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The Exploration and Practice of Agricultural Science and Technology Service Model——Taking Mango Technology Service Model as an Example

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Abstract. This paper takes the exploration and practice of the mango science and technology service model of the South Asian Subtropical Crops Research Institute of the Chinese Academy of Tropical Agricultural Sciences as an example to analyze the forms, specific practices and development status of the typical technology service model, and discuss the outstanding problems and suggestions of the technology service model, which provide useful experience and inspiration for the innovation of agricultural science and technology service models in other regions.

1. Introduction
Under the background of scientific and technological innovation and economic development, it is necessary to accelerate the transformation and application of agricultural scientific and technological achievements to promote rural development, increase agricultural efficiency, and increase farmers' income. At present, the main obstacle to the transformation of agricultural achievements is the lack of scientific and technological services. Therefore, it is a realistic choice to study the science and technology service mode.

In recent years, the mango industry has become one of the important industries in the remote and tropical regions of China to develop the economy and get rich for farmers. In the context of the construction of national agricultural modernization and the cultivation of new farmers in the "Second Five-Year plan", governments at all levels attach great importance to the promotion and application of scientific and technological achievements in agricultural industry. The agricultural science and technology service is a bridge, through which the scientific research results are connected with the actual productivity to promote the increase of farmers' income and promote the development of modern agriculture, which is the most important part for the current agricultural development.

This paper takes the exploration and practice of the mango science and technology service model of the South Asian Subtropical Crops Research Institute of the Chinese Academy of Tropical Agricultural Sciences as an example to analyze the forms, specific practices and development status of the typical technology service model, and discusses the outstanding problems and suggestions of the technology service model, which provide useful experience and inspiration for the innovation of agricultural science and technology service models in other regions.
2. Main modes and practices of mango technology services

2.1 Mode 1 - Panzhihua Comprehensive Technology Service Promotion Mode

(1) "Scientific research institute + local agricultural administrative department + company + researcher as guest + farmer" model

Specific practice: We continue to sign the cooperation agreement from 1997. Our institute has sent 12 technical personnel to work in various districts and counties in Panzhihua. The scientific and technical experts who have continuously introduced excellent new varieties of mango and organized nearly one thousand scientists and technicians have gone deep into the grass roots to conduct mango planting technical. As the main technical unit for the cooperation between hospitals and cities, The SSCRI sent scientific and technical personnel to various districts and counties to continue to carry out mango technology services from 2006, relying on the transformation projects of various scientific and technological achievements, and actively explore the joint participation of the agricultural scientific research institutes as the main body, which cooperate with other organization such as the Grass-roots Agricultural Technology Extension Department, the leading enterprises, the cooperatives and the vast farmers. The new model of diversified science and technology has realized the great transformation of Panzhihua mango from scratch, small to large, bad to excellent (see Figure 1).

The planting area of mango in Panzhihua (in 1997-2017)

One of the more successful service models is summarized as "Scientific research institutes + local agricultural authorities + companies + quit researchers + growers / farmers." The advantages of this service model: the local agricultural department has the advantage of territorial management, which provides convenience for the effective organization, publicity and large-scale training of scientific and technological services. Leading enterprises have the advantages of technology management and market sales, which accelerate the solution of various technical problems in the production link, and promote the digestion and absorption of technical achievements and its demonstration and promotion. The scientific research personnel stationed by the agricultural scientific research institute have the ability to track the development of science and technology at home and abroad, which have a keen sense of scientific and technological innovation, also have strong scientific and technological innovation and technology integration ability, and have the advantages of project, technology and talent. All sides complement each other to achieve the vigorous development of mango industry (as shown in Figure 2).
(2) New Agricultural School Model

Panzhihua New Agricultural School was established in 2005 and originated from the Farmer Field School.

Specific practice: the new agricultural school has 1 general school and 3 branches of branch schools, which through the selection and recruitment of students, and then students from different campuses are selected to have relatively high levels of education, who with ideas and management are appointed as chief technicians and technicians, and set up a scientific and technical service team. The principal is responsible for liaising with experts, organizing technical training and managing general technicians; the general technicians grasp the implementation of the training technology, contact the principal and manage technicians; the technician is responsible for the technical service of the students and farmers in the management area, contact the general technicians and manage the students. The school implements unified procurement of agricultural materials, unified technology management and unified sales (see Figure 3).

Figure 3. Panzhihua New Agricultural School Model

This model is summarized as “Scientific research institutes + local agricultural authorities + new agricultural schools + farmers”.

The advantages are the New Agricultural School not only provides places for training, but also organizes fruit farmers through multi-segment, participatory, and heuristic training through effective management combined with ideological guidance and technical training. It transforms the concept of
farmers, enhances farmers' skills. The loose farmers are organized to form an organized and disciplined modern agricultural producer. The spread of science and technology has transformed from passive infusion to active absorption, which has accelerated the absorption, popularization, and application of new achievements and new technologies. At the same time, it has also cultivated a number of practical scientific and technological talents for the rural areas.

2.2 Mode 2 - Tianyang Science and Technology Yard Model
Tianyang science and technology academy, with the development model of “Scientific Research Institutions + Institutions of Higher Learning + Local Government + Technology Small Courtyard + Demonstration Base + Farmers” is jointly built by CATAS, the China Agricultural University and the people's Government of Tianyang. It is a collection of scientific and technological innovation, test demonstration, training and promotion, talent cultivation. Which as a special platform for the integration of "production, learning and research" (see Figure 4). Based on the mango industry in Tianyang County, we carry out the work of science and technology training, science popularization, field observation, experiment and demonstration, and service promotion. It makes a feature of graduate students and scientific and technical personnel entering the village and serving farmers to organize production with “zero distance, zero time difference”. It guides farmers to rational fertilization to achieve high crop yields and resource efficiency. And which gradually promote the construction of rural ecological civilization and the reform of agricultural management system to explore the sustainable development of modern agriculture.

Specific practice: the graduate student of the science and technology academy will give the advanced technology of mango management to the fruit farmer, guide agricultural operations. The content was explained easily and understandably. It is very important to improve the management level of the local farmers at the time of farming. At the same time, the new recruits in SSCRI were sent to the science and technology academy to practice, who work with graduate students from agricultural colleges to carry out technical guidance and consulting services. In combination with agricultural activities, regular or irregular technical training sessions, on-site guidance, and the release of technical data are used to implement scientific and technological services. At the same time, the farmers' problems in production can also be fed back at any time. The scientific research personnel can find out the solution to the problem by analyzing and discussing, and answer questions for the farmers. Also find the valuable scientific problems from this process, and which tightly combines scientific research with actual production.

Figure4. Tianyang Science and Technology Courtyard Service Model
3. The Main Issues and Suggestions

3.1 Strengthen the training of technical personnel and stabilize the service personnel team.
The lack of technical extension personnel is the main factor restricting the development of mango science and technology services. It is recommended that: on the one hand, we must promote the integration of “production, study and research” in agricultural colleges and universities, cultivate professional talents through projects, encourage them to participate in grassroots practices, and combine theory with practice so as to ensure the supply of professional talents. On the other hand, we should improve the treatment of the basic personnel and the office environment, improve the personnel promotion channels and talent management system, and retain the service talents of Industrial Science and technology.

3.2 Broaden the way to popularize agricultural science and technology and improve service coverage.
As the mango planting areas are mostly located in remote and impoverished areas, the public basic service facilities such as transportation and network are poor, which makes the popularization of mango industry backward and high cost of popularization. Therefore, the government should speed up the construction of public service facilities such as networks and transportation in the mango planting area to facilitate the organization and promotion of industrial technology. On this basis, the promotion organizations can carry out remote teaching or guidance through network video, QQ, WeChat and other chatting tools, which can solve farmers' problems in time and improve the coverage rate of scientific and technological extension services of the mango industry.

3.3 Change our ideas, Raise awareness of science and technology services, and activate the driving force of scientific research and service.
The people’s understanding of science and technology services is not enough. The practice of many years in SSCRI has proved that relying on scientific and technological services can not only accelerate the transformation of scientific research results, but also instill fresh vitality for both parties of service supply and demand, which can truly achieve the result of “theory combined with reality”. It is a powerful way for farmers to increase income, increase agricultural output, and achieve prosperity in rural areas. Researchers in the Institute of Agriculture should actively change their ideology, raise their awareness of market competition, and closely combine the scientific research projects with the market demand so as to make the scientific research results truly rooted. We should formulate and improve the incentive system for science and technology services, and meet the interests and demands of those people who directly involved in scientific research as far as possible to mobilize the enthusiasm of servicing for Agriculture, Rural Area and Farmers.

3.4 Strengthen the administration of the government and optimize the service environment of science and technology.
The government's scientific and technological service should set up the feedback mechanism and timely release demand information to various agricultural colleges and universities, and organize the cooperation and connection of Technology service subject and object through transferring achievements of scientific research, training talents with new technical, and jointing research and development of scientific research projects. The government should increase investment to effectively solve the problem of funding shortage in scientific research achievement transformation services. Or to formulate relevant policies, guide financial support, and encourage companies that have the ability to undertake new technologies to invest in agricultural research projects. In the end, scientific research achievements must depend on the agricultural organizations and individuals to digest, absorb and convert it into productive forces. In this way, the government needs to mobilize rural households with a certain cultural foundation, agile, and positive attitudes to participate in science and technology docking and training, to cultivate new occupational farmers and enhance their return to agricultural
production as a new farmer. All of those improve initiative awareness and vitality of new rural construction services.

4. Summary
In fact, the establishment of the service model of science and technology is a dynamic innovation process. It is composed of several elements which is not immutable. The establishment of the model will be different according to the different actual conditions and needs. The ultimate aim is to improve the efficiency of the transformation of scientific and technological achievements, promote the increase of farmers' income and promote the development of modern agriculture.

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