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Challenges and Opportunities in Developing Beijing Modern Urban Agriculture

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Abstract We analyze development situations of Beijing modern urban agriculture from agricultural distribution, agricultural foundation and agricultural industrial system. Our research on challenges and opportunities of Beijing modern urban agriculture indicates that challenges include short of resources, deterioration of environment, and high production cost, and opportunities include large market space, advanced agricultural industrial experience and many other development opportunities. On the basis of these, we put forward development thought of Beijing modern urban agriculture in "the Twelfth Five Plan" period. We must improve foundation, integration and demonstration of agriculture; orient towards market and satisfy medium and high end market demands; actively cultivate and strengthen agricultural industrial level; create unique product brand; and raise added value of agricultural products.

Key words modern urban agriculture, Beijing, Development challenges and opportunities

modern urban agriculture has production, ecological and living production attributes. It is a type of agriculture many modern, industrialized and urbanized characteristics. Compared with other cities, Beijing's modern urban agriculture has a higher starting point. Regional distribution, production contents, mode of production, level of productivity and operating mechanism must satisfy demands of capital development. It is expected to form industrial system that has capital characteristics and functional features, and to bring into play its demonstration and driving action on agricultural construction in all parts of the country. The development exploration of Beijing modern urban agriculture has seen its initial success, and it has established urban agricultural corridor, and facility agriculture, seed agriculture, sightseeing agriculture, and other characteristic industries are rapidly developing. However, there are still many problems in the course of development of Beijing modern urban agriculture, such as shortage of natural resources, deterioration of environmental pollution, high production cost, low scientific and technological content of economic growth, difference between regional development level, as well as impact of financial crisis. Developing modern urban agriculture is a top priority of Beijing new socialist countryside construction in the 12th Five-Year Plan period, and it is a necessity for realizing urban and rural integrated development of Beijing, so it is of strategic significance^[1-4]. We try to explore Beijing modern urban agriculture suitable for new period, to promote its standardized, scientific and quality development, providing pioneering and demonstration experience for national agricultural modernization, so as to speed up integrated and coordinated development of urban and rural areas.

1 Development situations of Beijing modern urban agriculture

1.1 Industrial spatial distribution led by agricultural advantages has been formed According to the industrial distribution of five circles, Beijing's agricultural development has formed a basic frame of industrial spatial distribution led by agricultural advantages. All districts and counties develop on the basis of their regional advantages, and formed characteristic crop and economic bases, such as flower industry in Shunyi District, edible fungus in Fangshan District, watermelon and melon in Daxing District, and peaches in Pinggu District, their production has developed to certain scale and established brand awareness. The animal husbandry industry has gradually set up "three zones" and "multiple types and groups" of industrial pattern, and the aquaculture has established four functional zones.

1.2 The agricultural infrastructure construction is firmly pushed forward During the Eleventh-Five Year Plan period, the new socialist countryside construction made impressive progress in Beijing. Besides, the construction of rural infrastructure and public service facilities is further enhanced. What's more, Beijing has comprehensively promoted the new countryside "Five Infrastructure" and "Three Starting" projects. In 2006 to 2008, it completed safe drinking water project for totally 1.45 million farmers, which is two-year ahead of the goal of the Eleventh-Five Year Plan. Natural gas supply has been extended to such new districts as Huairou, Fangshan and Changping and central towns along the line. Biomass gasification and large-and-medium-sized biogas projects are carried out smoothly in Miyun, Huairou and Daxing Districts. Domestic rubbish in villages of plain areas is managed in a closed way.

1.3 Modern urban agricultural industrial system has been preliminarily set up Through constantly developing modern agricultural functions and actively exploring and making innovation in agricultural operating mode, the capital agriculture is

promoted to develop towards garden style in planting, scaled in distribution, characteristic in products, three-dimensional in production, and precise in management. At present, Beijing has preliminarily established the modern urban agricultural industrial system, which integrates modern urban planting industry oriented towards building strategic brand; fruit tree industry with regional characteristics and advantages; scaled, standardized and recreational modern urban cultivation industry; cluster modern urban processing industry with high technology and benefit; modern urban rural tourism industry combining entertainment, education and recreation. It is shown that the modern urban agriculture develops constantly, high-end agricultural products emerge in large numbers, and the trend of industrial integration is obvious.

1.4 Advantages of seed agriculture are gradually formed

Beijing has become the largest seed transaction and trade center in China, and also the national scientific and technological center for seed production, gathering the most powerful seed scientific research institutions, education institutions, and breeding organizations. In the mean time, Beijing is the place issuing national authoritative seed information. The annual Beijing's Seed Trade Fair is not only a transaction place of seed, but also an important information collection and exchange place for seed market. Besides, it has established a network for experiment and demonstration of "10 + 1" crops. In the management of crop types, Beijing implements strict new type test, pilot, assessment and popularization procedures, and arranges pilot test for over 400 new types annually.

1.5 Equalization of basic public service is preliminarily achieved in urban and rural areas

In 2009, Beijing continued to increase investment in suburbs, fixed capital investment of municipal government arranged for suburbs and urban areas is 51:49. The proportion of investment in suburbs exceeds 50% for five consecutive years. To actively promote equalization of urban and rural basic public services, Beijing has set up working platform for construction of rural social public service system. In addition, it has established equalization system of urban and rural basic public service, and carried out such livelihood projects as medical treatment, pension, minimum living allowance system, employment, education, culture and postal service, *etc.* Besides, the infrastructure construction, including Rail Transit, water, electricity, gas, and network communication, has gradually extended to rural areas, making farmers enjoy more and more reform and development achievements.

2 Challenges in developing Beijing modern urban agriculture

2.1 Shortage of land and water resources In Beijing, the land is mainly agricultural land, but the construction land takes up a larger proportion, showing land use characteristic of metropolis. Beijing is large in area, but 62% is mountain area. What's worse, industrial structure adjustment and urban construction cover more and more lands, reduction of arable land is quickening, and most of lost lands are those that have good water and heat conditions. Consequently, reserve lands are in

serious shortage and there are few unused lands, which are hard to develop and utilization. The rapid industrialization and urbanization will make the limited agricultural natural resources increasingly intense. Due to overlift of underground water for successive years in Beijing, the water level gradually drops, some rivers dry for a long time, and agricultural water has great limit. Since water resources are scarce and return rate of agricultural water is low, the first industry of controlling water in Beijing is agriculture.

2.2 Severity of environmental pollution problem Since the 2008 Olympic Games, general environmental situation in Beijing becomes better, but there are still some problems which can not be neglected. Along with considerable increase of demand of energy due to rapid progress of Beijing's modernization, total amount of gas, water and solid waste is increasing. Gas, water resources and soil are natural resources and environment on which natural production must depend. Serious situation of environmental pollution in Beijing poses enormous obstacle for high quality, high efficient and safe development of Beijing's modern urban agriculture.

2.3 High production costs Due to resource scarcity in Beijing, the production costs there are higher than adjacent regions, so there are no comparative advantages in producing stable agricultural products. From the perspective of the scale, the number of employees engaged in arable land and primary industry is less than 1% of adjacent regions; from the viewpoint of yield of agricultural products, the yield most agricultural products of adjacent regions are 30 to 50 times higher than that of Beijing; from the perspective of net income from tax reduction; in grain crops, production benefit of maize is 1/4 to 1/3 of adjacent regions on average; wheat suffered a loss of 5.9%; the production benefit of fruit and vegetable in open field is only 1/4 to 2/3 of adjacent regions on average; facility agricultural benefit is 1/4 to 1/2 of adjacent regions on average; benefit of leaf vegetables is 14% higher than adjacent regions on average, while the benefit of agricultural products is only 1/5 to 1/2 of adjacent regions, and the average benefit of fresh-water aquaculture is only 1/4 of adjacent regions.

2.4 Low cultural quality of labor forces Most rural laborers have low educational level, and the length of education received by farmers is 9.65 years on average. Most farmers just have junior middle school education, and there is a significant aging, womanlike and commercialization trend. For the permanent resident population of Beijing in 2005, those with junior middle school education account for 31.0%, those with technical secondary school education, vocational high school and senior high school education take up 24.2%, and those with college and above education account for 2.4%. In agricultural population, those with junior middle school education and above take up 45%.

2.5 Fierce competition with foreign agricultural enterprises With the aid of advanced technologies, abundant fund and wide experience in international market operation, foreign companies march into China's seed market. In less than 10 years, they have taken up over 50% of China's high-end vege-

table seed market, nearly involving all vegetables. Major domestic scaled vegetable production bases, particularly those oriented towards export, adopt seeds supplied by foreign agricultural enterprises.

3 Opportunities in developing Beijing modern urban agriculture

3.1 Constantly increasing demand for high quality products brings greater market space Beijing is one of the largest and most intensive consumption markets of agricultural products in the world. Along with improvement of living conditions, people's food consumption demand rises to healthy and nutritious level from sanitary and safe level. As public brand of safe and quality agricultural products advocated by government, "three products and one indication" (harmless, green, organic and GI products) have become leading agricultural products for current and future periods in China. Therefore, it is recommended to energetically develop modern urban agriculture, rely on its high scientific and technologic contents, strong product market guidance and innovation, as well as more emphasis on security and standardization, to provide higher quality and characteristic agricultural products for citizens of Beijing.

3.2 Beijing is building "World City" and the modern urban agriculture is having new opportunity Marked by the successful holding of Beijing Olympic Games, Beijing has stepped into a new development stage. In this situation, the proposition of new goal will be helpful to agglomerating common standing and making definite direction of future development. The quantity of "world top 500 strongest enterprises" in Beijing is only second to Tokyo and Paris. "World City" is the high-end form of international metropolis, and has considerable influence in global economy, politics and culture. Beijing modern urban agriculture has favorable opportunities of broad international market and moving toward the world with the aid of internationalization of Beijing's economy, culture and society.

3.3 Advent of agricultural "Capital Times" in China creates opportunities for agricultural opening-up of Beijing

The most outstanding characteristic of modern agriculture is "capital agriculture". Along with gradual opening-up of China's agricultural market after China's entry to WTO, China has formed agricultural opening-up pattern. Recently, both international capital and domestic industrial and commercial capital flow to China's agricultural field, injecting modern factors of production for development of Chinese traditional agriculture and providing modern organizational ways. As the capital of China, Beijing becomes the first selection for various types of international capital and domestic industrial and commercial enterprises, which greatly promotes development of Beijing modern urban agriculture.

3.4 Many achievements of foreign modern urban agricultural development provide advanced experience for Beijing

Foreign urban agricultural research started from the first half of the 20th century, initially appeared in American-European countries and Japan and has accumulated plenty of experience. We need to find out history and current situation of for-

eign urban agricultural development, draw advanced experience of foreign urban agriculture, reduce unnecessary errors during the development of urban agriculture in China, so as to save development time, cost, resource, manpower and fund, and to promote sustainable, healthy and rapid development of China's modern urban agriculture.

4 Thinking of development of Beijing modern urban agriculture

For the development of Beijing modern urban agriculture in "the Twelfth Five Plan" period, we must focus on improving foundation, integration and demonstration of agriculture; orienting towards market and satisfy medium and high end market demands; actively cultivating and strengthening agricultural industrial level; create unique product brand; and raising added value of agricultural products, to increase farmers' income and improving international competitive power of agriculture in the capital.

4.1 Lay solid foundation Compared with developed countries, China has higher land productivity but lower labor productivity, and Beijing has similar situation. In "the Twelfth Five Plan" period, it is required to increase scientific and technological investment in agriculture, develop seed agriculture and improve land productivity; increase proportion of facility agriculture, develop new and small agricultural machinery, improve agricultural mechanization level, promote agricultural labor transfer, and improve labor productivity; increase agricultural per unit area yield, raise resource utilization and make efforts to reduce the gap between developed countries.

4.2 Promote integration In "the Twelfth Five Plan" period, Beijing modern urban agriculture will march toward overall integration. Specifically, it should take scale, service and ecological oriented road of agriculture through integration of three major industries; exploit market and sell agricultural products through integration of planting, cultivation, production, supply and sales within the industry, promote development through marketing, to improve marketization level of agriculture and economic, social and ecological benefits; constantly increase agricultural added value through integration of various sectors within the industry, extend industrial chain and increase economic benefits. Finally, it is expected to realize objective of integrating ecological, economic and social benefits of agriculture.

4.3 Strengthen innovation Along with improvement of people's living conditions, agriculture has stepped into consumer-oriented market. Urban consumers pay more attention to quality of life and seek individualized consumption. Thus, in "the Twelfth Five Plan" period, Beijing modern urban agriculture should constantly pursue innovation and change, to satisfy people's increasingly diversified consumption demand. Besides, it should realize innovation in agricultural concept and set up innovative agricultural awareness and concept in large resource, mega-agriculture, great food and industrialized management; realize innovation in agricultural functions and constantly widen development thinking of Beijing modern urban agriculture; on the basis of production, living and ecological functions,

constantly explore multiple functions in depth, to develop agricultural benefits to the maximum extent and increase farmers' income; achieve agricultural innovation, and draw on experience of secondary and tertiary industries to develop agriculture.

4.4 Leading and demonstration Relying on advantages of Beijing, it is proposed to develop the agriculture oriented for export and foreign exchange earnings, fine agriculture; popularize, apply and demonstrate high and new technological achievements in agriculture; radiate surrounding areas; drive regional agricultural development; actively bring into play demonstration effect of Beijing modern urban agriculture, including international, national and regional demonstration; and gradually achieve innovative, scientific and technological, benefit and cultural demonstration of Beijing modern urban agriculture. Gradually, it is hoped to establish technical innovative system, technical application system and technical service system with capital characteristics, to make Beijing become innovation source and radiating source of modern agriculture for the whole China, and provide demonstration and leading function for construction of national modern urban agriculture.

5 Conclusions

After entry to "the Twelfth Five Plan" period, Beijing modern urban agriculture is restrained from many factors, including shortage of natural resources, serious environmental pollution, weak in standardized and scientific development research in modern urban agriculture, high agricultural production cost, lack of long-term planning, and great pressure of competition with foreign capital, etc. However, there are still many new development opportunities, such as the objective and trend of "World City" construction promotes internationalization of Beijing modern urban agriculture; advent of agricultural "Capital Times" in China creates opportunities for agricultural opening-up of Beijing, high quality; high level and diversified agricultural products have a broad market demand, foreign modern urban

agricultural development provides valuable experience.

Therefore, on the basis of full understanding of current development situations of Beijing modern urban agriculture, we analyze opportunities and challenges in development of Beijing's agriculture, make clear division of the development stage where Beijing modern urban agriculture stays in "the Twelfth Five Year Plan" period, and prepare more scientific and proper development objectives and strategies for development of Beijing modern urban agriculture, to promote comprehensive, healthy and sustainable development of Beijing's agriculture.

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