

Present Situation and Promotion Strategies of Agricultural Scientific and Technological Achievements Transformation and Application in Chongqing

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Abstract. The transformation and application of agricultural scientific and technological achievements in Chongqing has achieved certain achievements in terms of professionals the ranks, R&D platforms, policy supporting, transformation and application. However, the problems as follows still exist. The output and supply of agricultural scientific and technological achievements fails. The transformation rate of agricultural scientific and technological achievements is not high. The market business is not active. The transformation system and mechanism are not developed. The supporting facilities can't follow up. This paper studies on the existing problems and proposes some suggestions on strengthening policy orientation, market orientation, talent support, creative way, construction carrier and perfecting service to push on the agricultural scientific and technological achievements transformation and application.

1. Introduction

Agricultural scientific and technological achievements transformation and application is not only the important way of combining agricultural science and technology with agricultural manufacture and management, but also the effective means to promote the scientific and technological achievements entering into the market. For years, Chongqing municipal Party committee and municipal government attach much importance upon the problem of agriculture, rural areas and farmers, deepening the structural reform on agricultural supply, optimizing agricultural industry development layout, increasing the transformation rate of agricultural science and technology achievements. Especially since the innovation-driven development strategy is implemented and promoting agricultural development lies in relying on science and technology in Chongqing, agricultural science and technology has made great achievements. In 2016, agricultural science and technology transformation played an important role in contributing rate of agricultural science and technology, up to 58.5%. At present, Chongqing is in the crucial period of the transformation from traditional agriculture to modern agriculture. Optimizing and adjusting the economic structure and upgrading the consumption structure provide new opportunities for the development of agriculture and rural areas, however, limited in high price and resource environment. Besides that, agricultural science and technology achievements transformation and application is characteristic of territoriality. The technique imported from the other places can't solve the local problems. Agricultural science and technology must rely on self -



innovation. How to promote the agricultural science and technology achievements to transform and apply are the key issues in the modern agricultural development in Chongqing. This paper will record the achievements agricultural science and technology has made, points out the problems existing in the development, probes into the reasons and proposes development countermeasure and suggestions, which is valuable to speed up Chongqing's agricultural science and technology achievements transformation and application, improving the development of agricultural productivity and achieve agricultural modernization.

2. Status and Achievements of Transformation and Application about Agricultural Scientific and Technological

First, from the point of talent team, the steady talent team has been built. In Chongqing, there are 17 colleges and scientific research institutions related to agriculture, 4570 researchers devoting themselves to agricultural research, 2066 commonweal extension organizations and 2340 agricultural technicians to promote it. Among them, the talent team recruits 1 Chinese Academy Engineering, 1 chief expert of the modern agricultural industry technology system, 25 technical specialists, 26 comprehensive experimental station masters, and more than 200 high-level experts including researchers and professors. The agricultural science and technology innovation and applied extension system has been formed based upon science and technology innovation, achievements transformation, education and training and applied extension.

Second, from the point of R & D platform, the necessary conditions for science and technology innovation and achievements transformation is ready. 10 national agricultural science and technology innovation platforms and 1 national technology transfer and transform base have been established in Chongqing. The established institutes include 45 municipal agricultural science and technology platform, 9 national agricultural science and technology farm, 13 municipal agricultural science and technology farm, 134 agricultural science and technology expert's compounds, 12 sci-tech commissioner workstations, 45 leading agricultural enterprises technology innovation centre and so on. The chain has been formed, from the achievements creation, test before the production, display to advertisement and application.

Third, from the point of policy, motivational techniques have been perfected gradually. The reform and innovation have been deepened step by step. In September 2014, Chongqing Government issued Chongqing's Science and Technology Transformation Shares and Bonus Implementation Measures to distribute the science and technology transformation shares and bonus. In February 2016, the State Council printed and distributed Promoting the Science and Technology Achievements Transformation Law of the people's Republic of China, which provides institutional guarantee to promote science and technology achievements to transform into real productivity. In July 2016, Ministry of Agriculture issued Guidance about How to Develop Talents in the Field of Seed Industry and Enlarge the Rights and Interests Reform Experimentation of Research Achievements, which shows the rights and interests distribution of research achievements in the field of seed industry. In January 2017, Chongqing government issued Implementation Plans About How to Promote Science and Technology Achievements to Transform in Chongqing, deepening the reformation of science and technology system to speed up Agricultural scientific and technological achievements transformation on system support. A series of implementation of scientific and technological reforms and creative policies focus on the system and mechanism problems exposed by research specialist staff and the society.

Fourth, from the point of achievement research and development, quantity and quality go hand in hand. Great achievements have been made. In the period of the 12th Five-Year Plan, 1238 breeding and improvement of plant and animal varieties, agricultural biotechnology research and new agricultural technology have been developed. 1654 patents have been applied. 121 kinds of crop variety have been authenticated. The technology of fruit retention, protection from falling and water shortage for late-maturing oranges has been recognized by Ministry of Agriculture as the main technology spread in China in 2017, which help China to get number one in growing oranges in the Virus-free container and industrial scale late-maturing oranges in the world. Four national patents for

technological inventions have been awarded. They are respectively silkworm No. 8, the first *Botryotinia fabae* Lu et T.H.Wu sp.nov bred in China. cultivation techniques of anti-red spot disease, the method of testing the crops planting density and cross-breeding bean technology. Five research projects have been applied, including yellow-seeded Brassica napus genetic mechanism and breeding of new variety, the resource protection and development of Rongchang Pig, which won National Scientific and Technological Progress Second Prize. Bombyx mori Genome functional research has won National Natural Science Second Prize.

3. The main problems of agricultural science and technology achievements transformation and application in Chongqing

First, it is insufficient in the source output and effective supply of the agricultural science and technology achievement. At present, there are totally 95267 patents in Chongqing, including 5040 in the field of agricultural science and technology, accounting for 5.3%. In 2016, Chongqing was awarded 119 science and technology prizes. Among the above, there are 7 prizes given to agriculture, accounting for 5.9%. Up to June 2017, on the national transformation and transaction service platform of agricultural scientific and technological achievements, there are 3405 items to be transformed in the achievements bank, 94 items in Chongqing, accounting for only 2.7%. The items to be transformed and traded are limited. The institutes for agricultural scientific and technological achievements output can be divided into two types: scientific research institutes, colleges and universities and enterprises. In the whole process of agricultural scientific and technological achievements transformation, scientific research institutes, colleges and universities are the main institutes to be responsible for the projects and achievements supplies. Most of the projects funds are financially supported. Its research and development objectives are mainly designed based upon academic conditions and laboratory, community experiments. R & D activities are divorced from the actual production and market demand^[1]. Energy output is closely linked to the actual situation of agricultural production. There are few achievements satisfying the demand of agricultural supply-side reform and being valuable for market promotion. On the other hand, the overall R & D ability of agricultural enterprises in the Chongqing is still insufficient. They need to be further promoted, far from being the main bodies of agricultural scientific and technological achievements output and transformation.

Second, the transformation rate of agricultural scientific and technological achievements is not high and market transactions are not active. The transformation rate of agricultural scientific and technological achievements in developed countries is generally high, of which it is 70%~80% in the United States and Japan, up to 90% in Germany, Britain, France and other countries. In China, 6000~7000 agricultural scientific and technological achievements are developed every year, but only 30%~40% of which can be transformed^[2]. It is only 20%~30% in Chongqing, lower than national average. In addition, agricultural scientific and technological achievements in the market transactions are not active in Chongqing. The policy orientation in our country is to construct the technology transfer mechanism with the market as the main body step by step, to make the market play the leading role in the resource allocation and the technology transfer transformation. However, due to the constraints of various reasons, the market mechanism in Chongqing plays a very limited role in the transformation of agricultural scientific and technological achievements.

Third, the transformation system mechanism supporting measures are not perfect. The transformation mechanism of scientific and technological achievements is the bridge connecting the supply with the demand of scientific and technological achievements, guaranteeing scientific and technological achievements to transform smoothly. However, the current agricultural scientific and technological achievements transformation management system, distribution incentive system and related incentives have not really been implemented, to some extent, restricting the pace of agricultural scientific and technological achievements transformation. In July 2016, the institutes such as Municipal Academy of Agricultural Sciences worked as pilot unit to promote the reform of scientific research achievements distribution in the field of seed industry, explore the mechanisms such scientific and technological achievements transfer, transformation, rights and interests sharing, and

encourage the scientific research personnel to transfer and transform scientific and technological achievements. It is investigated that the following problems make the policy difficult to be implemented in the actual implementation process. For example, the policy is not perfect. The market supply is not balanced with the demand. It is not innovative in the transformation channel. The profit is not distributed properly.

4. Analysis of deep causes of the problems

First, the investment of agricultural scientific research is not enough. How to invest it is not proper. Generally, in recent years, the government has invested more and more in agricultural science and technology, based on the substantial increase in the total investment of science and technology. However, by comparison, the agricultural R & D investment in the total expenditure on science and technology is getting less and less. At present, agricultural research investment in agricultural financial investment accounts for less than 1% in Chongqing, lower than most developing countries. Compared with the proportion of 2%-4% in the developed countries, it is much lower. Meanwhile, the investment of agricultural science and technology is limited, just like sprinkling pepper, not focusing on industrial development to invest. It is difficult for the agricultural science and technology to be developed. As a result, agricultural scientific and technological achievements cannot be produced to be specialized, refined and in depth. In addition, the following problems still exist. The transformation investment of agricultural scientific and technological achievements is scattered. The structure is irrational. Regional advantages and resource characteristics are not highlighted. In 2013, Manipal agricultural science and technology achievement transformation fund was set up in Chongqing. The investment is scattered and unstained. The total investment amount is insufficient. The above factors make some agricultural scientific research projects difficult to develop in depth and push forward the agricultural science and technology achievement transformation.

Second, the application model of achievements transformation does not meet the needs of modern agricultural development. The modern agricultural organization and Production and management mode are changing. The transformation and application of agricultural scientific and technological achievements are lack of overall planning and supporting. The extension ideas, models, means and methods are still in the bud and exploration stage. It is hard for the agricultural scientific and technological achievements to be transformed into real productivity. Meanwhile, the achievements transformation team is not organized. The ability of technical popularization is not strong. The institutes such as agricultural scientific research institutes, colleges and universities are the main bodies of agricultural scientific and technological achievements transformation. The researcher mainly devotes themselves to the scientific research itself. The agricultural scientific and technological achievements transformation only can be developed to the demonstration stage. The institutes such as agricultural enterprises are new-rising forces in the scientific and technological achievements transformation. However, because of its limited R & D research strength and insufficient depth in scientific research, it plays a very limited role in the transformation and application of agricultural scientific and technological achievements. With the development of market economy, the present grass-roots agricultural extension staff are not qualified^[3]. The structure of age and major are not reasonable. Because of the lack of management and marketing ability, especially the inter-disciplinary talent skilled at running it, the model cannot satisfy the need of modern agricultural scientific and technological achievements transformation.

Third, the achievement transformation cannot adapt to the market application benefit link mechanism. The current achievements evaluation mechanism is unscientific, lacking the evaluation in the pilot stage. The evaluation of social and economic benefits is not specified, directly affecting the expected goals of the achievements and the upsetting the scientific researchers to transform the achievements. When facing benefit distribution, the evaluation system of the income distribution within the project team is not established, it is hard to guarantee the fairness of the income distribution. At the same time, because of various reasons such as imperfect assessment mechanism and ineffective management, the market potential of some achievements has not been dug out, resulting in low

conversion rate and benefit. In addition, in the environment of mass entrepreneurship and mass innovation, a series of incentive policies have been issued. However, the things supporting policies are still not well. It is not certain for the policy to be implemented, delaying to benefit the policies.

5. Countermeasures and suggestions on the transformation and application of agricultural science and technology achievements in Chongqing

The transformation of agricultural science and technology achievements is characterized by obvious regionalism, prominent basic and public welfare, long transformation cycle, uncertainty and big risk, and diversity of transformation receptor types^[4]. Because of its special ecology like typical hilly agricultural characteristics, various cropping systems, low temperature and weak daylight in winter and spring, and high temperature and drought in summer and autumn, it is necessary to reform and innovate the transformation and application of agricultural science and technology achievement in Chongqing. The general idea of implementation is to guide by government, dominate by market, support by talents, innovate mode, construct carriers, and perfect service.

First, the government should perfect the supporting policies of the transformation and application of agricultural science and technology achievements as soon as possible, put it in reality and roots to promote scientific research, achievements transformation and industrial development. The first is to strengthen the overall planning and policy guidance, increase support and total investment, concentrate on major research funds of industrial development, re-establish special financial project of the transformation of science and technology achievements, combine the financial science and technology investment guidance and market incentive mechanism, optimize the allocation of innovative talents and resources of agricultural science and technology, give stable support to the innovation of agricultural science and technology, improve the new environment of agricultural science and technology and strengthen the aftereffect of the source output and supply. The second is to implement various kinds of incentive policies. Research staff in colleges and scientific research institutes should be allowed to take part time job in some new science and technology innovation enterprises. After three to five years' work, they will return to their original positions. This is useful for them to know the operation mode and carry out scientific research work according to the market demand to improve the transformation rate of agricultural scientific results.

Second, we should set up a bridge of cooperation between research institutions, universities and local governments, industries and enterprises, and social organizations, explore new docking mode of market demand, and promote seamless connection between science and technology achievements and market demands. First, we must aim at the development of agricultural industry, identify the combination point between scientific research, market demand and future development, and provide dynamic monitoring, effectiveness evaluation and information feedback in the timely manner, so as to form the whole process of participation in the transformation of the decision-making mechanism. The second is to encourage the agricultural scientists and technicians to carry out science and technology innovation and entrepreneurial activities, directly guide the upgrading of the industry. It supports scientific research institutes, universities and local governments, and new agricultural business entities to form innovative entities, so as to achieve seamless docking of R & D, transformation and application. The third is to support the scientific research institutes, institutions of higher learning and association, and the transformation of intermediary services to establish a cooperative and win-win service network for agricultural science and technology achievements transformation. Actively explore and implement the major science and technology project bidding, project reporting, concluding, the transformation and application of market operation mode, realize the diversification of the main achievements of supply subject and supply mode, form a new pattern of market leading and scientific research subjects participating in the transformation of supply.

Third, The government and scientific research institutions should integrate resources and strengthen the construction of the transformation team of agricultural science and technology achievements, put science and technology demonstration projects as the carrier and agricultural science and technology achievements into practical productive forces as the target, closely combine

the agricultural research, agricultural education, agricultural extension personnel, clearly set up goals and tasks, straighten out the relationship, give full play to the talent of intellectual support. The combination of all kinds of talents through the establishment of effective interest mechanism should be promoted, and researchers and enterprises to jointly develop new technologies, new products should be encouraged ^[5].

6. Conclusion

The application of science and technology is an essential element in the development of modern agriculture. The transformation of agricultural scientific and technological achievements is characterized by obvious regional characteristics, prominent basic and commonweal features, long cycle of transformation, uncertainty and risk, and transformation of achievements into various types of receptors. Chongqing has made a series of achievements in the transformation of agricultural scientific and technological achievements, but the supply of agricultural technology is still insufficient and the enthusiasm of scientific and technological personnel is not high. Government, agricultural research institutions and agricultural science and technology enterprises need to cooperate deeply in agricultural research and development to form a complete interest chain and form win-win residents. The government should play the role of guidance and promotion, the researchers act as the main force, and the enterprises do the transformation and application.

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References

- [1] Zhai Jinliang. Characteristics, existing problems and countermeasures of agricultural scientific and technological achievements transformation of in China [J] .CAS Bulletin
- [2] Wang Danping. Analysis of the low conversion rate of agricultural scientific and technological achievements [J]. China Agricultural Information, 2013, (15): 240.
- [3] Mao Xuefeng, Kong Xiangzhi, Xin Xiangfei, Wang Jimin. The current situation and Countermeasures of Agricultural Science and Technology achievements in China during the Eleventh Five-Year Plan period [J] .China Science and Technology Forum
- [4] Wang Jinghua, Zhong Chunyan. Speeding up the agricultural scientific and technological achievements transformation to promote Agricultural development mode to change [J] .Research of Agricultural Modernization: 195-1988.
- [5] Meng Hong, Li Shibao. Study on the countermeasures of promoting the agricultural scientific and technological achievements transformation of under the new normal [J]. Agricultural Science and Technology Management: 2016 / 35 / 03 / 57-60.