# Development of Biotechnology Industry and It's Impacts in China

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- 1.Importance of biotechnology development in China
- 2. Aims of biotechnology industry development in China
- 3.Main Fields and Products of Biotech-Industry in China
- 4.Impacts of Transgenic Biotechnology

# 1.Importance of biotechnology development in China

- Fundamental requirement for guaranteeing health and safety of billions of people in China
- Breakthrough for solving issues related to traditional agriculture
- Efficient path for changing economic model and improving eco-environment
- Essential need for protecting country security
- Sustainable utilization of biological resources

# 2. Aims of biotechnology industry development in China

- Catch up with/get close to the most advanced technology in overall fields
- Catch up with the leading level in several important fields

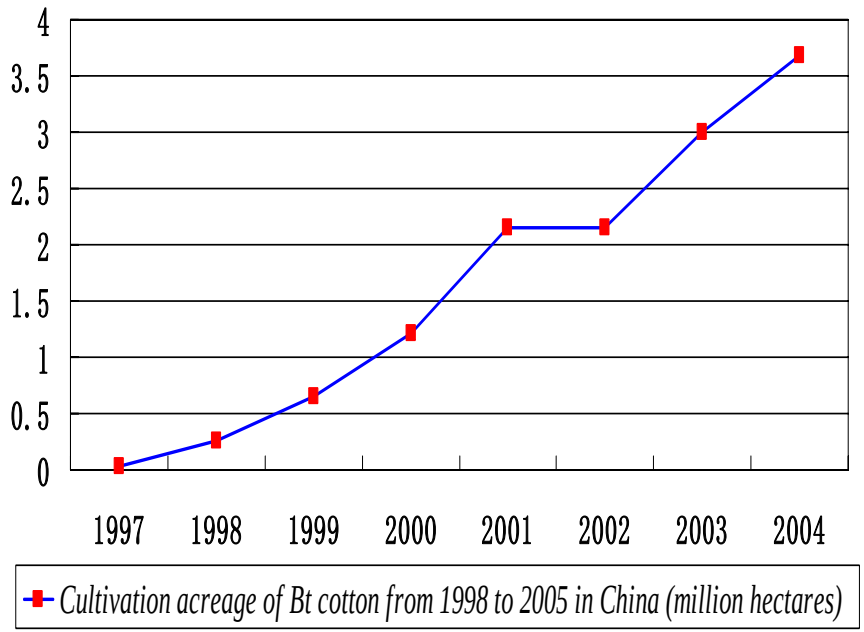
- Great breakthrough in innovation system
- Improvement on international competitiveness
- Establishment of national biotechnology industry network
- Upgrade of industry structure
- Rapid increase on scale of biotech-industry

# 3.Main Fields and Products of Biotech-Industry in China

- 3.1 Agricultural Biotechnology Industry
- 3.2 Biological Pharmacy Industry
- 3.3 Industrial Biotechnology
- 3.4 Biological Resources Technology
- 3.5 Environmental Biotechnology

# 3.1 Agricultural Biotechnology Industry

- Bt cotton
  - Field test of the Bt cotton first began in 1995.
  - Commercial planting of the new cotton variety was approved by MOA in late 1997
  - Accounting for 65% of the total area of cotton
  - Two resources: CAAS(61%) and Monsanto(39%)




Any Benefits from Bt cotton? (Survey conducted by CAS)

Yields of Bt cotton increased

Less use of pesticide

More income

# 3.1 Agricultural Biotechnology Industry (cont')

- Transgenic poplar
  - Transgenic Bt European Black Poplars (*Populus nigra*) in 8 provinces, about 347 hectares
  - Bi-transgenic White Poplar 741 (CrylAc + API) in 14 test centers for environment release experiments

# 3.1 Agricultural Biotechnology Industry (cont')

- Super Hybrid Rice

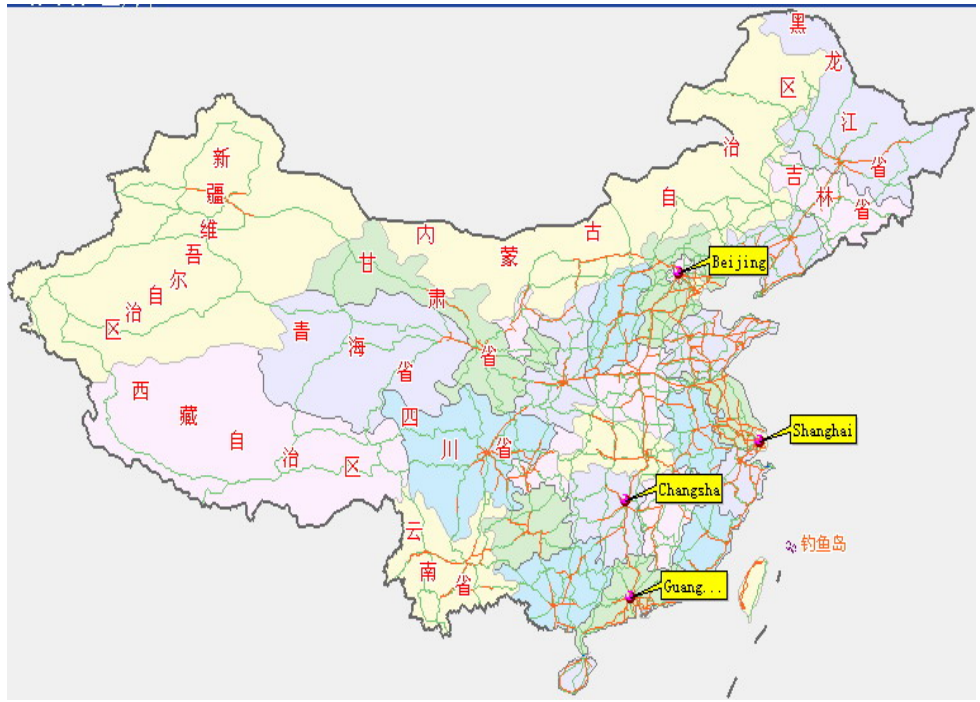
  436 million hectares, increase yields 6 billion kg, increase 7.5 billion RMB of income for farmers
- Biological Pesticide

  More than 200 biological pesticide manufactories, 130 varieties of biological pesticide components registered, 410 kinds of products, annual yields of 10000 tons for 27 million hectares use
- Biological Fertilizer

  400 biological fertilizer manufactories, annual yields of 2 million tons for 3.33 million hectares use

# 3.2 Biological Pharmacy Industry

- More than 140 manufactories
- 20 varieties of genetic engineering medications and vaccines
- Annual increase rate of Sales is about 30% from 2001 to 2005




**National biological pharmacy industry centers(2006)**

# 3.2 Biological Pharmacy Industry (cont')

- Genetics Engineering medication and vaccine
  - 2004，the first gene therapy medicine-recombinant adenovirus-p53 was approved into market
  - From 2000 to 2004，42 varieties of vaccines launched into clinic research
- Diagnostic Reagent
  - 490 varieties of medical diagnostic reagent into market
- Antibody pharmacy
  - 31 varieties of monoclonal antibodies for diagnosis, 7 monoclonal antibodies for therapy

# 3.3 Industrial Biotechnology

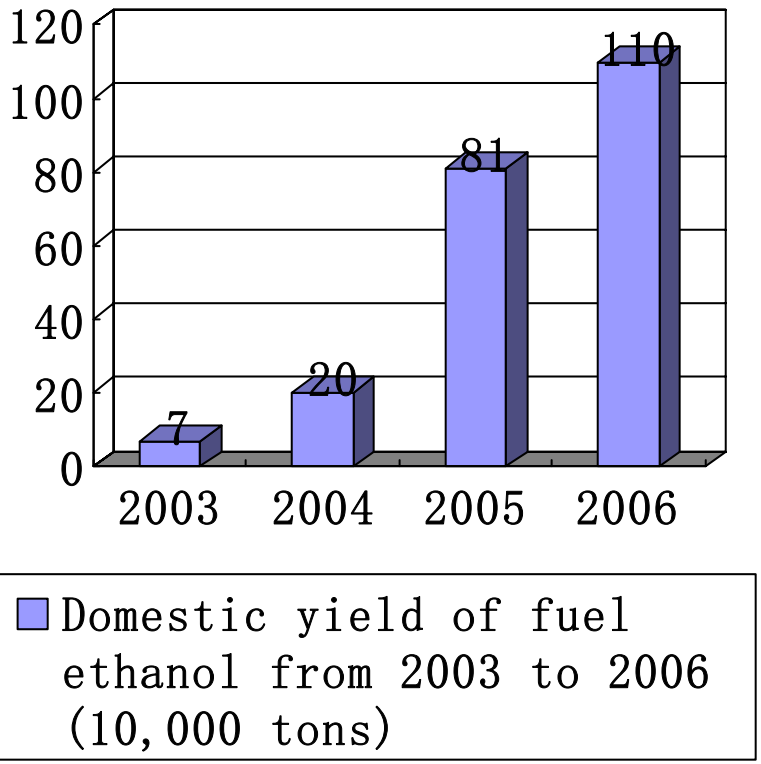
- Supplementing Enzyme
  - 0.5 million tons of yields, production value USD 15.6 million
- New Biological Materials
  - 1,3-Propanediol
  - long chain dicarboxylic acid
- Amino Acid
  - the second consumer country in the world

# 3.3 Industrial Biotechnology (cont')

- Organic Acids
  - citric acid, number one manufacture and merchant worldwide
  - lactic acid,  yields 45000 tons in 2004
- Food Additive
  - taste-enhancer  yields of  1.2 million tons, production value USD 2.3 billion
  - edible colorant  yields of 28000 tons, production value USD 72 million
  - preservative yields 3000 tons, production value USD 36 million
  - sweeteners yield3 0.35 million tons, production value USD 240 million

# 3.4 Biological Resources Technology

- Fuel Ethanol




- Biological Diesel Oil

Establishing manufactories, which yield more than 10000 tons/year in Hainan, Sichuan, Fujian province

# 3.5 Environmental Biotechnology

- Pollution Control Biotechnology
- New Varieties of Grass and Forest withstand drought and salinity
- Biological Improvement on Basification Soil

# 4.Impacts of Transgenic Biotechnology

- 4.1 Impacts of Genetic Modified Organisms on Environment
- 4.2 Impact of GMOs on Socio-Economy
- 4.3Potential Risks Imposed by Transgenic Foods on Human Health
- 4.4 Consumer Attitudes towards Transgenic Food

# 4.1 Impacts of Genetic Modified Organisms on Environment

- **transgenic crops and their impacts on environment**
- **transgenic forest and their impacts on environment**
- **transgenic microbes and their impacts on environment**

# 4.2 Impact of GMOs on Socio-Economy

- As to grain biosafety
- As to food sovereignty
- As to price markup of GMOs seeds
- unexpected contamination.

# 4.3Potential Risks Imposed by Transgenic Foods on Human Health

- predictable effects

  characteristics obtained via gene modification

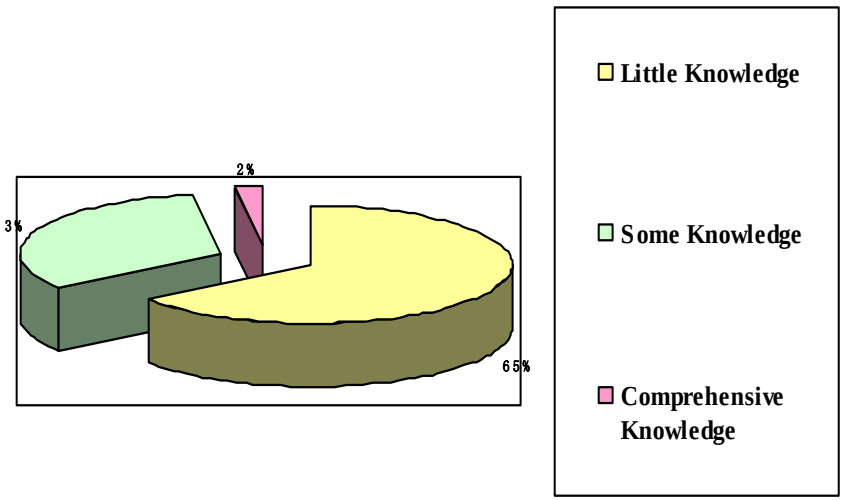
- unpredictable effects

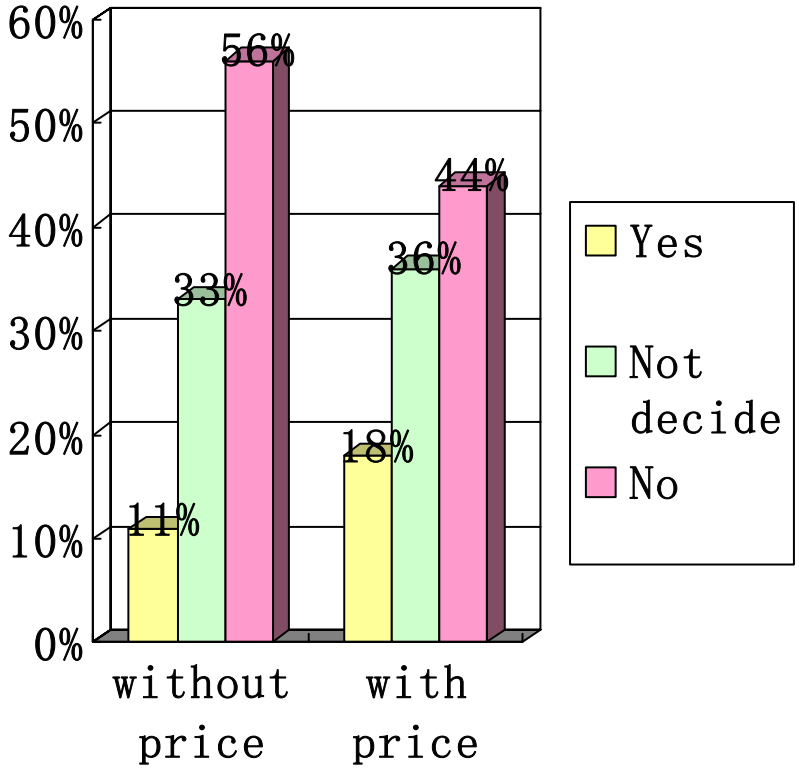
  changes of existing characteristics under certain situations due to gene insertion while obtaining predictable characteristics

# 4.4 Consumer Attitudes towards Transgenic Food

- Supporters Attitudes
- Opposers Attitudes
- Public Awareness

# Survey in Beijing, Shanghai and Guangzhou



# Summary

- Modern biotechnology is a most important, strategic tool for China
- Long way to go
- Biotechnology industry in China should be conducted in accordance with the national condition rather than the international trend.

# Merci!