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Agricultural Science and Technology Parks Initiated in China

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Abstract

Agricultural S&T parks (ASTPs) constitute the bases for demonstrating modern agricultural practice engaged in intensive production and commercial operations with S&T achievements as their pillars and agricultural infrastructures as the mainstay. The emergence of ASTPs is a new economic phenomenon during the past decade, and among the 400-plus such parks, 36 are State ASTPs set up with the approval of the State Council. These ASTPs have created a benign environmental condition for the advance of agricultural science and technology in China and for the development of new- and high-tech-based industries in the agricultural sector, and accordingly, they have played an important role in promoting modern agriculture, in enlivening rural economy, in increasing the income of farmers, and in restructuring agriculture.

Based on a study of State ASTPs, this paper attempts to make a systematic study of the history and current status of ASTPs and a study of policy issues related to their spatial distribution, characteristics of operation, and innovations in their development.

I. INTRODUCTION

The development of modern agriculture and rural economy and the endeavor to increase the income of farmers have become an important task in China's effort to build a well-off society in an all-round way. The initiation in China of agricultural S&T parks based on S&T innovations provides a new organizational form and operational platform for coping with problems related to agriculture, the countryside and the farmers.

Agricultural S&T parks (ASTPs) constitute the bases for demonstrating modern agricultural practice engaged in intensive production and commercial operations with S&T achievements as their pillars and agricultural infrastructures as the mainstay. The emergence of ASTPs is a new economic phenomenon during the past decade, and among the 400-plus such parks, 36 are State ASTPs set up with the approval of the State Council. These ASTPs have created a benign environmental condition for the advance of agricultural science and technology in China and for the development of new- and high-tech-based industries in the agricultural sector, and accordingly, they have played an important role in promoting modern agriculture, in enlivening rural economy, in increasing the income of farmers, and in restructuring agriculture.

Based on a study of State ASTPs, this paper attempts to make a systematic study of the history and current status of ASTPs and a study of policy issues related to their spatial distribution, characteristics of operation, and innovations in their development.

II. COURSE OF DEVELOPMENT

The development of ASTPs in China may be roughly divided into two phases, with 1990s as the exploratory phase and the years since the turn of the century as the second phase.

(1) Initial and exploratory phase (1990s)

In the early 1990s a new situation of "deepening reforms and opening the door wider to the outside world" dawned on China. Amidst a surging tide of setting up new- and high-tech developmental zones, beginning with the year 1994, several types of agricultural science and technology demonstration parks or zones were set up one after another. Available statistics indicate that their number grew rapidly and reached more than 400 by the end of the century. Chinese agriculture is developing amidst a transition from a traditional planned economy to a market economy and is undergoing changes from extensive and quantitative growth to intensive growth marked by high quality and economic returns of farm produce, and in this course these ASTPs, through their role in pooling together the achievements of various S&T fields, in demonstrating and diffusing good practices, have energetically pushed forward the readjustment of regional agricultural structure, promoted the development of rural economy, and enhanced farmers' income and the economic returns of the whole agricultural sector.

(2) Phase of development in accordance with established norms and standards (from 2000 onward)

With the advent of the 21st century, the development of ASTPs in China has entered a new stage marked by norms and standards newly established.

In January 2000, the State Council issued a circular entitled "Suggestions on Agricultural and Rural Work in 2000", in which the development of ASTPs is given high priority and relevant governmental agencies are required to formulate supportive policies. Subsequently, a "Plan for Developing State Agricultural Science and Technology Parks or Zones" was formulated by the Ministry of Science and Technology in collaboration with the following five agencies: the Ministry of Agriculture, the Ministry of Water Conservancy, the State Forestry Bureau, the Chinese Academy of Sciences, and the Agricultural Bank of China on the basis of inquiries and by taking stock of the experiences of existing agricultural S&T demonstration parks (zones) in various localities.

From February to July 2001, the Ministry of Science and Technology and the five agencies mentioned above jointly formulated the "Guide for Agricultural S&T Parks" and "Regulations on the Management of Agricultural S&T Parks (Zones) (For Trial Implementation)" through a process of thorough deliberations. In September 2001, 21 State ASTPs were approved by the Ministry of Science and Technology and the other five agencies based on the results of review made by a panel of experts, formally initiating the development of State ASTPs.

In January 2002, the "Suggestions on Agricultural and Rural Work in 2002" issued by the State Council further provided explicitly that special efforts be focused on the support of selected entities engaged in S&T innovations and on the development of a number of high performance ASTPs. In May 2002 fifteen additional State ASTPs were approved by the six agencies headed by the Ministry of Science and Technology and the Ministry of Agriculture based on the results of the review of a panel of experts. Thus, by May 2002 thirty-six State ASTPs had been established in China (see Table 1).

Table 1- A List of China's State Agricultural Science and Technology Parks (Zones)

Name of Park or Zone	Location*	Established in Year**	Name of Park or Zone	Location*	Established in Year**
Changping State ASTP	Beijing	2001	Xuchang State ASTP	Henan	2001
Jinnan State ASTP	Tianjin	2001	Wuhan State ASTP	Hubei	2001
Sanhe State ASTP	Hebei	2001	Wangcheng State ASTP	Hunan	2001
Taiyuan State ASTP	Shanxi	2002	Guangzhou State ASTP	Guangdong	2001
Chifeng State ASTP	Neimenggu	2002	Baoan State ASTP	Shenzhen	2002
Fuxin State ASTP	Liaoning	2001	Danzhou State ASTP	Hainan	2002
Jinzhou State ASTP	Dalian	2002	Baise State ASTP	Guangxi	2001
Gongzhuling State ASTP	Jilin	2001	Yubei State ASTP	Chongqing	2001
Harbin State ASTP	Heilongjiang	2001	Leshan State ASTP	Sichuan	2001
Pudong State ASTP	Shanghai	2001	Guiyang State ASTP	Guizhou	2002
Changshu State ASTP	Jiangsu	2001	Honghe State ASTP	Yunnan	2002
Jiaxing State ASTP	Zhejiang	2001	Lhasa State ASTP	Tibet	2002
Cixi State ASTP	Ningbo	2002	Weinan State ASTP	Shaanxi	2002
Suzhou State ASTP	Anhui	2002	Dingxi State ASTP	Gansu	2001
Zhangzhou State ASTP	Fujian	2001	Xining State ASTP	Qinghai	2002
Nanchang State ASTP	Jiangxi	2002	Wuzhong State ASTP	Ningxia	2001
Shouguang State ASTP	Shandong	2001	Shihezi State ASTP	Xinjiang	2001
Jimo State ASTP	Qingdao	2002	Changji State ASTP	Xinjiang	2002

Notes:

* Location refers to the province, autonomous region, municipality directly under the Central Government, and a city enjoying the status of a provincial-level entity in state planning.

** The year of establishment refers to the year in which the establishment of the State ASTP was approved by the Ministry of Science and Technology.

Source: *Annual Report on State ASTPs for 2002*, compiled by the Department of Rural and Social Development of MOST and the Department of Science, Technology and Education of MOA, December 2002.

Names of ASTPs, http://www.nastz.org.cn/wenjian/index/htm

III. CURRENT SITUATION

In recent years the development of agricultural S&T parks (zones) has been gaining great momentum, and this is especially true with State ASTPs, and commendable results have been achieved in the following areas: scientific planning, infrastructure development, environment improvement, perfection of regulations, bringing in enterprises and investments, technological innovations, developing norms and standards for management, and pooling together available resources, indicating a good start and steady progress in their operation.

(1) Geographical distribution

With respect to the geographical distribution of the thirty-six established State ASTPs there are

twelve in the eastern region, eleven in the central region, and thirteen in the western region, yielding a comparatively rational framework of location (see Table 2).

Table 2 Distribution of State ASTPs (Pilot Projects) in China

Batch No.	Region	Names of State ASTPs	No. of Parks Or Zones	Subtotal No. of State ASTPs	Total No. of State ASTPs
1st	Eastern	Shouguang/Shandong, Jiaxing/Zhejiang, Changping/Beijing, Jinnan/Tianjin, Changshu/Jiangsu, Pudong/Shanghai, Zhangzhou/Fujian, Guangzhou/Guangdong	8	21	36
	Central	Xuchang/Henan, Wangcheng/Hunan, Harbin/Heilongjiang, Sanhe/Hebei, Wuhan/Hubei, Fuxin/Liaoning, Gongzhuling/Jilin.	7		
	Western	Dingxi/Gansu, Wuzhong/Ningxia, Shihezi/Xinjiang, Baise/Guangxi, Yubei/Chongqing, Leshan/Sichuan.	6		
2nd	Eastern	Cixi/Ningbo, Jimo/Qingdao, Jinzhou/Dalian, Baoan/Shenzhen,.	4	15	
	Central	Danzhou/Hainan, Suzhou/Anhui, Nanchang/Jiangxi, Taiyuan/Shanxi.	4		
	Western	Honghe/Yunnan, Changji/Xinjiang, Chifeng/Neimenggu, Xining/Qinghai, Weinan/Shaanxi, Guiyang/Guizhou, Lhasa/Tibet.	7		

Source: *Annual Report on State ASTPs for 2002*, compiled by the Department of Rural and Social Development of MOST and the Department of Science, Technology and Education of MOA, December 2002. *Names of ASTPs*, http://www.nastz.org.cn/wenjian/index/htm

(2) Land area occupied

The area of individual State ASTPs varies from each other. Available data indicate that the largest one occupies more than 400 sq. km., while the smallest ones have an area around 1 sq. km. or even less.

(3) Sectors or products developed

China has a vast territory, and the endowment of natural resources and the environment of production in various localities vary from each other, and accordingly, agricultural production manifests distinct regional features. It follows that with regard to the question of setting priorities of sectors to be developed chosen among the sectors of agriculture, forestry, animal husbandry, poultry breeding, aquiculture, and sideline products for a specific ASTP, adequate consideration has to be

given to regional advantages and local features. At the same time, in the selection of specific agricultural products to be developed and traded, efforts will be focused on those with good repute, unique or new features, pertaining to new or rare varieties, or based on high-tech; and in the operation of an ASTP, special attention will be devoted to the application of achievements of modern science and technology so as to enhance comprehensively the economic returns of agricultural production.

(4) Actual performance

In recent years, thanks to the platform provided by the State ASTPs alone, not only a large number of new- and high-tech results in agriculture have been commercialized, and a much larger number of appropriate techniques have been disseminated, but also a more effective integration of such factors of production as technology, skilled personnel, and financial resources has been realized. Incomplete data indicate that in 2002 total investment in the development of State ASTPs in various areas aggregated to 11.4 billion yuan, and the number of enterprises hosted by these State ASTPs reached 818, with a total output of 15.5 billion yuan.

IV. SPECIAL FEATURES

The development of ASTPs in China is supported by science and technology and is oriented to the market, in response to the needs of agricultural innovations and of meeting the challenges of entry into the WTO, and in the process of promoting the modernization of agriculture in China and the industrialized operation of agriculture, and the formulation of appropriate norms and standards, special features of their operation have gradually taken shape.

(1) Setting priorities for individual ASTPs in light of their locational advantages

China is a vast country with a land area of 9.6 million sq. km., and its eastern, western, southern, northern, and central regions vary a great deal in their natural environment, level of economic and cultural development, and social conditions. It follows that the ASTPs located in different regions must differ in their choice of sectors and products for development. For example, the eastern and coastal areas have better natural conditions and locational advantages, and they pioneered in pushing forward reforms and developments in China, the ASTPs located there place greater emphasis on the development of outward-looking agriculture, focusing on the production of high value-added and/or export-oriented foreign exchange generating agricultural products; the central region is China’s main area of agricultural production, and the ASTPs located there focus on the production of grains, cotton, and edible oils of high quality and for specific purposes; the western areas are less favorable in their natural, geographical, and climate conditions, and the ASTPs located there have to placed greater emphasis on the maintenance of good ecological conditions, and strive to develop agriculture with unique features, ecologically-sound agriculture, and water-saving agriculture through the introduction of new- and high-tech and their demonstration.

(2) Improving the organic structure of ASTPs and realizing the diffusion of agricultural techniques through gradient promotion

An ASTP in China usually consists of three major components: the core area, the demonstration areas, and the outlying-radiating areas. The core area constitute the mainstay of an ASTP, where projects related to the introduction of new varieties, new techniques, and new facilities, especially the experimental projects concerning new varieties are carried out. The core area pertains to the base for R&D efforts in new- and high-tech in agriculture and the commercialization of R&D results, giving high priority to the integration, assembly, and innovation of techniques. The demonstration areas are adjacent to the core area in an ASTP and should play a leading role in demonstrating the application of new varieties and new techniques developed in the core area and should focus their efforts on unique features and the advantages of specific sectors, They belong to the core area's bases for specialized and standardized production practices and industrialized operation. The outlying-radiating areas are components of an ASTP lying far away from the core area, and their main functions lie in promoting the dissemination of the new varieties and new techniques developed in the core area and the demonstration areas within the leading sectors to places faraway so as to exert greater impact on a wide area of agricultural production and rural economy.

(3) Giving full scope to the diverse functions of the ASTPs

The ASTPs fulfill diverse functions involving production, processing, demonstration, research and development, education and training, reception of visitors and tourists, etc. As the ASTPs are economic entities, production and processing are of course their major basic functions. However, the objects of such productive and processing activities are not ordinary agricultural products, but are products of brand new varieties, including those generated by high-tech R&D. Demonstration and leading the way are the basic functions of the ASTPs, playing an important role in exhibiting new varieties and new techniques to farmers, in promoting the dissemination of high-quality agricultural products and R&D results, and in promoting the industrialized operation of agriculture. Education and training, research and development, and the reception of visitors and tourists are important functions of the ASTPs, playing a special role in training new- and high-tech agricultural personnel, in propagating state-of-the-art agricultural S&T knowledge and skills, in speeding up the process of the commercialization of R&D results, and in providing exquisite scenic spots combining fine gardening with natural landscape. Thus, in the development of ASTPs, not only their major basic functions should be given great attention, but their other basic functions and some important functions should also be given due attention.

(4) Promoting an operation model driven by "four categories of actors"

In the operation of ASTPs in China, great importance is attached to the principles of "operating like an enterprise under the guidance of the government, with the participation of intermediaries, and bringing about benefits to farmers", thereby creating a model of business operation driven by four categories of actors: the government, the enterprise, the intermediaries, and the farmers. In this model of operation the four categories of actors play different roles. Being the organizer and supervisor of the ASTPs, the government is responsible for creating a benign environment for the initiation and

development of the ASTPs, and should provide macro-level guidance and undertake necessary coordination. Being business entities engaged in investment and other entrepreneurial activities, the enterprises located in a specific ASTP, under the guidance of the government, should rationally allocate resources and organize production independently. Being agents responsible for introducing and disseminating advanced techniques, the intermediaries mainly provide services involving consulting, appraisal, training, and other S&T and intermediary services. Being participants of and producers in a specific ASTP, the farmers are recipients of technical guidance and training, and realize their own interests through their active participation in the development of the ASTP concerned in diverse forms. Thus, in the development and operation of an ASTP, it is of paramount importance to give full scope to the functions of the four categories of actors: the government, the enterprises, the intermediaries, and the farmers.

V. CONCLUDING REMARKS

The functions fulfilled by China's ASTPs include the following: carriers of the assemblage and integration of diverse agricultural techniques or technologies, a conveying belt linking farmers with the market, a source of modern agricultural science and technology achievements exerting widespread impact, a base for technical training and preparing skilled personnel, an agency conducive to the upgrading of the agricultural sector in the peripheral areas, serving as a model for rural economic development, pointing the way for farmers to increase their income, and, consequently, the ASTPs in China have become pioneers and exemplary models for China's endeavor to realize the modernization of agriculture, to introduce industrialized operation of agriculture, and to popularize standardized practice.

As things stand now, the development of ASTPs in China is still in its exploratory stage, and the ASTPs are themselves pilot projects in the reform of the structure of agricultural science and technology, and therefore, new situation and problems will inevitably arise in the course of their development. In view of the fact that agricultural development in China is entering a new stage and China faces the challenges occasioned by its entry into the WTO, there are a number of problems and issues to be tackled with regard to the development and operation of the ASTPs, such as the creation of a proper policy environment, widening avenues for investment and financing, intensifying innovation efforts, how to better fulfill demonstration functions so as to lead the way of advance for farmers.