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China: The controversy of genetically modified food

Introduction

Transgenic has become one of the top ten annual scientific words in *Scientific American 2014*, which caused fierce global dispute as well. Since Cohen transferred the penicillin resistance gene of *Staphylococcus plasmid* into *E. coli.* in 1974, genetically modified has brought a technological revolution worldwide. However, the debate about its safety has never stopped debate since its birth, especially in developing countries with a large population, like China.

China began researching in this domain around thirty years ago, while it is now the 6th largest genetically modified planting country, with the plantation areas expanded to 3.7million hectare. Without doubt, China needs transgenic, for it has the ability to dispose of the food crisis drastically. According to the official data in 2012, Chinese population makes up 19% of the whole world's population, while Chinese agricultural acreage being makes up only 8.5%. China will surely suffer hunger if crop output cannot be promoted. Meanwhile, the thigh-speed development in recent decades in China has lead to disagreeable climate, grievous drought and so forth. Whereas, genetically modified technology has the advantage to solve these problems. High-yield crops, BT seeds and high nutrient grains are the production from this theory. In modern China, mature genetically modified technology is actually a breakthrough in food revolution.

Up to 2009, 25countries have approved 24 kinds of genetically modified crops for commercial application. China approved a security certificate of four kinks of crops, namely cotton, rice, corn and papaya, of which only cotton and papaya can be used for commercial cultivation. The genetically modified crops that China has approved to import and be used as raw materials are soybean, corn, canola, cotton and sugar beets. Although GM is vital to the future of China, the development of transgenic has become extremely difficult. Against voices on GM is increasingly loud. There are two alignments of supporting and opposing GM in modern Chinese society, especially on the Internet. □

Experts Interview

On July 7th, 2015, I paid a visit to Hebe Agricultural Science Research Institute to investigate the modern progress in GM food and the authenticity of the remarks on the Internet. Fortunately, I interview Director Zhang, who majored in GM corn research, and Director Yong, who is in the first-tier research team on soybean.

During the talk with Mr. Zhang, he mentioned that GM corns are now focusing on four

research orientation. Bt (*Ostrinia nubilalis* and *Heliothis armigera* resistance in major) and HT are the basic types studied for approaching thirty years aimed at grasping domestic technique. Furthermore, disease-resistant (bacterial wilt and stem rot preventing) and drought resisting categories are current emphasizes in accordance with Chinese agricultural conditions. When I raised my doubts on whether the categories have been into the procedure of plantation, Mr. Zhang answered that genetically modified corns are still banned for commercial production in China due to the indeterminateness of its security. Nevertheless, the grievous pests and disease manage demand GM crops to play a special role in our lives. For instance, in rural areas, especially on the Northeast Plain, farmers prefer to a substantially GM corn seed without annotation on the packaging named *Ku Gan* (bitter stalk). This variety of corns is always underproduction though it is sold 80 yuan per kilogram (11dollars per kilo approximately), almost 1.5-2 times more than ordinary seeds.

Moreover, Direct Zhang denied the comments that American public refuse GM food in their diets. He said that, above 95% of the corns' cultivation uses GM seeds, the others are for the sake of preventing variation appears in worms' population, which is a general knowledge in American farmers. Broadly speaking, apart from the 30% exports', the domestic consumption is divided into three fields, with approximately 60% in fodder producing, 20% in biofuel manufacture and the surplus being on the markets.

Director Yong is also an advanced professor both in academic and experimental domains. She stated frankly that although GM soybean's implantation are banned, 98% of the soybean products are GM soybeans, including livestock's' feedstuff, protein powder, soya oil, fermented bean curd etc. According to the data in 2014, the amount of soybean import in China was 71.4 million tons, which is 6 times of Chinese domestic output. The most pivotal issue at present is commanding state-owned technology so as to avoid dependence on importation. She also emphasized that the previous decades witnessed tremendous achievement of Chinese researches in GM soybeans. Since the first generation of HT(Herbicide-Tolerant) soybeans were successfully developed in 1996, experiments on 2nd and 3rd generation have achieved tremendous successes, which has greatly reduced the dependence on Monsanto company. The scientific group that Ms. Yong leads is working on the topic of cultivation of high-quality GM soybeans, with a lower proportion of linolenic acid and provide better constituent of aliphatic hydrocarbons. Moreover, burgeoning projects like types of drought-resistance, alkaline-resistance, high-heat resistance and phosphorus efficient, are under testing. She also warned that, the safety of GM food is still intangible. No one can promise GM food has no detriment to human beings.

Define a typical family

With the deeper research carrying on in genetically modified crops, amount of farmers in rural areas are contracted with scientific institutions. Here is an example in Di Shang village, Qiu Tou Town, Gao Cheng Area, Shijiazhuang City, Hebe Province. Qian Yanxing, a 56 years old man, has a cultivated field of genetically modified corns. He lives with his wife, who is a shopkeeper of a grocery store nearby but also works in fields irregularly, and his

mother, who doesn't have labor capacity currently. He has three daughters and adopted a son. The girls are 32years old, 30years old and 27 years old respectively. And the boy is 24 years old and got married in April this year. All kids moved out and are living with their own family in different cities. The size of his field is 7 mu (about half hectares) and it is divided into three pieces, with 3 mu (1/5 hectares) of corns, 3 mu (1/5 hectares) of wheat and 1mu (1/15 hectares) of persimmon trees. They cultivate the fields by intercropping. With the improvement of scientific literacy in rural areas, the whole family have health insurance. The mature crops are used in scientific researches and commercial usages, both the methods can bring profits for Qian. Generally counted, the family earns around 25000RMB (about 3500 dollars) per year from the crops, which are available for the couple and the old lady to survive.

Social Research

To make clear how much the public know about GM and how many people support it, I did a survey in a senior high school and an enterprise respectively. The content of the questionnaire is as follows,

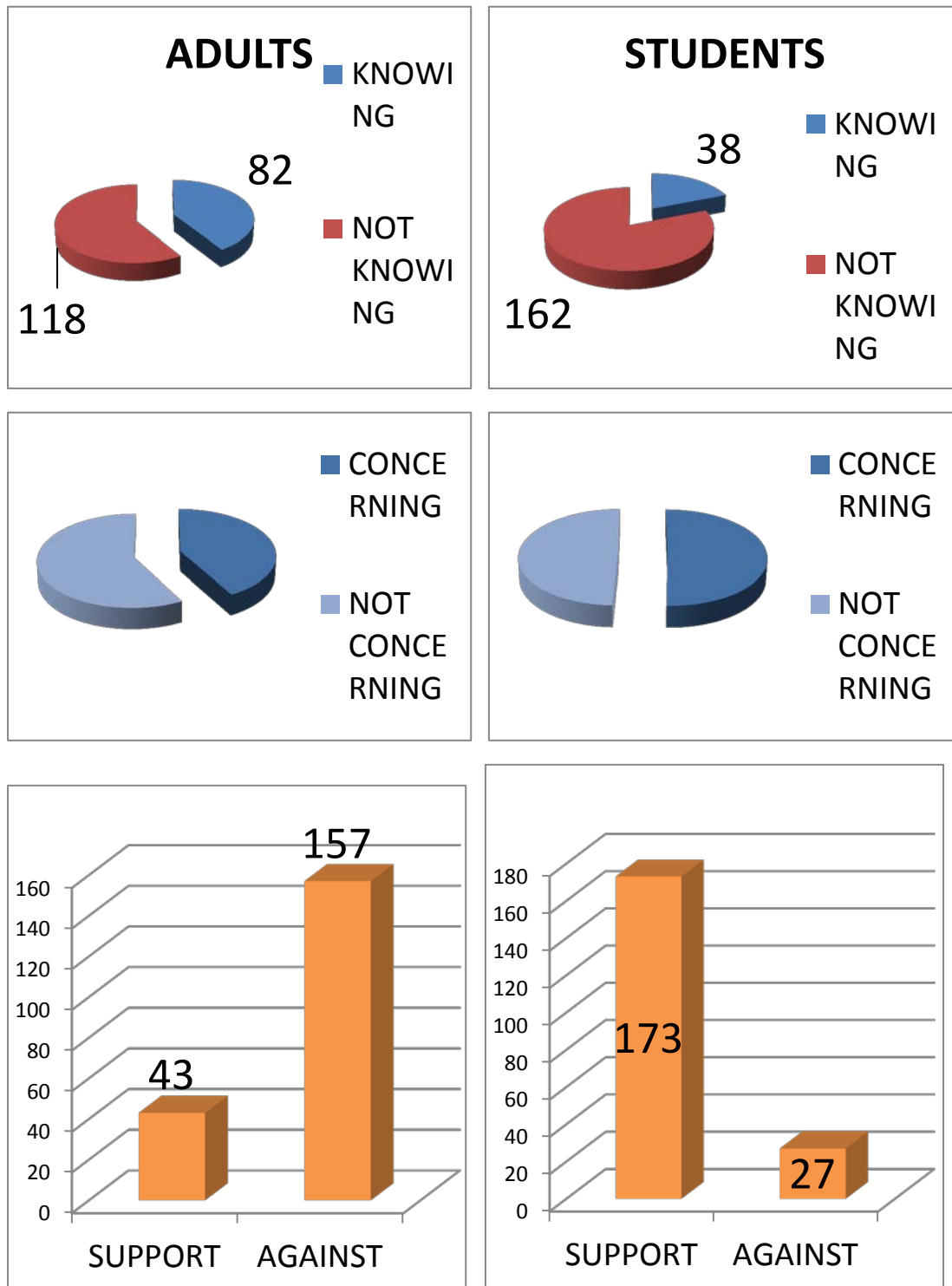
Questionnaire about genetically modified food (GM food)

Occupation: student employee

1. How much you know about transgenic?
 Much A little None
2. The major way you got knowledge about GM food is through,
 Class Internet Official media Hearsay
3. Will you particularly pay attention to report on GM food?
 Always Frequently Rarely
4. Which of the followings are GM foods?
 soybean corn rice tomato Orange cotton
5. Do you consider genetically modified food harmful?
 Yes No Not knowing
6. Which of the followings do you think owns the largest GM planting area?
 USA China European countries Brazil
7. Do you support China planting GM crops?
 Yes Reason _____
 No Reason _____
8. How much GM food do you think has already appeared on Chinese market?
 A few Much, but without public announcement
9. What do you think is the most important in deepening the development of transgenic?
 Perfecting and improving rules and regulations
 Focusing on researching and experiments
 Enhancing public understanding

We send our sincere appreciation to you.

According to the result of investigation, I analyzed the data as follows,



Two kinds of pie charts illustrate the acquaintance (shown from No.1, 4, 6) and attention (shown from No.2, 3) respectively of students and adults on GM food. As it can be seen, students keep a more watchful eye on GM food, whereas adults have more life experiences. The knowledge learned from class is not combined tightly with realistic social situation.

The bar chart compares the approval rate on GM food of students and adults. Students mainly consider the national grain output and the benefit GM food brought macroscopically. On contrast, adults consider the safety their kids and themselves first in majority.

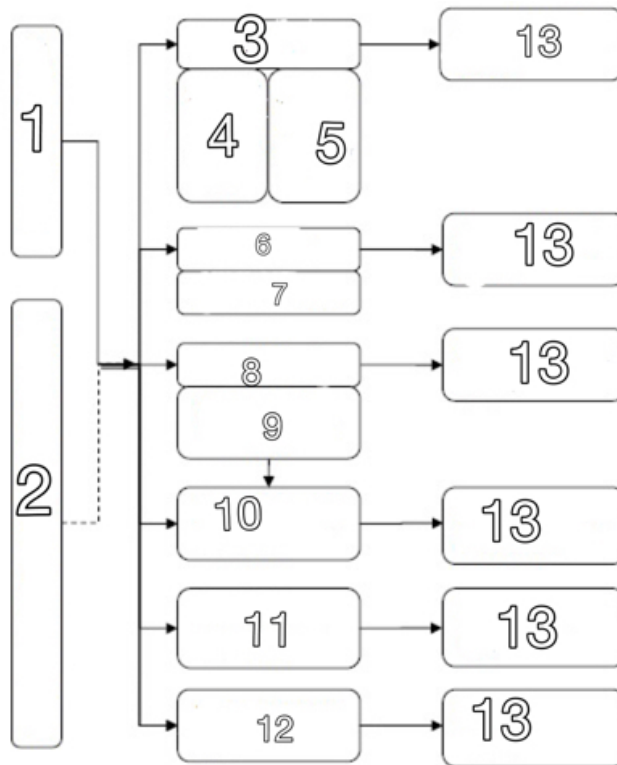
Besides, the answer for *which aspect do you think is the most important in GM development* concentrates on the supervision of government, with 35%, compares with 23% on technology evolution and 42% on public acquaintance. From this point of view, we may deduce that the suspect on GM nowadays is mainly caused by the lack of knowledge and the mistrust towards the government.

Obstructions in further development

Combining the results that interview, investigation and information reflected, the obstructions in the course of deepening the development in GM food in China can be summarized into five points.

1. The duality of GM technology. If government hastily impels GM food into process of commercial production before official verification is released, the unpredictable consequence would even menace global ecological balance and mankind health. Considering the immaturity of transgenic, civilians made their options to refuse GM foods.
2. The limitation of public acquaintance. Civilians are confused about rumors and the authentic, even forming a ridiculous cognition like 'being a transgenic after eating GM food'. The improvement of individual quality is a long term issue. Students are simply taught theories of transgenic in class. On the contrary, adults only have life experiences but puzzle about the scientific causations.
3. The loophole in government supervision. It is shown that more than ten rules and regulations have been enacted during previous decades, based on the principle of safety, pro-environment and global engagement. Dr. Yuhong Wang once analyzed the deficiency of the established laws. Low legislation efficiency, conflicts and contradictions and low operability are the main three defects. In reality, the governance opaque behavior made the regulations pieces of waste paper, lessening the government credibility simultaneously.

For instance: The chart below shows the Chinese Institute of GM:



1. Food Safety Committee
2. Joint Conference
3. Ministry of Agriculture
4. GM food safety Administration
5. Biological Security Council
6. Ministry of Environment
7. Biological Safety Administration
8. Ministry of Health
9. GM food experts committee
10. CFDA
11. AQSIQ
12. SAIC
13. Local authority

The defects in the supervision structure are basically three aspects---- defective institution (lack of coordinative sections), coexist and absence of regulation overlap and insufficient regulation ability construction.

4. The kernel in this issue---benefit. Benefit can promote the scientific progress or be a great obstacle. Obtaining a unique GM patent signifies to gain intellectual property that can bring profits, which accounts for the international research in this domain. In addition, the effect of successful GM on related staff in links of researching, producing and marketing will stir up resistance. With benefits driving, the attack on GM appeared in crowds, which leads to the arising of 'Anti-GM' group. Public, especially those who are not well educated are likely to be deceived by rumors on the Internet. Netizens have become an

increasing power, who even leads the consensus in modern society. Driven by ‘group psychology’, civilians ignore the dispel of the rumors from experts but believe firmly in ‘Most is the truth’.

5. The particular benefit issue in China---conspiracy theory. Here’s a post on forum Kun Shan----- “However experts advocate GM is harmless, we just need to remember: 1.USA banned it, 2.EU banned it, 3.Chinese officials food providing system banned it, 4.World Expo banned it, 5.Asian Games banned it, 6.Africa banned it, 7.Universiade banned it, 8.RF proved that GM food made animals die out in three generations, 9.The Treasury canteen banned it.’ Though the contents are ridiculous enough, public will be confused when this sort of passages accumulating to fill the whole website, which caused the public to believe “China has become the world's GM laboratory, and we are all lab-rats”. Meanwhile, French documentary *A World In the Eyes of Monsanto* added the public doubt. The ‘Golden Rice’ case played as evidence in the negative side as well. In fact, public consensus denounced that the development of GM food has insidious political aim inside.

Solutions

Genetic modified Food should be considered a science of fair project instead of a social problem. Overall, the principles to deepen the development of genetic modified food in China should follow what Dr. Long ping Yuan has said, ‘Be vigorous in researching, while cautious in generalizing’.

1. **Accelerate the science and technology development.** As Dr. Jiming Li once stated, ‘After foreigners broadly collected varieties of domestic crops and carried on GM and molecular markers, Chinese have to pay a huge sum to buy the intellectual property before taking the materials into the usage of researching and breeding. China then will be genuinely threatened.
2. **Improve the education system in GM fields.** It is urgent to raise the level of public scientific standard. Government should magnify the voice of experts and scholars, in order to scientize genetic modified food, to bring truth out of demonization. It is fit here to imitate an institution in UK, named Science Media Centre. It is an organization comprising officials and NGOs, which consists of Cambridge, ministry of health and other legal representatives as well. As an independently running organization, it releases information based on accurate theories. For instance, if there comes a report that claimed variation which appeared on human after eating GM food, scientists of this institution will arrive to do experiments at the first time. Media will get data from them before beginning to write unadorned reports.
3. **Promote government functions.** It is apparent that government has a great influence on guiding the directions. Science is the backbone during the development, like the abandon of allergic nuts in Brazil, which set a standard in technical guarantee. Chinese government should consummate the rules and regulations concerning GM foods, take the

responsibility to detect the import and export strictly and intensify the penalties. Meanwhile, the development of GM food should be transparent, with each GM productions being labeled.

Conclusion

Transgene is a main technique that can alleviate global hunger immensely, which should be paid close attention throughout the world. Chinese government should keep following the six words--- ‘Vigorous in researching, cautious in generalizing’ in the process of going deep into GM experiments. As a country with enormous population, China has the responsibility to invest more to ensure food safety. Perhaps it is just like Mr. Nigel Helford once said, “Genetic modified food is more command of a scientific controversy.”

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