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Urban Agriculture: The Major Direction of Future Agricultural Development in Huainan City

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Abstract On the basis of introducing the concept of urban agriculture, this paper analyses the necessity of developing urban agriculture in Huainan City as follows: it is the need of transformation and upgrading of agricultural industry; it is the need of development of urban-rural integration; it is the need of sustainable urban development; it is the need of solving the issues concerning agriculture, countryside and farmers effectively. Then this paper analyses the endowment of developing urban agriculture in Huainan City. And finally the basic conception in industrial form and spatial framework is put forward, to develop urban agriculture in Huainan City.

Key words Urban agriculture, Industrial form, "One Cycle, Three Areas", Huainan City, China

The agriculture in Huainan City has a long history of development, and as a saying from time immemorial put it, "the places in two sides of the Huaihe River have seldom been paralleled". With entering the new era, in the context of accelerated adjustment of the regional economic structure, and continuous and high-frequency revolving of "two wheels"-industrialization and urbanization, Huainan City has been upgrading ideas, towards a more favorable direction. On the basis of the survey, as far as I am concerned, industrialization and urbanization should breach the shackles of conventional thinking, establish a new concept of agricultural development, and exploit the benefit-increase potential of agriculture, to promote farmers' income, rural development and social harmony, not at the cost of sacrificing or eliminating one industry. So To develop urban agriculture vigorously should become the main direction of future agricultural development in Huainan City.

1 The overview of urban agriculture

The urban agriculture, as an academic term, first appeared in the 1930s, and the concept of urban agriculture in a real sense, was advanced by the American economist in 1977[1]. Food and Agriculture Organization (of the United Nations) defines the concept of urban agriculture as the modern agriculture that uses the space in the city, including land, mountains, and water, to engage in farming, breeding industry and other economic activities, within the metropolis or around metropolitan area, in order to provide fresh agricultural products, ecology, tourism, and leisure products to the city. As can be seen from this definition, urban agriculture, in itself, is the modern agriculture integrating economic, social and ecological benefits, and indispensable part of healthy and sustainable development of the city, whose essence is "relying on city, serving city". It fully utilizes the agglomerating advantages of capital, technology, information and market. To take agricultural industry as basis, high technology as driving force, enterprise management as means, and take ecological green agriculture, tourism and leisure agriculture, the agriculture oriented for export and foreign exchange earnings and hi-tech modern agriculture as symbol, it provides green and healthy agricultural products and space for recuperation and multiplying to the city, and also adequate employment opportunities and solid ecological protection for local development, so as to promote increasing integration between agriculture and other industries, and mutually reinforcing between agriculture and urban development. From the relationship established between agriculture and the city, urban agriculture is significantly different from traditional agriculture and suburban agriculture. In the category of traditional agriculture, urban and rural areas are antithetic, and urban and rural areas have strict boundaries, competing for natural resources and the factors of productivity mutually; in the category of suburban agriculture, urban and rural areas are complementary, and the main function of rural areas is to protect the supply of life necessities to urban areas; in the category of urban agriculture, urban and rural areas are integrated, that is, urban areas need agriculture, agriculture relies on urban areas, and urban and rural areas are interactive, mutually reinforcing each other.

In foreign countries, the urban agriculture in Japan, the United States and some European countries has many characteristics. Among them, Japan orientates the urban agriculture in two aspects: "food" and "greenness". "Food" is to provide various fresh farm and sideline products for urban residents' life, and give play to the characteristic economic function of agriculture; "greenness" is to create green ecological environment for urban residents' survival needs, and give play to the public welfare function of maintaining ecological balance and disaster prevention, and there are mainly three development modes: sightseeing-based agriculture, facility-based agriculture and features-based agriculture (sightseeing-based agriculture is to set up vegetable plot, paddy field, fruit trees and wood-

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land, to attract tourists to visit and experience, whose essence is is a combination of agriculture and tourism; facility-based agriculture is to use modern technology and advanced agricultural technology, to produce pollution-free farm and sideline products throughout the year; features-based agriculture is to encourage powerful agricultural groups to establish Japan's unique production base of farm and sideline products, and carry out in-depth development, so as to form the characteristic industry with competitiveness in the international market). The presentation and practice of "urban agriculture" in China began in the early 1990s, and Beijing, Shanghai, Shenzhen, Chengdu, Hangzhou and other places are trailblazers. At present, with the accelerated pace of urbanization, most of China's cities are developing urban agriculture, and some cities have achieved significant results. Shanghai is the first in China to include "urban agriculture" into the planning of national economy and social development. As early as 1995, it took the lead to advance "change from the suburban agriculture to urban agriculture". Currently, urban agriculture in Shanghai, focusing on seedling project, greenhouse project, green project, biological vaccine and bio-pesticide project, has taken shape. The basic structure of it is "Three Circles" (inner circle, middle circle, outer circle), "Six Zones" (satellite city agricultural zone, island agricultural zone, *etc.*), "Ten Belts" (urban agriculture belt forming on both sides of expressway from downtown to 10 districts and counties). In 2006, Hangzhou City issued the opinions and supporting implementation measures of developing urban agriculture successively, and now when we come to Hangzhou suburbs or rural areas, it is not the grain in sight most, but scads of flower and nursery stock planting bases.

2 The necessity of developing urban agriculture in Huainan City

2.1 It is the need of transformation and upgrading of agricultural industry Relying on the city for development is a part of essence of urban agriculture. Supported by urban science and technology, human resources, capital, market, information, infrastructure, transportation and other elements, urban agriculture achieves professional, large-scale, and intensive management, integration of agricultural production and big market, close combination of small-scale production and socialized service system, and successful "marriage" of the traditional production methods and modern science and technology, so that the level of agricultural marketization and modernization, and overall efficiency are effectively improved.

As early as the 1990s, Huainan City launched the work of agricultural industrialization, and in 2008, it began to implement Agricultural Industrialization "712" Promotion Action Project, but the leading agricultural industrialized enterprises have small scale in general, with weak market competitiveness, and none of them gains output value exceeding 1 billion yuan, obviously at a disadvantage compared with the surrounding city. In addition, the agricultural research and development capability of Huainan City is relatively weak, for want of highly educated professional technical personnel and academic technology leaders. Although in recent years, it has made some achievements in the field of conventional breeding, it starts late in the field of biotechnology breeding, getting nowhere; the agricultural promotion system is not perfect, all counties and districts develop unevenly, and in a handful of places, the agricultural technology promotion institutions even do not work normally, and the role is difficult to play; the scale of farmer cooperatives is small, with insufficient driving ability, and yet there are no industrial cooperative associations covering whole city. In view of this, we urgently need the policy guidance, to accelerate the pace of comprehensive restructuring of agriculture, and boost agricultural industrial upgrading for the development of urban agriculture.

2.2 It is the need of development of urban-rural integration The urban agriculture is the industrial complex, with the functions of production, living and ecology, and the urban areas and rural areas benefit from each other, and exist in harmony; there are many parts of industrial chain, integrating production, learning and research, production, processing and sale, trade, industry and agriculture, tourism, shopping and entertainment; three industries in rural areas develop in balance. Thus, urban agriculture is both the major carrier for mutual penetration between urban and rural areas, and the industrial form of agriculture changing from production and processing of pure agricultural products to modern service industry. Urban-rural integration is one of important strategies in Huainan City, but limited by the historical conditions, coupled with deep-rooted dual structure of "city-industry, countryside-agriculture" that is long established, the situation of imbalanced relationship between industry and agriculture, imbalanced development of urban and rural areas has not yet been changed fundamentally, and the deep-seated contradiction impeding the development of agriculture and countryside in Huainan City still exists. In addition to urban expansion and mining subsidence, the space for agricultural development is increasingly squeezed, and the task of coordinating urban-rural development of Huainan City is onerous. From the change of Engel coefficient of urban and rural residents in the period 2005 – 2010, the richness and sense of happiness of rural residents in Huainan City is far less than that of urban residents, and there is a trend of volatility and expansion[2]. Through the development of urban agriculture to promote fusion of agriculture, the secondary industry and the tertiary industry, we can not only free the farmers from bondage of land, and exploit the value inherent in rural resources, but also change the dirty and messy appearance of countryside along with the development of agriculture-the development of urban agriculture is an effective way to enhance agricultural efficiency, and coordinate urban and rural development.

2.3 It is the need of sustainable urban development If it lacks the supporting agricultural space, the city's functional structure would be difficult to be improved. The urban agriculture is an important part of urban ecological system. On one hand, it provides wholesome farm and sideline agricultural products for the city, and forms point-shaped, flake-shaped, belt-shaped, circle-shaped and park-style green landscape in city or around city, to construct ecological barrier for the sus-

tainable development of cities, playing the important role in restoring urban ecological system and keeping urban ecological balance (through natural metabolism, the agriculture takes in, stores, purifies, degrades and absorbs the wastes and pollutants arising from human activities; on the other hand, it provides conditions for urban residents to enjoy the natural taste, experience the farming life, and acquire agricultural knowledge, so as to result in enormous value amplification effect, and promote the city's prosperity and sustainable development.

Huainan City is a typical resource-based city, with prominent simple industrial structure and insufficient security. Industry accounts for nearly 60% of GDP, the rate of contribution of which to the city's economic growth and fiscal revenue hovers around 60% to 70%. The industrial value-added of coal, and electricity industry, accounts for more than 80% of the industrial value-added of whole city. From the perspective of optimization of industrial structure in whole city, developing efficient and ecological urban agriculture comprehensively in the vast rural areas, is of great significance to changing the situation of city's economy relying on coal excessively. From the perspective of easing employment pressure in society, the urban agriculture has the characteristic of long industry chain, which can provide more employment opportunities than traditional agriculture. Development of urban agriculture can not only absorb the surplus rural labour force, so that migrant farmers are safe from the pain of "leaving one's native place against one's will", but also provide a large number of jobs for urban residents and alleviate social contradictions. It is estimated that by 2015, in Huainan City, the number of urban and rural workers will reach 1.7 million, and urban institutions, and individual and private economy can find a place for 0.8 million workers. The agricultural working population remains at 0.4 million year in and year out, with gap of 0.5 million. If the restructuring efforts in the agricultural industry are scanty, the future rural and urban employment pressure will be released intensively, and many ensuing social issues will limit the sustainable urban development. From the perspective of constructing resource-saving and environment-friendly city, there are no resources-saving and environmental friendly cities if without resources-saving and environmental friendly industries. All industrial forms in industrial system of urban agriculture have prominent resource-saving and environment-friendly characteristics, and vigorous development of urban agriculture will provide important industry support for building of resources-saving and environmental friendly cities. In addition, the farmland area per capita in Huainan City is only 0.047 hm^2, 0.02 hm^2 lower than that of whole province. Coupled with the impact of urban expansion and land subsidence, the reality of dwindling total area of farmland, and farmland area per capita, can not be avoided, so in this case, we should develop efficient, high value-added urban agriculture to achieve the maximum utility of limited agricultural resources.

2.4 It is the need of solving the issues concerning agriculture, countryside and farmers effectively The core of issues concerning agriculture, farmers and countryside is increasing the farmers' income, and the basis of farmers' income increase is agricultural development. The technology-intensive, capital-intensive, and labour-intensive urban agriculture has both the production benefit and service benefit, which can exploit the potential to the extreme for increasing agricultural efficiency, so as to further expand the space for increasing farmers' income, and promote the healthy development of the rural economy and society. In terms of constitution of total income of farmers in Huainan City in recent years, the wage income and household operating income are still the main sources of income of farmers in Huainan City. In the period 2005 – 2010, although the share of farmers' wage income in total income did not exceed the share of household operating income in total income, but the growth momentum was strong, with an annual rate of 16%, far higher than the growth rate of household operating income. Thus currently the income growth of farmers in Huainan City shows the following characteristics: the driving effect of wage income is prominent, and the role of household operating income gradually weakens. In other words, the contribution of the farmers' benefit obtained from the land to farmers' income growth is "shrinking" relatively, and the potential of land and other agricultural resources has not been effectively developed. The traditional pattern of agricultural development cannot adapt to the need of solving issues concerning agriculture, farmers and countryside, and building new socialist countryside, therefore we urgently need to develop urban agriculture to promote the comprehensive transformation of agricultural industry, and "rejuvenate" the land and other agricultural resources.

3 The endowment of developing urban agriculture in Huainan City

3.1 Internal endowment

3.1.1 It has immense space for development. The urban-rural distribution of Huainan City has prominent characteristics of "manypoints, long line, and wide range". The pattern of "big decentralization and small concentration", "one hundred miles of coal city and interweaved urban-rural areas", indeed restricts the exertion cluster effect of downtown. From another point of view, this pattern provides adequate and appropriate development space for urban agriculture. Meanwhile, the downtown, sub-centers of the city, and a large number of small towns and mining areas, will play the role of promoting the development of urban agriculture; river, lake, mountains and other resources in Huainan City are also important foundation for the development of urban agriculture.

3.1.2 It has high urbanization rate and industrialization rate. Currently, three indicators in Huainan City (the share of non-agricultural population in total population, the rate of industrialization, and the rate of urbanization) are all much higher than the provincial and national level. And the conditions of industry nurturing agriculture and city supporting rural areas have become ripe. On the one hand, the strong industrial base promotes the talent, technology, capital, management experience and other factors to flow between agriculture and industry; on the other hand, high urbanization rate provides sufficient demand space for urban agriculture that serves the city. According to estimate of the relevant departments, as of 2020, the total population in Huainan City will reach about 2.9 million, and

the urbanization rate will reach 80%. The urban population is 2.36 million, and the population in the central city is 1.65 million. We should use dynamic outlook to study and weigh the situation, and provide the supporting space of urban agriculture for the future Huainan City with high level of urbanization. It is both necessary and feasible.

3.1.3 It has certain policy initiative. In 2010, the total grain output in Huainan City was 1.391 million t, accounting for 4.5% of total grain output in whole province. The grain production in Huainan City has made contribution to food security of whole province, but it is not the key point within the province; for the grain production in Huainan City, the provincial government sets the guiding plan rather than mandatory plan (the target is 100 tons / year), and if it fails to reach the target, it will affect the annual evaluation score. From another perspective, the urban agriculture can promote the level of large-scale agriculture, facility-based agriculture and technology-based agriculture, and the space of "score increase" of evaluation provided will be greater than the value of "score decrease" caused by decline in the grain yield. Therefore, in terms of self-regulating of agricultural structure, Huainan City has the unique advantages compared to the surrounding cities.

3.1.4 It has good basis of modern agriculture. Huainan City always attaches importance to the adjustment of agricultural structure and the development of modern agriculture, laying good foundation for the development of urban agriculture. In 2005, it promulgated the development planning of five industries (high-quality grain, animal husbandry, bean products, fishery and vegetables) (2004 – 2007); in 2008, it launched agricultural industrialization "712" promotion action plan; in 2009, it formulated Several Opinions Concerning Improvement of Development of Modern Agriculture. In early 2010, the city certified 60 pollution-free agricultural products in total (accounting for 6.4% of the province), 52 kinds of green food (accounting for 5.5% of the province), 6 organic products and organically converted products (accounting for 5.0% of the province), and 13 agricultural products which obtain the title of "Famous Agricultural Products in Anhui Province"; it had 59 standardized agricultural demonstration zones (bases) above city-level, including 3 state-level standardized demonstration zones, 3 national raw material production bases of green food, 3 provincial-level standardized demonstration zones, 7 provincial-level standardized production bases and 43 city-level standardized demonstration zones; the transfer of rural land management right was accelerated and propelled, a total of five counties (districts) built land transfer market, and the transfer area in whole city reached 85000 acres, increasing by 73.4 % compared with that in 2008; the specialized agricultural cooperative organizations develop well (There were 236 farmer cooperatives registered in industrial and commercial bureau, increasing by 153 compared with those in the same period of 2008, an increase of 284.3%, and 4 farmer cooperatives were rated as advanced cooperatives across the province and provincial-level demonstration cooperatives).

3.2 External endowment

3.2.1 The advantage of "complementing" is prominent. In province, and especially Hefei Economic Zone and North Anhui, there are no districts and cities explicitly advancing the strategic vision of developing large-scale urban agriculture bases that can drive the development of the surrounding regions. In the region, the form of urban agriculture takes on dot-shaped distribution, and it mostly aims at general needs of local markets. The self-sufficiency ability of new and fine high-quality agricultural products is limited, and the rural tourism has not yet developed well. Huainan City is located in the middle of Anhui Province, connecting south and north, east and west, with prominent improvement of traffic conditions in recent years, thus the outstanding geographic location and transportation conditions pave the way for the comprehensive development of urban agriculture.

3.2.2 Its "orientation" is in line with planning. *Urban System Planning in Hefei Economic Zone* (2008 – 2020) clearly orientates the agricultural development within the region, that is, it should accelerate the development of urban agriculture, rely on the advantages of economy, technology, information and talents in the leading cities and central cities, and establish the multi-functional pattern of modern urban agriculture with prominent characteristics, which harmonizes with the development of industrialization and urbanization of Hefei Economic Zone[4]. *Demonstration Zone Planning of Undertaking Industrial Transfer in Wanjiang City* Belt approved by the State Council recently, also includes modern agriculture into six pillar industries in demonstration zone. Furthermore, Hefei Economic Zone marks out 4 ecological function zones (Changjiang – Huaihe hilly ecological zone, West Anhui mountain ecological zone, ecological zone of plain along the Yangtze River, and middle Huaihe River ecological zone, and the middle Huaihe River ecological zone is mainly located in Huainan City. The urban agriculture has efficient, water-saving, ecological, and environment-friendly features, in line with the planning of ecological protection region in economic zone.

3.2.3 The opportunity of "forestalling" is hardly available. According to the prediction of *Urban System Planning in Hefei Economic Zone* (2008 – 2020), by 2020, the total urban population in economic zone will reach about 15.8 million, with the level of urbanization of 65% – 68%; there will be one megacity (Hefei, 3.6 million population in downtown), an extra large city (Huainan City, 1.65 million population in downtown), two large cities (Chaohu and Lu'an, 0.6 million – 0.8 million downtown population), 20 medium-sized cities (Tongcheng, *etc.*, 0.35 million – 0.4 million downtown population; Shangpai and other 18 towns)[2]. The rapid elevation of urbanization level within the region in the future and surge in urban population, especially the downtown population, provide the great service space for the development of urban agriculture in Huainan City. If gaining the initiative by striking the first blow to form the brand advantage and generate cluster effect, it will be able to seize the high ground.

4 Basic conception in industrial form and spatial framework

4.1 Industrial level We will mainly develop 5 kinds of urban agriculture.

4.1.1 Product-based urban agriculture. It gives full play to the industrial economic function of urban agriculture, deepens the strategic adjustment of agricultural structure, promotes continuous upgrading of agricultural industry, and strives to improve

the added value of agricultural products, so as to achieve base breeding, standardization of production, enterprise management, industrialization development, and provide high-quality, green, fresh agricultural products in conjunction with flowers and seedlings for afforestation and beautification, to the local areas, the surrounding areas and even Yangtze River Delta cities.

4.1.2 Sightseeing-based urban agriculture. In the light of the urban residents' living need of being eager to experience the feeling in countryside in their spare time, sightseeing-based urban agriculture uses the advantages of urban agriculture, such as rich resources, greenness and healthiness, and low-cost consumption, integrating leisure vacation, enjoyment of natural scenery, and experiencing of farming, in order to attract urban residents inside and outside the city to experience rural life in holiday.

4.1.3 Popular-science-based urban agriculture. It aims to build the popular-science-oriented urban agriculture base with education of agricultural knowledge as the theme, so as to build a platform for the young people in cities having little knowledge of farming to learn knowledge about agriculture.

4.1.4 Landscape-based urban agriculture. We rationally use open agricultural space within the city, and integrate diverse cultural elements into Huainan City, to develop the landscape-based urban agriculture, such as public farm, forming unique urban style and features.

4.1.5 Processing-and-service-based urban agriculture. It extends agricultural industry chain taking market as orientation, vigorously develops seed breeding of agricultural products, deep processing of agricultural products, storage and transportation of agricultural products, and other industries, and exploits value-added potential of agriculture.

4.2 Spatial framework "One Cycle, Three Areas" is focused for urban agriculture.

4.2.1 "One Cycle": urban agriculture cycle in main city zone. Around urban center and Shannan District on the point of completion, it focuses on the construction of ecological barrier and the back garden of life in downtown, to develop sightseeing-based urban agriculture, extending to the northwest, to achieve integrated development with Bagongshan Beancurd Cultural Industry Park. It focuses on building of high-quality and high-yield vegetables and special mushroom industrial park, eastern farm-fun-style cultural park, Shannan strawberries, watermelon, flowers, nursery stock base, Wabu Lake eco-tourism, farming experience, popular science education base, and Bagongshan Beancurd Cultural Industry Park.

4.2.2 "Three Areas": Panfeng Urban Agriculture Area in sinking land above exhausted mines, processing-and-service-based Fengtai Urban Agriculture Area, sightseeing-and-leisure-based Maoji Urban Agriculture Area. Panfeng Urban Agriculture Area in sinking land above exhausted mines focuses on highlighting function of ecological conservation along with governance in subsidence area, emphasizes the development of aquaculture (Cultivating marine or freshwater food fish or shellfish, and aquatic vegetables, *etc.*), characteristic fruit trees and other industries, coupled with the development of agriculture, industry, tourism and other industries; processing-and-service-based Fengtai Urban Agriculture Area, relies on the local rich agricultural resources, takes the existing deep processing industry of agricultural products as basis, constructs large production base of high-quality agricultural products, and focuses on the development of efficient and ecological production, processing, transportation industry of fresh agricultural products; sightseeing-and-leisure-based Maoji Urban Agriculture Area is based on Jiaogang Lake Scenic Spot which is national 4A level scenic spot, to develop tourism industry of urban agriculture.

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establish the empirical database. At the same time, insurance companies should strengthen the actuarial technique, to make the agricultural risk predictable and measurable as far as possible.

(ii) Timely adjusting agricultural insurance premium rate. Agricultural insurance premium rate is usually adjusted by estimating the claim frequency and average claim amount. Due to changes in various conditions, the probability of occurrence of events is also changing. All of these lead to the inevitable deviation between actual experience and expected results. In addition, with the continuous promotion of agricultural insurance, increase in types of agricultural insurance and increase in the number of the insured, the premium rate should also be adjusted in real time, so that it is more reasonable.

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