

# Science and Technology in Chinese Agriculture: 1978 – 2008

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Since 1978, science and technology in Chinese agriculture has entered a new era: agricultural research institutes have expanded; number of people involving in related research has increased; research environment has been improved; innovation ability has been enhanced; research findings are applied to large-scale production more efficiently. All those achievements have boosted the rural economy and speed up social development.

## **Agriculture Science and Technology Policy Briefs**

### **(1) Concentrate on key technical problems**

Since the Sixth Five-Year Plan of China (1981 – 1985), related government departments have chosen a series of key technology projects to fund, and all those projects are aimed at adjusting agricultural structure, improving economic growth pattern, saving cost and increasing yield and product quantity, improving ecological environment and cultivating competitive advantages. These projects include new fine variety breeding, fine variety searching and storage and innovation, aquatic animal disease control, safe and efficient fertilizer and pesticide R&D.

### **(2) Intensify high technology research**

According to “National High-tech R&D Program of China (863 Program)”, biological technology and information system construction should be emphasized. Specifically, in the field of biotechnology, policies focus on indication of resistance, defense genes and in the field of information technology, focus on information platform construction, network buildup for policy, market, resource and technology information, monitor and prediction and alert system construction for agricultural resources, environment, disaster and food.

### **(3) Strengthen basic research**

“National Program on Key Basic Research Project (973 Program)” stresses the importance of original, cutting-edge basic research, such as genetic technologies and bioinformatics. This program is designed to promote long-term development and achieve national competition advantage.

### **(4) Promote agricultural extension**

Since Chinese Reform has opened up, lots of agricultural technology achievements have been made and many of them have been applied to large-scale production. Agricultural research institutes, universities and government agencies collectively implement all kinds of extension projects and all those efforts have significantly increased yield, farmers’ income and

ensure the stable and long-lasting development of agriculture.

**(5) Cultivate more agricultural technology enterprises**

Policies are designed to support major agricultural technology enterprises by creating better research environment. Big agricultural companies are encouraged to establish their own R&D department and cooperation among research institutes, universities and companies is strongly encouraged. The goal is to establish an innovation system that is led by enterprises, aimed at markets and is connected to industry, universities and research centers.

**(6) Increase agricultural policy research**

Soft science should be used in government macro agricultural policies making. The main topics are food security, ecological safety, farmers' income growth and agricultural competition ability enhancement. Policy research can use both qualitative and quantitative methods.

**Advances Related to Agricultural Technology**

(1) Number of agricultural technology institute increases and new research fields emerge. By 2006, there are 1,347 agricultural research institutes, which is 2.6 times the number in 1979. Specifically, there are 666 in agriculture, accounting for 49.4%; 241 in forestry, accounting for 17.9%; 112 in animal husbandry, accounting for 8.3%; 121 in fishing, accounting for 9.0%; 45 in agricultural reclamation, accounting for 3.3%; 162 in mechanization, accounting for 12.0%. Decomposing from the ownership level perspective, there are 76 national research institutes, 514 province-level institutes and 791 county-level institutes. Agricultural universities and colleges and other research institutes like Chinese Academy of Science have recently developed quickly. Weak fields including, agricultural biology, agricultural engineering, and agricultural economics are becoming stronger. Some cross-disciplinary researches emerge.

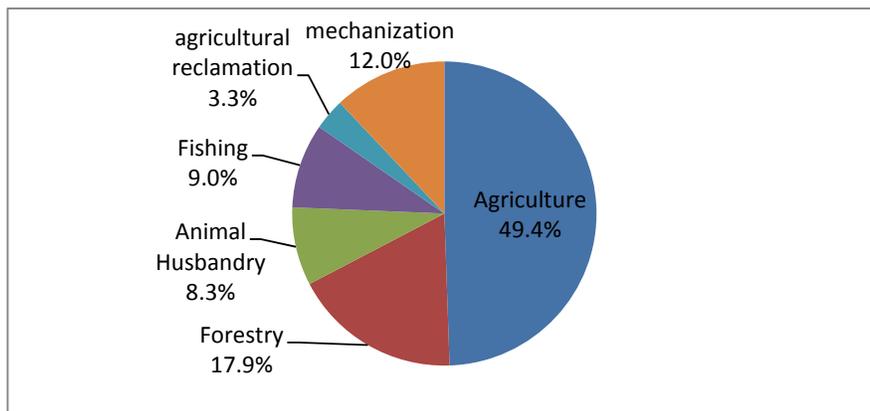


Figure 1: Industry composition of Agricultural Research Institutes

(2) Number of people involving in agricultural technology research increases and young researchers are playing an important role. There are 65,800 people involving in agricultural

technology in 2006, which is 3.29 times the number in 1979. Specifically, there are 41,200 in agriculture, consisting of 62.6% of the total; 5,800 in forestry, consisting 8.8%; 6,700 in animal husbandry, consisting of 10.1%; 4,700 in aquatic animal industry, consisting of 7.1%; 2,900 in agriculture reclamation, consisting of 4.4%; 4,500 in mechanization, consisting of 6.8%. Agricultural researchers have more training opportunities through studying abroad and joint-training& and research projects.

(3) Research environment has been improved and innovation ability has been enhanced. Since the Eighth Five-Year Plan of China, research environment of related institutes, universities and colleges have improved a lot. Twenty-one national laboratories have been built and in total there are 84 ministerial-level laboratories, 32 national agricultural engineering and science research centers, 70 national crop improvement centers and affiliations, 36 national agricultural science parks, 281 national and industrial agricultural product quality supervision and inspection centers, 198 agricultural demonstration parks and 15 outdoor experimental stations. All those provide necessary infrastructures for related research.

(4) International communication and cooperation expand. Along with the implementation of opening-up policy, communication and cooperation with developed and developing countries increase a lot. Cooperation takes many formats, including mutual study abroad program and inter-government technology cooperation. China also helps some African and Asian countries build demonstration or extension centers for rice, corn, sugar cane, tobacco and vegetables, etc.

(5) Government led funding system for agricultural technology has been established. Input for agriculture technology increases every year. Government expenditures on science is 1,355 million RMB in 1985 and the number increased to 11.8 billion RMB in 2006, accounting for 0.56% of agriculture GDP. Budget for agricultural research has increased a lot. Expenditure for agriculture research is slightly more than 100 million RMB and increased to 200 million RMB in 1984, reached 300 million RMB in 1990 and increased to more than 1 billion RMB in 2001. Since 2001, the growth rate also increased. In 2003, the total expenditure for agriculture research is 1.243 billion RMB and 1.322 billion RMB in 2004. After the first National Science and Technology Assembly in 2006, expenditure on agriculture kept increasing and this strongly support agricultural innovation.

(6) Management systems for agricultural technology has built up and improved. Chinese agriculture technology management system has changed a lot as a result of modern science and technology and the introduction of modern management theory and methods. Complete agriculture technology management system is gradually established and modern management methods are used. The management of agricultural research institutes has also been improved: the scope of autonomy is expanded; high quality research groups are gradually formed; rules and regulations are established and improved; modern management methods are initially used.

### **Major achievements**

From 1979 to 2007, there are over 50,000 agriculture related technology achievement awards

at or above province level, of which 9,485 are national and ministry level technology achievements, 2008 are national key technology achievements. Those achievements have significant positive effects on the country's economy and society.

National and Ministry Level Agricultural Technology Achievements

	Farming	Forestry	Animal Husbandry	Fishing	Total
national science conference award	217	86	45	37	385
"Top 3" Award	1,013	271	235	104	2,008
Award for Science and Technology Progress(Ministry level)	3,645	2,070	764	613	7,092

Note: Top 3 Award refers to National Award for Science and Technology Progress, State Technological Invention Award and State Natural Science Award

Major achievements can be summarized as follows:

- (1) research on plant and animal gene and breeding
- (2) research on cultivation technology and husbandry
- (3) prevention and control of major insects and diseases
- (4) middle and low-yielding farmland management and regional agricultural comprehensive development
- (5) agricultural mechanization and application of high technology
- (6) application of biotechnology
- (7) basic agricultural research
- (8) investigation of agricultural resources and macro-strategy making

## Conclusion

Since Chinese reform has opened up, as a result of increased input and application of technology, overall agricultural production capacity has been improved a lot. Food supply has been increased significantly and can meet the total demand. This greatly improves people's living quality and contributes to world agriculture.

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