Summary of Researches on the Impact of Developing Energy Crops on China's Food Security

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Abstract: In recent years, the academic community has engaged in intense discussions on whether the development of energy crops will affect China's food security. Although there is basically agreement, there are still differences. This paper aims to explore whether China can solve the complex chain problem of “increasing energy demand, increasing energy resources, highlighting the increase in land resources required for an energy crop – reducing food production land resources – and threatening food security”.

1. Introduction

Since the 18th National Congress of the Communist Party of China, the Party Central Committee with Comrade Xi Jinping as the general secretary has always regarded food security as the top priority for governing the country. It has raised a new strategy for national food security in the new era and put forward the "rice theory" and "bottom line theory". "Red Line Theory" and further pointed out in the report of the 19th National Congress that "ensure the national food security and put the Chinese people's rice bowl in their hands", thus forming a series of important food safety theory innovations and practical innovations. Going out of a food security road with Chinese characteristics.

On the other hand, the contradiction between China's huge energy consumption and energy shortage has become more and more prominent, and the environmental pollution caused by energy consumption has become more and more prominent. According to a study by the International Energy Agency, by 2020, China's oil imports will account for 77% of total domestic demand, and by 2030 it will reach 84%. The sharp increase in China’s oil imports has also attracted the attention of other countries in the world. Some countries have even thrown out the “oil threat theory” against China.

Therefore, the development of clean energy is extremely urgent. However, at present, China's energy crops mainly rely on crop fruits, so they must be planted on the land to harvest. Therefore, whether planting energy crops will compete with food, whether energy crops can be developed to ensure energy security on the basis of ensuring food security becomes a very real problem, how to develop energy crops under limited land resources. The research also has strong theoretical and practical significance.

2. Foreign related research

Since the successful Nobel Prize winner Calvin in the United States planted energy plants in California, a wave of research and development of energy plants has been rapidly established around the world. Many countries have also developed corresponding research and development programs, such as Brazil's alcohol energy plan and the world's largest biomass energy project ProAleoo1 (ProAleoo1), the US energy farm, the EU's energy development strategy. In 1975, Brazil proposed an alcohol project to study the production of alcohol from sugar cane. In 1979, the United States developed the "UPR (Genetic Improvement of Asexually Reproductive Crops)" program. In the mid-1980s, India and the United States jointly implemented the "IACRP Program (India-US Sugarcane Coordination Research Program), which are aimed at energy crops. Selected breeding research carried out.

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In Brazil, many farmers turned to producing energy crops because they were more profitable than traditional production activities, causing other crops to be replaced by sugar cane (Brown, 1980; Johansson, 2007; Meekhof, 1984). In September 2005, Brazilian Agriculture Minister Rodriguez Gus wrote that the oil era will end and bioenergy will become a new energy source that is widely used. R. Rathmarm et al. (2010) have shown that in addition to the above effects, it is possible to increase the price of agricultural land. The US Department of Agriculture's Shapouri (2003) analysis believes that the development of biomass energy in the United States will seriously affect the planting structure in the United States, which will increase the area planted in the United States, resulting in a significant reduction in the area planted with wheat and soybeans. Both Mathews (2007) and Wright (2006) have found that agricultural energy has dynamically changed land use, which has led to a short-term rise in food prices. Donald Mitchell (2008) used time series modeling to analyze the reasons for the record high food prices, and found that bioenergy development in the United States and Europe is the main reason, while the dollar depreciation, rising food production costs, import and export related policy restrictions, natural disasters, etc. Not the main reason. Li Ganqiong (2008) believes that the development of fuel ethanol not only affects the supply and demand of domestic corn, but also further affects the international trade of corn. Brown (2007), who once said that "China is making the world hungry", believes that the development of fuel ethanol will generally increase world food prices, which will have a serious negative impact on poor countries that have not yet resolved food and clothing problems or rely on food imports. The results of the International Food Policy Research Institute (2006) on the economic impact of developing fuel ethanol in countries such as India, the United States, and Brazil show that if these countries produce fuel ethanol according to the intended target, the world agricultural product price will increase by about 10%.

According to existing research, scholars believe that the development of energy crops poses a certain threat to international food security. However, some articles believe that it is only a short-term situation. In the long run, there will be no effective competition between biomass energy and food. The reasons include: the development of second-generation biomass energy technology will reduce the use of food crops; agricultural productivity Raising the productivity of the land; using marginal land and land that is being recuperated, does not crowd out the land for food production. (Goldemberg, 2008; Dale, 2007; Kerckow, 2007; Pimentel, 2007; Turpin, 2009; Sumathi, 2008; Hazell, 2006).

Therefore, Yan Fengzhu (2009) pointed out that the starting point of national biomass energy strategy is not so simple. The main purpose of developed countries is to occupy the new energy market first. The few developing countries that develop biomass energy have more purposes. Seeking more forms of protection in the field of agricultural products.

3. Domestic related research

Guan Qiaoyan (2007) believes that the use of biomass energy to develop energy crops cannot adversely affect the ecological environment and pose no threat to food security. Chen Jianpeng (2009) believes that the production of raw materials and food is a “zero-sum game”, and the two are the relationship. Qiu Huanguang (2009) analyzed the impact of biofuel ethanol development on recent global and China's rising food prices. According to their research, it can be concluded that bioenergy development is one of the significant factors in the recent sharp rise in international food prices. Shen Yafang (2008) pointed out that the use of corn as a raw material for the production of fuel ethanol will be bound by the land and will affect China's food security. To solve this problem, it is necessary to develop internal potential. Moreover, the use of alternative crops as raw materials for the production of fuel ethanol should be developed in the direction of non-food. Yang Shiqi et al. (2009) also pointed out that the development of energy crops must occupy a certain area of cultivated land, which inevitably leads to the problem of competing with land for food crops. Before it can completely solve food security, it will have a negative impact. Huang Jiyu (2009) believes that the development of fuel ethanol will significantly increase the price of agricultural products for energy crops, but it has some negative impacts on food security such as rice and wheat.

China's use of crop main products as raw materials to produce fuel ethanol should maintain a moderate scale and strictly limit corn. When food or feed crops are used to produce fuel ethanol, the future focus should be on non-food ethanol, especially on second-generation bioenergy technologies (ie, ethanol production from cellulose). From the perspective of national food security, Liu Yufeng (2009) believes that the main food crops such as corn and wheat cannot be used in large quantities for fuel ethanol production, but to break through the bottleneck of using aged grains such as corn and wheat as raw materials for production. Find non-food and other raw materials that are suitable for the development of fuel ethanol production. Fu Chang (2014) believes that with the increase of the consumption level of sugar in China, the domestic production will inevitably fall short of the amount needed for sugar production, which makes sugarcane and sugar beet difficult to use as raw materials for fuel ethanol production. Li Meng (2012) believes that the relationship between food consumption and biofuel ethanol should be objectively analyzed, and a food security early warning system should be established to balance the development of grain fuel ethanol and non-grain fuel ethanol industry, and smoothly transition to “non-food”.

The above research suggests that if we continue to use corn, sugar cane and other food crops to produce fuel ethanol, it will pose a threat to China's food security.

Li Bifang (2010) and Ning Zezhen (2010), from the perspective of food disputes, believe that the current stage is not enough to promote the food crisis. The article believes that the food crisis generated by bioenergy should be from the corresponding import and export and land. Use it to find a solution. Liu Xiaoran (2006) also pointed out from the perspective of food security that if China uses a variety of raw materials to produce biomass energy, as long as the development is reasonable, the development of bioenergy will not affect food security. Du Fengguang (2006) also believes that because a variety of raw materials can be used to produce the material fuel ethanol, so that it does not rely too much on a certain raw material for producing fuel ethanol, so the production of material fuel ethanol will not be too much threat. Food security in our country. Wang Fang (2013) believes that there are about 100 million hectares of land that can not be planted in China, but can plant energy plants, and 3.11 million hectares of artificial afforestation land. According to the utilization rate of 20% of these land, about 1 billion tons of biomass can be produced per year, plus energy crops such as cassava and sweet sorghum. According to experts, at least 50 million tons of fuel ethanol and biodiesel can be produced every year. The potential for renewable energy development and utilization is enormous. According to public data, Haoyu (2016) pointed out that China's annual gasoline consumption in 2015 was 115 million tons. If all gasoline is added with ethanol as an oxygenator, it will require 15 million tons of ethanol, or 45 million tons of corn. This is not a large proportion of corn with excess food stocks. What's more, foods grown in some polluted areas and foods that are inedible due to long-term inventory deterioration can be used as raw materials for the production of ethanol fuel. Therefore, the development of fuel ethanol is a pure concern for food safety.

Yuan Zhanqi (2010) and other research found that a series of cassava varieties were introduced from South China, planted on the marginal land of red soil with low soil fertility, with less flowering and low planting costs. Xu Zhuqing et al., taking the cultivation of medicinal paulownia in Linyi City, Yunnan Province as an example, to explore that the substitution effect of medicinal paulownia is mainly limited to crops on non-excellent arable land. It has the strongest substitution intensity for mountain corn, is a good choice for using marginal land, and is a policy of returning farmland to forest. Parallel is not awkward. On the basis of China's national conditions, Chen Liang (2009) analyzed the feasibility of planting bioenergy crops in the poor land of western China, and pointed out that rational development and utilization of poor land in the west can guarantee food security to a certain extent and reduce the use of fossil fuels. Environmental pollution, etc. The program (2010) believes that planting energy crops such as switchgrass and miscanthus in the Loess Plateau region in the northern farming-pastoral ecotone can achieve a “win-win” of economic and ecological benefits. Qiu Xiaoqiang (2008) pointed out that planting energy cassava can benefit a variety of marginal land. Yan Liangzheng (2008) believes that China's Xinjiang, Gansu, Ningxia, Shandong and Jiangxi provinces have great potential to use non-grain crops to produce non-grain

crops. Wang Hao (2012) and other basic national conditions analysis of China's land resources, that three types of land can be used to develop energy crops: First, it has not been used, natural conditions are poor, but it can produce certain biomass, have certain production potential and The land of development value; the second is the barren hills, the wasteland, the sand area and the saline-alkali land; the third is the winter leisure field produced on the farmland operation time.

In general, the development and utilization of marginal land (referring to non-cultivated land with relatively poor natural conditions, including new breeding grounds, barren slopes, tidal flats, saline-alkali land, etc.) is the only way for biomass energy to develop in China.

4. Summary

At present, the development of global energy crops is mainly characterized by the relatively weak pattern of the strong America, Europe and Australia and Asia. The main representative countries of the Americas are Brazil and the United States. While Africa is basically in a blank, it may take some time to develop energy crops. Therefore, China's research and practical development of energy crops is relatively late. From the existing research, the academic view between the development of energy crops and China's food security is basically the same, that is, the development of energy crops cannot pose a threat to China's food security. But there are still differences.

First of all, whether the production of fuel ethanol based on corn will pose a threat to China's food security. Many scholars believe that if we continue to use corn and other food crops as raw materials for fuel ethanol, it will not only promote the rise of agricultural prices but also pose a threat to food security, so it should be transformed into non-corn energy crops. Some scholars believe that China's current corn stocks High, the annual surplus of corn is serious, even if you continue to use corn as a raw material for fuel ethanol, you can not completely destock, and will not threaten China's food security.

Second, there is a disagreement about whether energy crops compete with food. Some scholars have said that there is a problem with the land for food, and more scholars believe that the current energy crops are mainly used for marginal non-food land, so it is not enough to threaten food security. Some scholars believe that the current energy crop cultivation is mainly based on non-food crops, second-generation energy crops and even algae organisms, and there is no problem with food disputes.

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