

# Ecological protection strategy of grain production competitiveness in Jilin Province

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**Abstract:** *Through the analysis of the current situation of grain production and ecological protection policies in Jilin Province, this paper further clarified the effect of policy implementation and the relationship between ecological protection and production competitiveness, and put forward the development strategies of green, quality, characteristic and brand. Furthermore, this paper advocates for the construction of a modern seed industry system, the development of staple food industrialization, the promotion of a grain circular economy, the integration of ecological protection with agricultural production, and the protection and utilization of black soil, among other strategies. These initiatives are designed to achieve sustainable development in Jilin Province's grain industry and to enhance its global competitiveness.*

**Keywords:** *grain production competitiveness; Ecological protection strategy; Jilin Province; Sustainable development*

## 1. Introduction

As an important agricultural town in northeast China, Jilin Province plays an important role in national grain production. Jilin Province not only occupies a core position in domestic food security, but also plays an important role in the international food market. The latest research data show that the grain sown area of Jilin Province accounts for more than 85% of the total cultivated land of the province, and the average annual grain output is stable between 16-25.1 million tons, accounting for about 4-5% of the total national output. The comprehensive grain production capacity of Jilin Province has reached 25 million tons, and its per capita grain consumption, sales volume and corn export volume are among the top in the country. Since the reform and opening up, Jilin Province has provided the country with more than 300 billion kilograms of commodity grain, which has made indelible contributions to ensuring national food security and social stability and development, and occupies a pivotal position in China's food security system. However, with the change of global climate and ecological environment, the sustainability of grain production in Jilin Province is facing unprecedented challenges. How to protect the ecological environment and realize the sustainable development of agriculture while ensuring food production has become an important topic of agricultural development in Jilin Province and even the whole country. Jilin Province is rich in agricultural resources, especially black land, a precious natural resource, which is an important basis for grain production. Therefore, the protection and rational use of black land resources is of great importance to enhance the competitiveness and sustainability of grain production in Jilin Province. In this context, this paper aims to further clarify the policy implementation effect and the relationship between ecological protection and production competitiveness through the analysis of the current situation of grain production and ecological protection policies in Jilin Province. By proposing and implementing effective ecological protection strategies, we can promote the green transformation and sustainable development of agricultural economy while ensuring national food security, and make positive contributions to the realization of rural revitalization strategy and ecological civilization construction.

## 2. Analysis of current situation of grain production in Jilin Province

### 2.1 Production capacity analysis

According to the latest data released by the National Bureau of Statistics, the total grain output of

Jilin province in 2023 reached a record high of 83.73 billion jin, a year-on-year increase of 5 percent, and jumped from fifth to fourth place in the country's ranking. The sown area was 5825.6 thousand hectares, the total output was 41.865 million tons, and the yield per unit area was 7186.4 kg/ha. The main grain crops in Jilin Province include corn, rice and soybeans, of which the grain yield per mu is 940.52 jin, 21.58% higher than the national average, ranking first among the main grain producing provinces. In 2023, the grain yield per unit area further increased to 958.2 jin/mu, continuing to maintain the first place in the national grain-producing province, showing the growth trend of grain production in Jilin Province.

## **2.2 Analysis of production cost**

In terms of production costs, Jilin Province improves land use efficiency by building high-standard farmland. In 2023, 4,929,400 mu of high-standard farmland will be built, and a total of 4,2049,400 mu will be built, accounting for 51.3% of permanent basic farmland. In addition, the comprehensive mechanization rate of major crops in Jilin Province has reached 94 percent, which is nearly 20 percentage points higher than the national average, helping to reduce labor costs. In terms of technical input, Jilin Province promoted 105 leading crop varieties, including corn, rice and soybeans, and reduced production costs through improved seed promotion and yield improvement actions.

## **2.3 Product quality analysis**

Jilin Province has also achieved remarkable results in the quality of grain products. By promoting breakthrough and saline-tolerant varieties, as well as selecting 76 crop varieties for high-yield competitions, Jilin Province has improved the quality of food products to meet higher quality standards. Although specific consumer satisfaction data is not directly available in the search results, the increase in grain production and yield per unit area in Jilin Province, as well as the promotion of high-standard farmland and improved varieties, have helped to improve product quality, which may increase consumer satisfaction.

## **3. Effects of ecological protection policies and practices**

### **3.1 Policy Background**

The ecological protection policy of Jilin Province and its evolution process can be shown in many dimensions. The Regulations on Ecological Environmental Protection of Jilin Province was deliberated and adopted on November 27, 2020, and officially implemented from January 1, 2021, which not only marks a new era of ecological environmental protection in Jilin Province, but also provides a solid legal support for environmental protection in the province. Further, Jilin Province issued the "Beautiful Jilin Construction Planning Outline (2024-2035)", which aims to create a green, rich, safe and modern Jilin, and further demonstrates the policy orientation and historical development vein of Jilin Province in the field of ecological protection. These policy documents jointly outline the policy framework and historical track of ecological protection in Jilin Province, showing its firm pace and clear direction on the road of ecological civilization construction <sup>[1]</sup>.

### **3.2 Policy implementation effect**

The ecological protection policy of Jilin Province has achieved a series of results in the field of grain production. The policy has promoted the green transformation of the industrial structure, optimized resource consumption and reduced pollutant emissions. Progress has also been made in the prevention and control of environmental pollution, with improved air quality, water and soil environmental quality. The enhancement of ecosystem functions is reflected in the protection and restoration of forests, black lands, grasslands and wetlands. In terms of grain production, Jilin Province has achieved growth, with the total grain output in 2022 significantly higher than that in 2010. Nevertheless, there are challenges in the implementation of the policy. In the northeast black soil area, the problems of topsoil loss and organic matter content decline are prominent, which affect the quality of cultivated land. Soil pollution and heavy metal pollution in some major grain-producing areas pose a threat to food security. In addition, increased dependence on groundwater in the northern grain-producing provinces may lead to reduced water security capacity, posing risks to food production. These problems need to be paid attention to in the subsequent policy formulation and implementation,

and corresponding measures should be taken to solve them.

### ***3.3 Relationship between ecological protection and production competitiveness***

Ecological protection measures have had a positive impact on the competitiveness of food production. First, by implementing ecological protection policies, Jilin Province has improved land quality and production efficiency, such as high-standard farmland construction, and enhanced the stability and sustainability of food production. Secondly, ecological protection policies have promoted the innovation and application of agricultural technologies, such as the application of "water and fertilizer integration + dense planting" technology, which has increased grain yield per unit area. In addition, ecological protection also helps to improve product quality and enhance market competitiveness, such as through the research and promotion of conservation farming technology, protect black land, and improve food production and quality. However, ecological protection may also lead to cost increases, such as high-standard farmland construction, ecological restoration, etc., require large capital investment, which may have an impact on the short-term cost competitiveness of food production. But in the long run, ecological protection can help achieve sustainable development and improve the long-term competitiveness of grain production in Jilin Province.

## **4. Ecological protection strategy of grain production competitiveness in Jilin Province**

### ***4.1 Implementation of green, quality, characteristic, brand development strategy***

Jilin Province implements green, quality, characteristic and brand development strategies to promote the sustainable development of grain industry. The green development strategy focuses on reducing the environmental footprint of agricultural production and improving resource efficiency by promoting water-saving irrigation, precision fertilization and other technologies. The quality strategy improves the internal quality of food products and increases the supply of high-protein and high-nutrition food products through scientific planting management and variety improvement. The characteristic strategy focuses on the development of regional characteristic food products to meet the market demand for characteristic agricultural products. Furthermore, the branding strategy, which includes the development and promotion of geographical indication products, is instrumental in bolstering the market recognition and brand value of Jilin Province's grain products, consequently amplifying their market competitiveness.

### ***4.2 Construction of a modern seed industry system***

The establishment of modern seed industry system in Jilin Province involves the selection and promotion of fine varieties, the protection of germplasm resources, the innovation of breeding technology and the supervision of seed quality. Jilin Province must strengthen the cooperation between scientific research institutions and enterprises to promote scientific and technological innovation in the seed industry. This collaboration aims to cultivate new varieties that are high-yielding, of high quality, and exhibit stress resistance, adapting to the province's climate and soil conditions. Additionally, it is essential to improve seed laws and regulations, enhance market supervision, and ensure fair competition in the seed market, as well as protect the legitimate rights and interests of farmers. These measures are crucial for enhancing the overall competitiveness of Jilin Province's seed industry.

### ***4.3 Development of staple food industrialization***

Jilin Province promotes the overall competitiveness of grain industry through the industrialization of staple food. The industrialization of staple food includes improving the technical level and efficiency of grain processing, as well as product innovation and market expansion. We will develop high value-added products such as convenience food and quick-frozen food to meet consumers' demand for convenient and healthy food. Jilin Province should focus on strengthening the construction of the post-production service system for grain, which includes improving the modernization of grain storage, transportation, and processing facilities. This initiative aims to reduce grain losses and enhance the overall efficiency of the grain industry.

#### **4.4 Promotion of grain circular economy**

Jilin Province promotes grain circular economy to maximize the utilization of resources and minimize the impact on the environment by improving the utilization rate of grain and oil by-products [2]. Specific measures include the promotion of straw returning to the field, energy utilization of corn cob and rice husk, feed utilization of wheat bran and oil cake and so on. Technological innovation and policy guidance promote the food industry to develop in the direction of low carbon, environmental protection and high efficiency, and achieve a win-win situation of economic and ecological benefits [3].

#### **4.5 Integration of ecological protection and agricultural production**

Jilin Province has realized the organic combination of ecological protection and agricultural production by implementing ecological agriculture models, such as organic agriculture and conservation tillage, to reduce the use of chemical fertilizers and pesticides and protect soil and water resources. The government of Jilin Province should promote ecological compensation mechanisms and encourage farmers to adopt environmentally friendly agricultural production methods [4]. Additionally, the government should strengthen the promotion and training of ecological agriculture technology to improve farmers' ecological protection awareness and technical level.

#### **4.6 Protection and utilization of black land**

Jilin Province implemented black land protection and utilization strategy to ensure food security and sustainable agricultural development. Black land conservation strategies include scientific crop rotation, subsoil preparation, soil improvement and other measures to improve soil fertility and water retention. Jilin Province must strengthen the monitoring and management of black land resources, formulate reasonable land use planning, and take measures to prevent excessive reclamation and soil degradation. It is also essential to protect and restore the ecological function of black land to ensure the long-term stability of food production [5]. Through these measures, Jilin Province can improve the competitiveness of grain production and realize the sustainable development of agriculture while protecting the ecological environment.

### **5. Conclusion**

This study deeply analyzed the reality of grain production in Jilin Province, ecological protection policy and its implementation effect, and discussed the internal relationship between ecological protection and grain production competitiveness. On this basis, this paper puts forward ecological protection strategies to promote the sustainable development of Jilin's grain industry and enhance its competitiveness in the global market. Specifically, the study highlights the importance of implementing greening, quality, specialisation and branding development strategies aimed at reducing the environmental impact of agricultural production, improving product quality, meeting market demand and enhancing brand influence. At the same time, constructing modern seed industry system, promoting staple food industrialization, promoting grain circular economy, realizing organic combination of ecological protection and agricultural production, and strengthening protection and utilization of black land all provide feasible ways to enhance the competitiveness of grain industry in Jilin Province. The implementation of these strategies not only helps to protect and improve the ecological environment, but also improves the efficiency of food production and product quality, thus ensuring national food security and contributing to the sustainable development of agriculture.

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