AGRICULTURAL TECHNOLOGY TRANSFER IN CHINA

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Keywords: Agriculture, technology transfer, China, rural economic reform, the first productive forces, technique popularization organization, the Green Certificate System, "Spark" and "Torch" programs, "Harvest" program, vocational training, TV schools, water-saving irrigation

Contents

Summary

Agricultural technology transfer, based on the development of agriculture and rural economy, is a part of China's science and technology development strategy, and an

important measure the Chinese government has taken to vigorously develop the rural economy.

The aim of agricultural technology transfer in China is as follows: through the spread of science and technology in the rural area, to enhance the quality of the laborer; to guide the farmers to vigorous development of rural economy through progress in science and technology; to promote the development of market economy in the rural area; to speed up the progress of the modernization and industrialization of agriculture and the rural area, and finally to build a new rural area with Chinese characteristics.

The mission of agricultural technology transfer in China is: to make good use of rural natural resources; to make equipment applicable for the rural area; to train a large number of technicians, managerial persons and farmer entrepreneurs for the rural area; to promote the establishment of social science and technology service system in the rural area, and to develop high-yield, fine-quality and efficient agriculture.

The objectives of agricultural technology transfer in China are: to enhance the living quality of the farmers; to promote the realization of being well-to-do for the farmers. The projects of agricultural technology transfer in China have given Chinese farmers opportunity to learn in great detail about a major vast national endeavor, to solve and address very difficult and universal problems relating to the development of rural areas, areas often poor but with great potentials for development. Agricultural technology transfer in China is especially important because of the deliberative focus and use of scientific achievements and relevant technologies to deal with these problems, and a way to cope with difficult challenges by mobilizing the know-how and resources.

1. The Background

China, on the whole, is an agricultural country among the developing countries, with rural areas covering 90% of the land, and farmers accounting for 80% of the total population. Although the area under cultivation in China accounts for 7% of the world's cultivated land, it has to support a very large population, accounting for 22% of the world's population. This is the national condition of China. Agriculture is the base of the economy in China, both today and in the future. There will be a politically stable situation if there is a steady increase in agriculture and the country will become rich if the big farmers become rich, so it is an ongoing issue—to properly settle the problem of agriculture, the land and the farmers, for China's economic and social development.

China, with a weak economic foundation, is a developing country, having the characteristics most developing countries share, i.e. over a large part of the country many people have not yet broken away from poverty. At the same time, China has a very large population, with per capita availability of many of the natural resources being below the world average, so the surplus laborers have been constrained by the very limited land area. For centuries there has been a shortage of natural resources per person in China, and the rural area has long been an obstacles to China's economic and social development.

In 1978, China first launched its rural reform, and shortly after the policy of opening the

country to the outside, and economic reform, were introduced. With the rural reform going deeper and deeper, the Chinese government timely launched the science and technology structural reform, propounding that "Economic development should be science and technology driven, and the scientific and technological efforts should be geared to economic construction". The policy incisively states that science and technology are the first productive forces. We know that rural development depends on three things: a good policy, science and technology, and the investment of both human and financial resources.

Consequently, many scientists and technicians turned to agriculture and left the laboratories for the "main battlefields" of rural economic construction, so as to give their hands and minds to rural economic development, distributing the science and technology fruit to the rural area. The rural economic structural reform and the science and technology structure reform brought about good social conditions for agricultural technology transfer. Since reform and opening up, China's agricultural science and technology have developed steadily, achieving marked successes.

1.1. Breakthroughs were made in the screening and cultivation of new species and fine strains

By the end of 2001, the national crop germplasm bank had a collection of 332 000 accessions, covering 35 families, 192 genera and more than 712 species or subspecies. The 32 germplasm resource nurseries of the country preserve 38 000 accessions, covering 1050 species and subspecies. Successes were achieved in the development and application of more than 5000 crop strains—new combinations, which enabled grain, cotton and other major crops to be renewed three to five times and the output of these crops to increase by 10 to 30%. Major breakthroughs were also made in the utilization of hybrid dominance in farm crops, with a large number of high yielding and adversity-resistant rice, corn and other new varieties (combinations) and more than 100 vegetable varieties and 90 new animal and poultry breeds (strains). The coverage of fine strains of farm crops reached about 80%.

1.2. New progress was made in major fields

New progress was made in major technologies for integrated control of major plant and animal pests and diseases. New technologies and new processing were developed in the processing of farm and sideline produce. Good progress was made in hi-technology fields such as cell hybridization, embryo transplantation and microorganism fermentation projects, and these were applied to production. Breakthroughs were made in the research and application of high yielding and highly efficient technology, and rapid development was made in multiple crop inter-planting, as well as multi-cropping and multiple ripening technology.

2. Major Problems

Despite all the above achievements, the general development level of agricultural science and technologies was low, leaving a big gap as compared with the advanced world. Whereas the contribution of agricultural technology transfer to agricultural

growth in developed countries has reached 70 to 80%, it was only about 42% in China. The major problems existing with agricultural technology transfer are as follows:

Separation of science and technology from agricultural production and rural economy. There are many conventional agricultural research results, but fewer high-tech results; the application of conventional achievements are more widespread than that of high-tech and basic research. There are more local and small achievements than major achievements of big impact, and many research results are appraised but few are converted or transferred into production.

Insufficient input and inefficient utilization. In 1994, county-level technique popularization organizations in 960 counties, accounting for 44% of the total, found themselves "weaned from the breast" Their financial support was abolished or agricultural operational expenses were cut. More than 20 700 townships suffered fund shortages, accounting for 43%. The input is also segmental, dispersed, with projects duplicated and operational mechanisms not running smoothly. The utilization rate of input in agricultural technology transfer is also low.

Popularization organizations of agricultural techniques are insecure. Some places dismissed, merged or down-graded their popularization units during the science and technology structural reform. The worst problem is the serious drain of personnel. Of the 1.72 million college and professional school students trained since the founding of New China, only half are still working in agriculture.

To solving the problems the promotion of agricultural techniques has recently focused on the building of popularization centres, making the fixing of nature, size of personnel and specific people as major strategic measures for promoting sustainable development of agriculture and the rural economy, today and in the future. The counties approved the establishment of 167 000 agricultural technology popularization stations, accounting for over 95% of the total due to be established.

The work of fixing the nature was completed. All the funds needed by the technology popularization centres were appropriated by the public finance at corresponding levels. The number of personnel for each centre was also fixed, and the management system was also determined. Over half of the township agricultural technology popularization centres were put under the management of departments in charge of various counties. These problems had remained unsolved for many years. This has thus consolidated the whole technology popularization system, boosted morale, and provided a good means of technical popularization.

3. The Contributions

Foremost, in order to achieve the production goals, the Chinese government recognized that research and technology development and transfer would play a pivotal role in bringing about desired progress in productivity and sustainability. It has accordingly been strengthening the system, especially since the early 1980s. Now the "Law of Agricultural Technique Extension of the People's Republic of China" and the "Law of Agriculture of the People's Republic of China" are being implemented in different parts

of the country so as to stabilize and harmonize the national extension system.

The Enforcement of the Green Certificate System is one of China's novel initiatives. Other technology transfer programs, such as The High-tech Research and Development (863) Program and The National Science and Technology Achievements Spreading Program, especially enterprise-oriented ones like the "Spark" programs and "Torch" programs (see Glossary), and farmer-oriented schemes such as the "Harvest" program, are popular in the country. The non-government science and technology facilities have been growing vigorously in recent years. They have become important fresh troops in the Chinese agricultural armory, e.g. Laizou's (Shandong province) non-government science and technology; its high scientific level and strength have shown its special advantages and become an excellent complement to state-supported agricultural science and technology.

The recent contributions by advanced and adaptable technologies to agricultural growth have been exceptionally high in China.

3.1. Grain crop cultivation and its supporting technologies

In 1996, the areas where rice transplantation by throwing was applied came to 1.54 million hectares, 853 300 hectares more than in the previous year, expanding by 120%, and accounting for 5% of the total rice growing area. The areas where the technique of dry land cultivation of rice seedlings was applied totaled 9.33million hectares, 4 million hectares more than in the previous year. The areas for precision or semi-precision sowing of wheat and corn (maize) were expanded by 1.33 million hectares. The hybrid rice and corn (maize) areas were expanded by 2 million hectares.

At the same time, breakthroughs were also made in plastic film covering in cornfields, and rationing rice cultivation. The package of technical measures such as cropping systems and soil management helped boost the technical input to grain crops. It was estimated that rice seedling throwing helped increase per hectare yield by 375 kilograms; the technique of dry land seedling cultivation and sparse transplantation helped increase the per hectare yield by 600 kilograms. The technique of precision or semi-precision sowing of wheat helped increase yield by 225 kilograms; and the plastic film covering helped increase yield of corn by 2250 kilograms per hectare.

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Biographical Sketch

WANG Dong-yang studied at the Agricultural School of Anqing, in Anhui Province, from 1981.

From 1983 he was a technician at the Agricultural Popularization Center of Sishan Township, Wuhu City, Anhui province. From 1986 he was a Master candidate, studying agronomy at Yunnan Agricultural University, and from 1989 he was a PhD Candidate in agronomy at Beijing Agricultural University.

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