of pesticide or fertilizer during the cultivation of medicinal crops. GSP (effective from September 2000) aims at regulating and supervising the medicinal crops and crude drugs trade.

6. Refer to Note 4.
7. Villagers' Committee is an organization conducting administration of village affairs through election of village residents.

8. On November 3, 1962, The Chinese Communist Party promulgated Working Guideline for Peoples Communes in Rural Areas, which permitted the existence of "private plots". As it was made up of 60 items, historically this document is referred to as the 60 Items.


10. The Villagers' Committee stated that in 2005 there were more than 950 "cultivation type" households in Zhengzhang Village. There were around 40 "mixture type" households, which accounted for less than 5% of total households. Despite the low percentage of "mixture type" households, 5 households in this category (20% of chosen households) were chosen as samples in order to make clearer comparisons.

11. Huangqi is a major component of a traditional crude drug used for patients with abnormal sensations and neuropathic pain of the legs. Protein oxidative medication, made by boiling Huangqi and other medicinal plants in water in a copper pot, was shown to have an inhibitory effect on lipid peroxidation. The effects were similar to, or stronger than, those of mannitol and superoxide dismutase as free radical scavengers. The results also demonstrated that Huangqi has inhibitory effects on oxidative stress induced by mental stress (Wang and Zhang 1992: 97).

12. Crude drugs that are considered to have SARS resistance functions include Banlangen (Strobi-lantanthis Rhizoma et Radix), Jinyinhua (Lonicerae Flos), Jiegeng, Huangqi, Shashen, Fangfeng, Baizhu, etc.

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(J): written in Japanese

(JE): written in Japanese with English abstract

(C): written in Chinese