

Technical Barriers to Trade and China's Agricultural Products Export - Taking Garlic Export as an Example

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Abstract: Firstly, this paper analyzes the impact mechanism of TBT on agricultural exports; Secondly, based on the characteristics of technical barriers to trade in the United States, the European Union, Japan and South Korea, this paper analyzes the export situation of China's agricultural products, the number of batches detained and recalled, the types of blocked products, and the reasons for the blocked products. The research finds that the overall situation of China's agricultural products encountering technical barriers to trade has improved, but the situation of encountering green barriers is increasingly serious. Therefore, this paper selects the impact of green trade barriers on garlic export as an example to analyze the reasons for China's garlic export encountering green barriers and propose countermeasures. Finally, from the perspective of actively utilizing the WTO Agreement and the dispute settlement mechanism, taking countermeasures, improving the quality level and innovation ability, and establishing an early warning mechanism, specific suggestions were put forward.

1. Introduction

With the fierce competition among countries in the field of economic and trade, the situation of trade friction between countries is becoming increasingly diverse, gradually transforming from a single tariff barrier to a technical trade barrier, becoming an important means for many developed countries to safeguard their own interests. In recent years, technical trade barriers in countries such as the United States, the European Union, Japan, and South Korea have had a certain impact on China's agricultural product exports, leading to an increase in agricultural product export costs and a decrease in the scale of agricultural product trade. In 2001, China joined the WTO, and the export value of agricultural products was 16.07 billion US dollars. In 2006, the export trade volume of agricultural products was 31.01 billion US dollars. According to a survey by the Ministry of Commerce, in 2021, 71% of China's export enterprises faced technical trade barriers, 39% of their export products were restricted, resulting in losses exceeding 17 billion US dollars. It can be seen that technical trade barriers have become obstacles to China's agricultural product exports.

On January 1, 1995, the WTO began implementing the Agreement on Technical Barriers to Trade (TBT) and the Agreement on the Implementation of Sanitary and Phytosanitary Measures

(SPS). Technical trade barriers include technical regulations, standards, and conformity assessment procedures, as well as supervision of animal and plant health and food safety. They increase the technical requirements of imported products, increase the difficulty of imports, and achieve the goal of restricting imports. Technical barriers to trade have both restrictive and promoting effects on international trade. On the one hand, in order to meet the requirements of destination countries for export products, enterprises have to increase fixed and variable costs, thereby driving low productivity enterprises out of the market. Among them, fixed costs include upgrading production equipment, obtaining certificates, and adjusting the production chain; Variable costs include technical standard updates, product design and packaging updates, and time costs associated with extended customs inspection procedures. On the other hand, the limitations of technical trade barriers improve the quality of exported products, enhance consumer confidence, reduce the risk of information asymmetry, and thus stimulate consumer demand.

From the perspective of garlic export trade situation, garlic exports face various technical trade barriers and measures. In recent years, countries such as the United States, Brazil, and Canada have implemented anti-dumping measures against garlic in China; South Korea, Japan, and some Southeast Asian countries have taken measures to prevent our products from entering their domestic markets; India, the European Union, and Thailand implement import quota restrictions. These trade barriers have limited the market space for garlic exports in China, increased export pressure on major sales markets, and made it increasingly difficult to explore international markets.

As a developing country, China's ability to resolve trade disputes and respond to technical trade barriers is still relatively weak. Therefore, based on the characteristics of technical trade barriers in developed countries, this article will analyze the situation of China's agricultural product exports being hindered and the reasons for product obstruction. It will clarify the prominent technical trade barriers and agricultural products that are more hindered, providing reference significance for domestic enterprises producing similar products. At the same time, through research on the current trade of agricultural products in China, targeted measures to address technical barriers to trade are proposed to further promote the export of agricultural products in China.

2. Literature Review

In recent years, there have been more and more technical trade barriers set up by foreign countries for domestic products, which has attracted widespread attention from scholars. They have conducted in-depth research on this issue and achieved some research results, which provide a reference for us to deal with technical trade barriers.

The formation of technical trade barriers comes from the following three aspects: firstly, information asymmetry and exclusivity lead to market failure; Secondly, there is a significant technological gap between countries; Thirdly, interest groups within the country seek to safeguard their own interests(Gao Wenshu 2013)[1]. Meanwhile, Gao Jikun (2016) analyzed the reasons for the formation of technical trade barriers from three aspects: international, national, and domestic. He believed that due to the improvement of international understanding of human sustainable development, different countries have different development speeds, and there are huge technological gaps, resulting in different regulations on technical standards[2].

TBT or SPS is not conducive to Brazil's exports(Ferrza et al 2017)[3]. Meanwhile, Song Tian (2018) analyzed the current situation of agricultural products trade between China and countries along the the Belt and Road from a macro perspective, and considered the notification of technical trade measures. The results showed that technical barriers to trade hindered China's exports to countries along the the Belt and Road[4]. Also, Zheng Xutao and Zhou Lingrui (2019) used a gravity model to study the trade situation of tea between China and Japan, and found that Japan's

pesticide residue limit standards significantly hindered the export of agricultural products in China[5]. Then, Fu Shaojun and Chen Zhilin (2020) believe that the technical trade barriers of EU member states have a negative impact on China's high-tech product exports, and there will be a positive effect if the technical trade barriers lag for a period[6]. Moreover, based on the perspective of special trade concerns, the results showed that technical trade barriers significantly inhibited China's agricultural product exports, and the higher the frequency of special trade concerns being discussed, the more significant the inhibitory effect (Zhang Yinghong and Zhu Jing 2020)[7].

Although the above research has conducted qualitative analysis on the reasons for the formation of technical barriers to trade and conducted empirical research on different dimensions. Unfortunately, most studies have focused on measuring technical barriers to trade using notification volumes and have not provided a detailed classification of technical barriers to trade. This article will analyze the situation of China's agricultural product exports being hindered in recent years, define the prominent technical trade barriers, examine their impact on garlic exports, and provide reference significance for other similar products that encounter such technical trade barriers.

3. The Current Situation and Problems of Technical Trade Barriers

3.1. Characteristics of Technical Barriers to Trade in Major Countries

The United States mainly adopts technical trade barriers such as technical standards and conformity assessment procedures to exert an impact on China's agricultural product exports. The United States has established specialized licensed evaluation agencies to test whether products meet standards, and these evaluation agencies must be approved by government departments before they can operate. In addition, the United States has proposed the Critical Control Point (HACCP) for hazard analysis, which monitors and controls the food processing process to provide safety assurance to consumers. In 1973, the United States first introduced the HACCP system for canned food processing, followed by the addition of aquatic products, meat and poultry products to the system.

The EU has the most complete and complex technical regulations, standards, and conformity assessment system in the world, mainly exerting influence on China's agricultural product exports through green barriers. The EU has set strict standards for pesticide residues in agricultural products, aflatoxin levels in food, disclosure of genetically modified foods, and inspection and quarantine of aquatic products. Moreover, with the continuous updates of EU food safety standards, China has gradually encountered an increase in green barriers, and the number of notifications and blocked batches has also increased year by year. In addition, the EU also recognizes the HACCP system, requiring food related enterprises to ensure food hygiene and safety in food preparation, processing, production, packaging, transportation, sales, and other aspects, including analyzing the hazards during food operation and the key points where food hazards may occur, and conducting effective supervision and control at these key points.

Japan mainly exerts influence on China's agricultural product exports through the development of technical standards. In 2006, Japan issued the Positive List System for Agricultural Chemical Residues in Food, which is a technical standard for the system of agricultural chemical residues in food. The affirmative list system divides the residue limits of agricultural chemicals into five types: following the original limit standards without reestablishing temporary limit standards, temporary standards, prohibited substances, exempted substances, and uniform standards. In addition, agricultural products imported from Japan also need to undergo strict quarantine procedures. The Ministry of Agriculture, Forestry and Fisheries and the Ministry of Health, Labour and Welfare are guided by the Food Safety Committee, with the former responsible for disease and pest quarantine and the latter responsible for imported food hygiene and quarantine.

The South Korean government mainly exerts influence on China's agricultural product exports through conformity assessment procedures and product inspection and quarantine systems. In terms of conformity assessment procedures, the National Agricultural Products Quality Management Institute of South Korea has developed Good Agricultural Practices (GAP) to ensure the safety of agricultural products in production, harvesting, and management, specifically by removing harmful factors such as pesticides, heavy metals, and pollutants from agricultural products. In terms of product inspection and quarantine, the South Korean Ministry of Food and Drug introduced the Pesticide Positive List System (PLS) in January 2019, which stipulates that the pesticide residues in food and agricultural products exported to South Korea must comply with the maximum residue limit standard of South Korea. In the absence of a standard, a residue limit standard of 0.01mg/kg is adopted.

3.2. The Current Situation of Technical Trade Barriers

Technical barriers to trade are mainly divided into five types: technical regulatory standards and conformity assessment procedures, product inspection and quarantine, product packaging and labeling requirements, green barriers, and information technology barriers. In China's agricultural product trade, agricultural products are recalled or detained due to encountering technical trade barriers, which worsens the export conditions of our agricultural products. From 2016 to 2018, China's agricultural product exports gradually increased, reaching \$79.71 billion in 2018. With the increase in agricultural exports, the number of batches of agricultural products detained or recalled by the United States, the European Union, Japan, and South Korea has also increased, reaching 1798 in 2018. From 2018 to 2021, the export volume of agricultural products in China will first decline and then rise. In 2020, the minimum export volume of agricultural products will be 76.06 billion US dollars, considering the impact of the COVID-19. With the easing of the epidemic and economic recovery, the export value of agricultural products in 2021 exceeded 80 billion US dollars, reaching a new high. On the contrary, the total number of batches of agricultural products detained or recalled in China due to technical trade barriers in major countries has decreased, as shown in Figure 1.

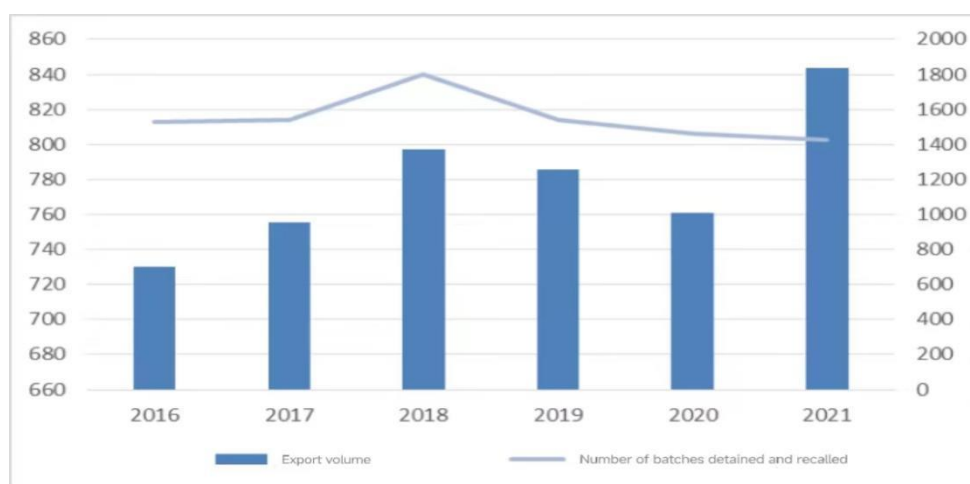


Figure 1. Current situation of China's agricultural product exports from 2016 to 2021. Note: The data is from Agricultural Trade Promotion Center of the Ministry of Agriculture and Rural Affairs, as well as China Technical Trade Measures website

In China's agricultural product trade, vegetables and products, aquatic products and products, and other processed food products are the main hindered products. In 2021, the United States, the

European Union, Japan, and South Korea detained or recalled 1427 batches of substandard agricultural products exported from China, including 246 batches of vegetables and products, 121 batches of aquatic products and products, and 109 batches of other processed food products. Compared with 2020, China's overall export of agricultural products has improved, with a significant decrease in the number of substandard meat products. However, the top three categories of vegetables and products, aquatic products and products, and other processed foods still show an upward trend, as shown in Figure 2.

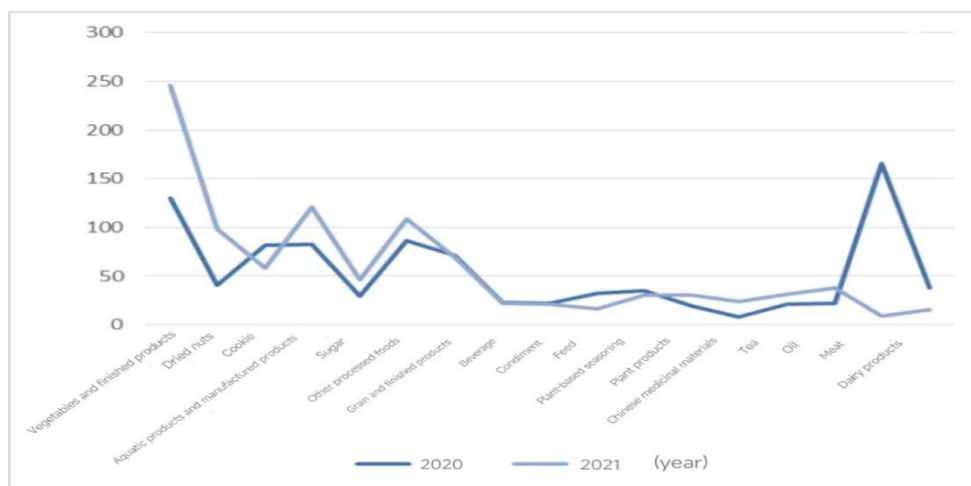


Figure 2. Main categories of agricultural product exports hindered in China in 2021. Note: The data is from China Technical Trade Measures website

In 2021, the United States, the European Union, Japan, and South Korea detained or recalled 289 batches of substandard agricultural products in China due to quality reasons, 175 batches due to non edible additives, 184 batches due to agricultural and animal residues, and 199 batches due to pollutants. Among them, substandard quality and non edible additives belong to technical standards and conformity assessment issues, while agricultural and animal residues and pollutants belong to green barrier issues. Compared to 2020, the impact of packaging and labeling requirements has decreased, while the impact of technical standards, conformity assessment, and green barriers has shown a clear upward trend, as shown in Figure 3.

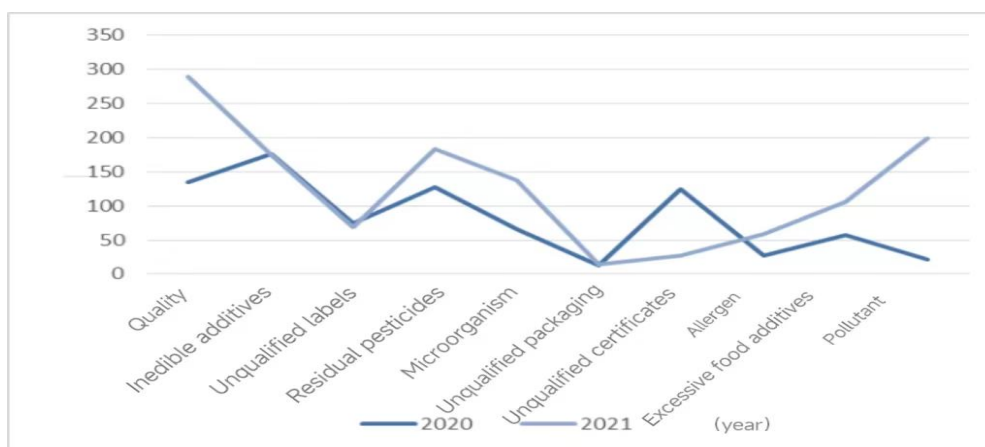


Figure 3. Main reasons for China's agricultural product exports being hindered in 2021. Note: The data is from China Technical Trade Measures website

3.3. The Reasons for China's Agricultural Product Export Encountering Technical Trade Barriers

Compared with developed countries such as the United States, the European Union, Japan, and South Korea, our government lacks attention to technical trade barriers. The United States has a specialized scientific research institution on technical barriers to trade, which can provide timely response and early warning tracking of different product situations; The European Union has set up RASFF and RAPEX warning systems to track technical trade barriers, particularly focusing on industries with severe technical trade barriers such as machinery and textiles in food and non food industries, in order to avoid being damaged by technical trade barriers. Both Japan and South Korea have a positive list system to detect pesticide residues in imported agricultural products. In addition, with the increasing environmental awareness of the government and the public, the government's inspection system for imported products has become stricter, and people are more inclined to choose green products. In recent years, China has also started to learn from developed countries to establish corresponding research institutions, but due to immature systems and imperfect functions, the update of TBT notifications is slow.

Although agricultural products are labor-intensive, with the improvement of international standards, the requirements for product updates have also increased, and products with more technological added value are easily favored. On the one hand, due to insufficient attention paid by Chinese enterprises to technological research and development, and slow technological innovation, products have been returned. On the other hand, due to the short preservation time of agricultural products, they are prone to soil and water pollution during planting. If the production technology of enterprises cannot keep up, they will produce a large number of unqualified products. In addition, enterprises may also have a mentality of taking chances with the high standards set by foreign countries, resulting in export products being hindered by technical trade barriers and being returned, resulting in significant losses.

4. The Impact of Green Barriers on the Export of Agricultural Products - Taking China's Garlic Export as an Example

According to the previous analysis, although the overall obstruction of China's agricultural product exports has improved, the impact of green barriers shows a clear upward trend. This article takes China's garlic export trade as an example to analyze the impact of green barriers on agricultural product exports. The selection of this case has typicality and similarity. On the one hand, the green barriers involved in garlic export almost cover the use of green barriers in agricultural product exports, such as pesticide residue limits and reasonable guidelines for pesticide use, production and processing requirements, etc. On the other hand, the global production, consumption, and export of garlic mainly come from China. Therefore, by studying the impact of green barriers on garlic exports, it can provide reference significance for similar agricultural product exports that have encountered green barriers.

4.1. Overview of Garlic Export in China

China's garlic exports include primary products such as fresh or refrigerated garlic, dried garlic, other fresh or refrigerated garlic, salted garlic, garlic made or preserved with vinegar or acetic acid, and frozen garlic. Among them, the main export products are fresh or refrigerated garlic and dried garlic. From 2016 to 2019, the overall export volume of garlic remained stable. After increasing in quantity in 2020, it returned to its original level, as shown in Figure 4.

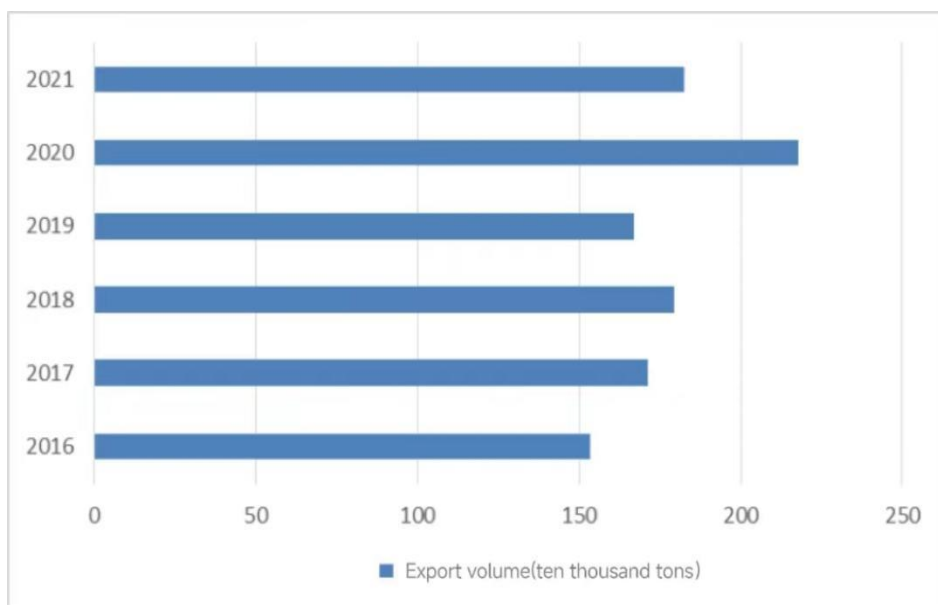


Figure 4. Total Garlic Export in China from 2016 to 2021. Note: The data is from International Garlic Trade Network

According to customs data, the export volume of fresh or refrigerated garlic in 2021 decreased by 25.72% year-on-year. The main exporting countries of fresh or refrigerated garlic are Southeast Asian countries, with Indonesia, Vietnam, and Malaysia ranking the top three. In 2021, the export volume of dried garlic increased by 14.82% year-on-year, with the top three exporting countries being the United States, Brazil, Germany, and the Russian Federation. See Figures 5 and 6. Overall, the garlic export market is relatively concentrated, mainly sold to Southeast Asia and South Asia, followed by South America.

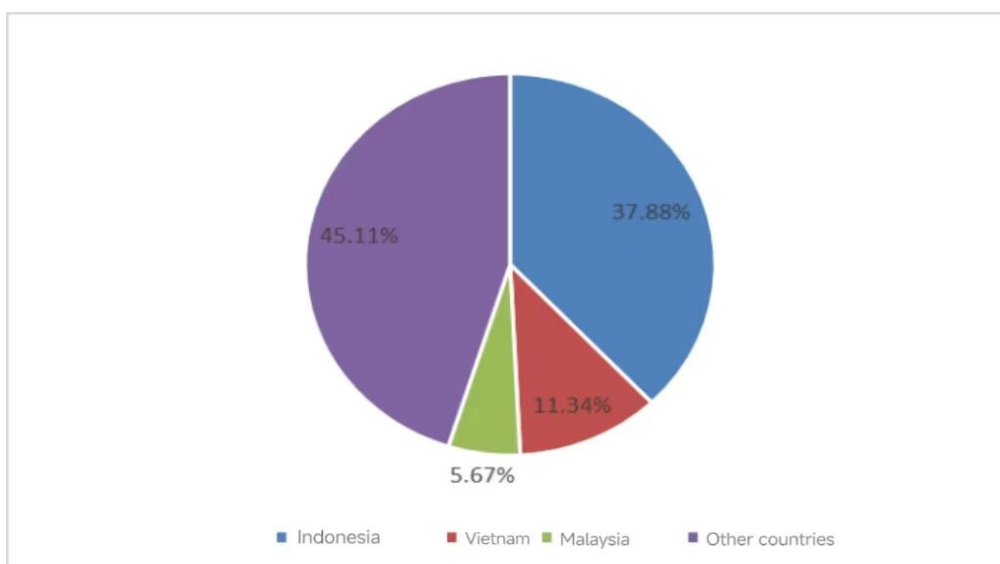


Figure 5. Export Countries of Fresh or Refrigerated Garlic in China in 2021

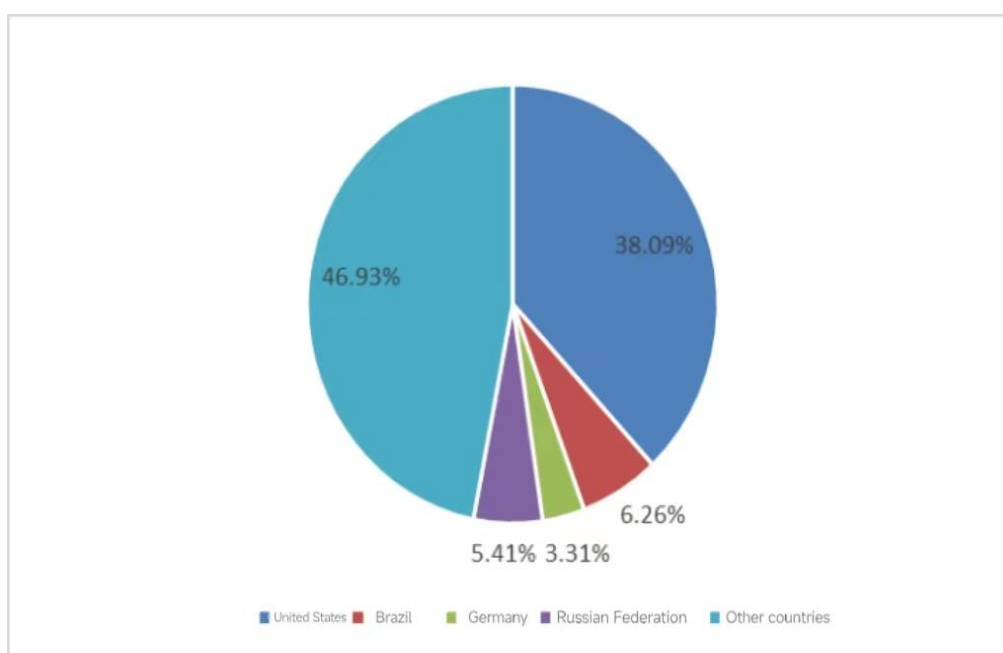


Figure 6. Export Countries of Dried Garlic in China in 2021

Note: The data is from General Administration of Customs.

4.2. The Reasons Why Garlic Exports Encounter Green Barriers

The processing of garlic is simple, with low added value and low technical content. Exports are still mainly made of large garlic, mainly fresh garlic and dried garlic products. The processing of garlic is limited to the primary level of garlic rice, garlic slices, and garlic granules, which cannot meet market demand. In addition, the processing of garlic only focuses on simple processes such as pickling, drying, and slicing, with no technical content to speak of. The added value is extremely low, and the export price is correspondingly low, which can easily lead to conflicts of interest with the same type of agricultural products from the importing country and easily lead to the implementation of antidumping measures by the other party. However, products such as garlic oil and garlic juice with higher technological content are in short supply and have higher profits in the international market.

The main garlic production areas have not established unified standards, and there is a lack of scientific guidance on pesticide use. Some farmers illegally use high residual and highly toxic pesticides. The abuse and indiscriminate use of pesticides have led to incomplete prevention and control of garlic diseases, which to some extent increases the frequency of pesticide spraying and easily leads to excessive pesticide residues, increasing export risks. In addition, excessive use of pesticides and fertilizers has caused soil pollution, and some enterprises lack environmental awareness, resulting in the deterioration of the environment for garlic growth and an increase in the content of harmful substances.

4.3. Countermeasures for Garlic Export

According to the previous analysis, China's garlic export products include fresh or refrigerated garlic, dry garlic, other fresh or refrigerated garlic, salted garlic, garlic made or preserved with vinegar or acetic acid, and frozen garlic. However, the most exported products are only fresh or refrigerated garlic and dry garlic, with a small market share for other products. Therefore, in order

to meet the needs of exporting countries, enterprises should adjust their product structure to increase product diversity, develop deeply processed products such as garlic oil, garlic juice, and allicin, and promote organic garlic and green pollution-free garlic.

At present, international and national standards are converging, and many national standards have been used as the basis for international standards. For example, in Japan's affirmative list system, there are strict regulations on the residue limits of garlic pesticides, with a maximum residue of 0.1mg/kg for triadimefon and a standard of 0.2mg/kg in China; Octyl sulfuric acid and Lisbon do not exceed 0.01ng/kg, and there is no clear standard listed in China. By comparison, it can be seen that China should update and enhance its national standards to ensure that its agricultural products meet international standards or the requirements of importing countries, and avoid encountering technical trade barriers due to different quality standards.

5. Conclusions and Suggestions

This article analyzes the reasons for China's garlic exports encountering green barriers, with low garlic processing and standardization being the main reasons, and proposes corresponding strategies. Next, based on the relationship between technical trade barriers and agricultural product exports, the following suggestions will be proposed.

5.1. Utilizing the WTO Agreement and Dispute Resolution Mechanisms, and Taking Appropriate Countermeasures

The Agreement on Technical Barriers to Trade implements non discriminatory and national treatment for product regulations, standards, certification, and inspection of WTO member countries. For unreasonable and clearly discriminatory trade measures, the WTO dispute resolution mechanism can be utilized. China should build its own non-tariff barrier system on the basis of international norms, promote domestic industrial upgrading to adapt to international advanced standards, and use this to deter the other party and reduce technical trade barriers. At the same time, we will improve our country's legal standard system, ensure that it complies with international standards and WTO rules, and gradually adapt our agricultural products to the increasingly strict and standardized international market requirements.

5.2. Improve the Quality Level and Innovation Ability

China's agricultural product enterprises are taking a labor-intensive and low value-added path, with insufficient emphasis on technological research and development of agricultural products, and weak independent innovation capabilities. On the one hand, countries and enterprises should introduce advanced foreign technology and experience. On the other hand, we should increase our own research and development investment on the basis of absorbing foreign technology, after all, relying on foreign technology is not a long-term solution. Therefore, it is necessary to enhance the innovation driving force of key agricultural product export enterprises, actively build a bridge between enterprises and agricultural research institutions, use industry association intermediary platforms to establish a bond between enterprises and the government, and deduce the transformation of agricultural products from low value-added, resource and labor-intensive to high value-added, capital and technology intensive.

5.3. Establish an Early Warning Mechanism

Industry associations are located between enterprises and the government, and should provide

the latest dynamic information obtained by government departments to the other party based on the characteristics and needs of the enterprise. They should also provide early warning on technical trade barriers related laws and regulations of major trading partners. Secondly, a consulting department can be established to provide consulting services for enterprises, helping them analyze their own strengths and weaknesses, and proposing corresponding strategies. In addition, industry associations should provide training services for enterprises, widely listen to their opinions and suggestions, and strengthen quality and safety supervision. For example, Japan imposes restrictions on beef packaging, mandating the inclusion of detailed information such as beef gender, birth date, breeding location, processor, retailer, and description of absence of mad cow disease. Once problems arise, they can be promptly traced back to the responsible party.

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If any, should be placed before the references section without numbering.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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