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Analysis of the current situation of honey exports and development countermeasures in Anhui Province under green trade barriers

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Abstract: With the rapid development of global trade, green trade barriers have become a crucial factor influencing international commerce. As Chinas foreign trade continues to expand, Anhui Province has seen consistent annual growth in honey exports, establishing itself as a leading province in the country. The region has achieved significant progress in both product quality and production techniques, with continuously upgraded quality standards. This study focuses on Anhuis honey industry, examining its current export landscape and challenges posed by green trade barriers in an era where such barriers are increasingly prominent. The findings carry substantial significance for understanding global trade dynamics and addressing environmental protection requirements in international trade.

This study, building upon a review of literature on green trade barriers and Anhui Provinces agricultural products and honey exports, employs statistical analysis to examine the current status of Anhuis honey exports through perspectives such as export volume, unit price, and target markets. It further analyzes the green trade barriers encountered in these exports. The paper then provides an in-depth examination of the root causes behind these barriers and proposes actionable strategies to boost the development of Anhuis honey export trade.

Research findings indicate that while Anhui Provinces honey exports have maintained steady growth in the face of green trade barriers, they are simultaneously confronting increasingly stringent environmental protection requirements. The primary challenges stem from four key factors: the need for process improvements in production techniques, outdated honey quality standards, an imbalanced export structure, and the prevalence of trade protectionism worldwide. To advance Anhuis honey export sector, this study proposes implementing the following strategies: promoting organic product development, enhancing standardized systems, accelerating industrialization of beekeeping practices, and cultivating globally recognized premium brands.

Key words: green trade barriers; honey; export trade; Anhui Province

I. Introduction

1.1 Research Background

With the deepening integration of global trade and heightened environmental awareness, the international trade landscape is undergoing profound transformation. Particularly since the 2008 global financial crisis, developed countries have established new trade protection frameworks centered on "green barriers" through non-tariff measures like environmental technology standards and quality certification systems. As a key production hub for Chinas honey industry, Anhui Province has become the primary target of green trade barriers. Being the worlds largest honey producer and exporter, Chinas honey export performance not only drives regional economic growth but also significantly impacts national agricultural export strategies. Recent developments—including the EUs revisions to food contact material regulations (EU 2015/2283 and 2019/1790), Japans updated positive list system, and the U.S. FDAs FSMA (Food Safety Modernization Act) requirements—combined with COVID-19 disruptions to global logistics, have intensified green trade barriers against Anhuis honey exports. This dual challenge threatens both the stability of traditional markets and the sustainable development of specialty agriculture under Chinas rural revitalization strategy.

1.2 Research significance

In the current global context where trade protectionism is rampant and green trade barriers are proliferating, this study provides a comprehensive analysis of Anhui Provinces honey export landscape and the green trade barriers it faces. By thoroughly examining the underlying causes, the paper proposes targeted solutions, offering crucial research insights. The findings not only help Anhuis honey exports overcome green trade barriers but also provide valuable references for the sustainable development of the provinces honey industry nationwide. Furthermore, these experiences can serve as a blueprint for other agricultural products to navigate similar trade barriers.

1.3 Research Methods

1.3.1 Literature research method

By compiling literature on green trade barriers and Anhui Provinces honey export practices, this study systematically reviews and synthesizes research findings from domestic and international scholars. It establishes theoretical foundations and clarifies research methodologies, while conducting comprehensive analysis of existing literature to identify the fundamental concepts, characteristics, and impacts of green trade barriers on agricultural exports. The study further examines the current status and challenges in Anhuis honey export sector, providing critical support for subsequent problem identification and the formulation of targeted policy recommendations.

1.3.2 Comparative analysis method

The export unit price of honey in Anhui province was compared with that in other provinces in China to find out the advantages of honey export in Anhui province and provide reference for putting forward targeted countermeasures.

1.3.3 Statistical analysis method

Based on the relevant data collected from China Statistical Yearbook, National Bureau of Statistics, Customs and other websites, this paper analyzes the export volume, export unit price and export market distribution of honey in Anhui Province with the help of statistical charts, so as to fully understand and grasp the current situation of honey export in Anhui Province.

II. Theoretical basis and research review

2.1 Definition of related concepts

Green trade barriers refer to a series of import restriction measures formulated by importing countries in international trade activities under the pretext of protecting natural resources, ecological environment, and human health. Chinese international trade experts define them as: environmental protection measures directly or indirectly adopted to restrict or even prohibit trade for ecological conservation. These primarily include international and regional environmental conventions, national environmental regulations and standards, voluntary initiatives such as ISO14000 Environmental Management System and eco-labeling, as well as requirements for production methods, processing techniques, and internalization of environmental costs[1]。

2.2 Theoretical basis

2.2.1 Comparative advantage theory

The theory of comparative advantage was put forward by the British economist David Ricardo[2]This theory posits that the foundation of international trade lies not in absolute cost differences among nations, but in relative cost disparities. Even if a country lacks absolute advantages in producing all goods, it can still achieve mutual benefit through specialization. By focusing on exporting goods where it holds comparative advantage while importing those where it lacks such advantage, countries can create mutually beneficial trade relationships[2]The theory of comparative advantage provides the theoretical foundation for international trade, explaining why countries engage in trade and how such trade enhances economic welfare. In the context of green trade barriers, this theory remains applicable. While Anhui Provinces honey exports currently may not match those from certain specialized countries in terms of quality at current price levels, its high-quality and advanced production now meets diverse market demands. However, environmental costs and regulatory impacts on comparative advantage must be carefully considered.

2.2.2 Environmental regulation theory

Environmental regulation, aimed at protecting the environment, governs various behaviors that pollute public environments. As a crucial component of social regulation, its scope primarily covers air pollution, water contamination, toxic substance utilization, hazardous waste disposal, and noise pollution. Environmental pollution constitutes a negative externality, where regulating such behaviors converts societal costs into private costs borne by individuals. There are two approaches to environmental regulation: command-and-control measures and market incentives. The former includes establishing environmental standards, pollutant emission limits, and technical specifications; the latter involves implementing pollution discharge fees, taxation systems, and emission rights trading mechanisms[3]This theory posits that environmental issues represent manifestations of market failure. Given the public good nature and externalities of environmental resources, market mechanisms often prove inadequate in addressing these challenges. Consequently, governments must implement interventions through measures such as establishing environmental standards, levying environmental taxes, and providing subsidies. These policies guide and incentivize enterprises to adopt more environmentally friendly

production methods and technologies, thereby achieving the dual objectives of environmental protection and economic development. In the context of green trade barriers, countries often enforce differing standards for the same product category. Such discrepancies inevitably impact exports, necessitating adjustments to production standards to meet the green development requirements of other nations. Environmental regulation theory provides crucial theoretical support for understanding and addressing environmental demands in international trade.

2.2.4 Competitive Advantage Theory

A nations trade advantage is not as straightforwardly determined by natural resources, labor force, interest rates, or exchange rates as traditional international trade theories suggest. Instead, it largely depends on a countrys capacity for industrial innovation and upgrading. In todays globalized world where competition increasingly revolves around knowledge creation and absorption, the formation and development of competitive advantages have transcended individual enterprises or industries. They now emerge from the combined effects of various internal factors within an economy – including a nations values, culture, economic structure, and historical context – all of which contribute to shaping its competitive edge[3]In the context of green trade barriers, the theory of competitive advantage provides a new perspective for Anhui Provinces honey exports. From a broader perspective, as the worlds largest trading nation, China possesses a robust export foundation. In recent years, Anhui Province has progressively optimized its industrial innovation capabilities and enhanced self-driven innovation capacity, gradually establishing a complete industrial chain.

2.3 Literature review

2.3.1 Domestic literature review

(1) Research on the impact of green trade barriers on agricultural exports

Many scholars focus on the dual effects of green barriers on agricultural exports. In terms of short-term inhibitory effects, Qin Liping et al. (2024) concluded based on the gravity model that green barriers in Japan and South Korea reduced the export scale of Chinese agricultural products by 12%-15%[5]; Duan Wenxin et al. (2025) found that green barriers greatly inhibited Chinas agricultural exports to Russia, and the impact intensity was not as large as that of exchange rate fluctuations. It falls within the category of long-term forcing effect[6]Hua Hongjuan et al. (2024) mentioned that SPS measures rely on the forcing effect to promote quality improvement, and finally make Chinas agricultural exports show a "U-shaped" recovery trend[7]; The longitudinal study by Hu Yaqing et al. (2024) shows that the green barriers of the EU drive the optimization of Chinas agricultural production mode, and the negative effects decrease by more than 40% over time[8],

Yan Yingzhao (2023) research shows that the green barriers of THE North American Free Trade Area have a "standard convergence effect" on Chinese agricultural products, but the export volume has increased by 8.3 percentage points[9]; Jiang Chenglong et al. (2024) confirmed that the impact intensity of European and American TBTs on Shandong agricultural products was 2.4 times that of the ASEAN market[10]。

(2) Research on the causes and countermeasures of green trade barriers encountered in agricultural exports

Low added value is an important reason for the export of agricultural products to encounter green trade barriers. For example, Li Wenbiao (2025) tracked and found that 87% of the cases of vegetable export being returned in Shandong province due to substandard testing were concentrated in primary processed products[11]。

Therefore, in order to deal with the problem of green trade barriers, Xu Kaixin (2023) believes that in the face of TBTs of RCEP member countries, Shandong agricultural enterprises restructured their production processes, resulting in an increase of 19% in average quality control costs, but a decrease of 62% in customer complaint rate[12]; Li Cheng (2024) proposed to enhance the anti-risk ability through organic certification and high value-added processing, which can make the premium space of deep-processed honey products up to 35%~50%[13]; Huang Minqing et al. (2024) emphasized that enterprises should actively internalize the US green standards and promote the digital transformation of supply chains, so as to improve compliance efficiency by 40%[14]。

(3) Research on the export of agricultural products in Anhui Province

Xu Xiaofang et al. (2019) pointed out that the export of agricultural products in Anhui province has a vicious circle of "low added value, weak brand and small scale", and the export profit rate is only 53% of that in coastal provinces[15]He Yaxin (2025) believes that although the digital transformation theory is forward-looking, the digital coverage rate of agriculture in Anhui province is less than 1/5 of that in Shandong Province, and there are great implementation bottlenecks[16]。

In order to solve the above problems, Zhou Yu Jiao (2019) emphasized the urgency of upgrading detection technology, and believed that the improvement of detection efficiency could shorten the customs

clearance time of Anhui enterprises by 7 working days[17]; Zhou Jiake (2019) proposed the strategy of "standard docking and certification first", and a bee industry in Chaohu increased its orders by 300% after practicing this model[18]。

（4）Study on honey export in Anhui Province

In terms of honey export, Huang et al. (2011) analyzed the practical impact of green technical barriers on honey export in Anhui province by describing the current situation of honey export in Anhui Province[19]Bao Xiaoyu et al. (2016) analyzed quarterly data from 2005 (after the RMB exchange rate reform) to 2014, using Johansen cointegration tests to examine the long-term effects of RMB exchange rate levels and fluctuations on Anhui Provinces honey exports. They further employed a Vector Error Correction (VEC) model to assess short-term impacts. The findings revealed that both RMB appreciation and its volatility exerted significant negative effects on Anhuis honey exports in both the long and short term, while exchange rate fluctuations demonstrated notable influence on export performance[20]。

2.3.2 Literature review abroad

In terms of agricultural exports, Kumar (2024) pointed out that India and China are facing similar difficulties in relying on a single category of agricultural products[21], Bansal et a. (2024) believe that geographical indication certification can increase the international premium ability of agricultural products by 28%~75%[22]。

Research on green trade barriers primarily focuses on the following areas: First, defining, categorizing, and analyzing their impact mechanisms. MAO Y (20 24) argues that green trade barriers refer to restrictive measures implemented to protect the ecological environment and human health, including technical standards, environmental labeling, and packaging requirements. These measures significantly impact international trade. The study further examines how these barriers constrain export trade in developing countries[23]KHADIJEH H (20 24) found through empirical research that the green trade barriers constructed by developed countries have greatly hindered the export of agricultural products from developing countries and increased the difficulty coefficient of their market access. The third is to explore measures to deal with green trade barriers[24]TRI M (20 23 pointed out that developing countries can break the shackles of green trade barriers and improve the international competitiveness of their products by means of technological innovation, improving product quality and strengthening international cooperation[25]Zhao (2025) demonstrated that fiscal subsidies can mitigate the negative effects of green trade barriers, but there are significant regional differences in the effectiveness of policy implementation. These research findings provide valuable references for this paper to analyze the green trade barriers encountered by Anhuis honey exports and propose countermeasures[26]。

2.3.3 Literature review

A review of domestic and international literature reveals that China has conducted substantial research on addressing green trade barriers and boosting agricultural exports, yet studies specifically targeting Anhui Provinces honey export sector remain scarce. While the provinces honey exports have demonstrated strong overall performance, they still face challenges from green trade barriers. Moreover, discrepancies in global green trade standards and inconsistent regulatory requirements across countries leave honey exporters without effective guidance. This paper therefore conducts an in-depth analysis of Anhuis current honey export landscape, examines the root causes of encountered green trade barriers, and explores practical solutions to overcome these obstacles.

III. Current situation of honey export in Anhui Province and green trade barriers encountered

In recent years, while Anhui Province has maintained a leading position in Chinas honey exports, the intensifying trade protectionism across nations has prompted major export partners to strengthen green trade barriers. This analysis examines Anhuis current export landscape through three key dimensions: domestic export value, shipment volume, and market competition from key trading partners. The findings reveal the challenges faced by Anhuis honey exports in navigating these evolving global trade regulations.

3.1 Analysis of honey export scale in Anhui Province

3.1.1 Analysis of honey export volume in Anhui Province

Anhui Provinces honey exports showed an upward trend from 2017 to 2018. During the initial phase of its export development, the province initiated Belt and Road construction, which significantly boosted export volumes from 30,167.6 tons in 2017 to 36,313.2 tons. Although this accounted for a relatively small share of Chinas total exports, the growth momentum remained robust. The export volume experienced a decline between 2018 and 2019, followed by relative stability from 2019 to 2020 due to global economic fluctuations and

pandemic impacts. In 2021, with the gradual recovery of global trade, Anhuis honey exports rebounded significantly, increasing its domestic market share. As the global economy continues to recover and Anhuis honey industry advances, the provinces honey exports are expected to maintain steady growth.

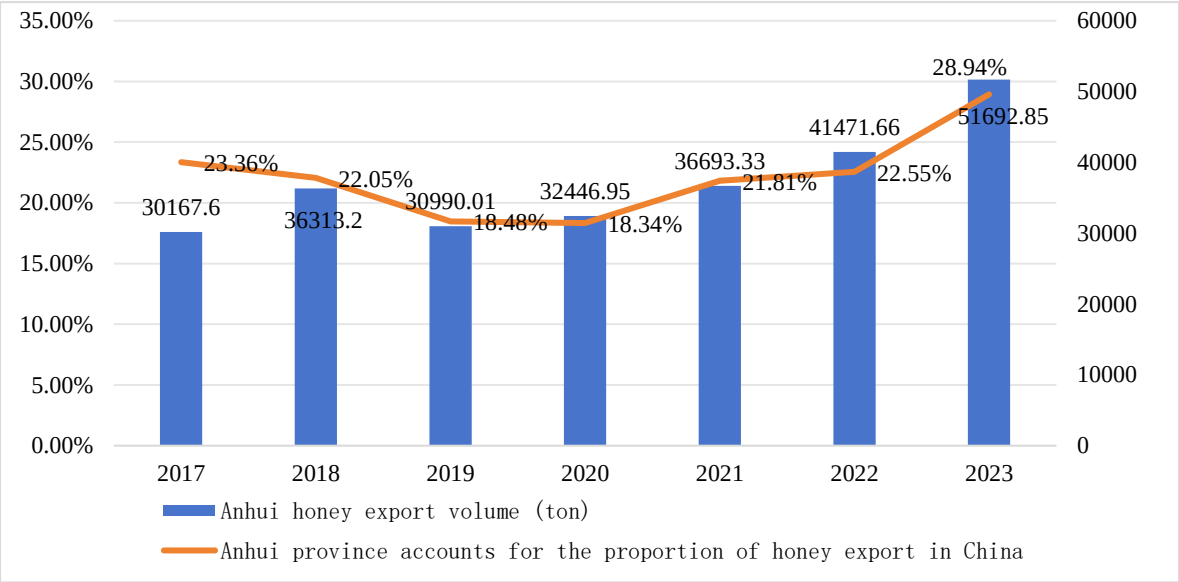


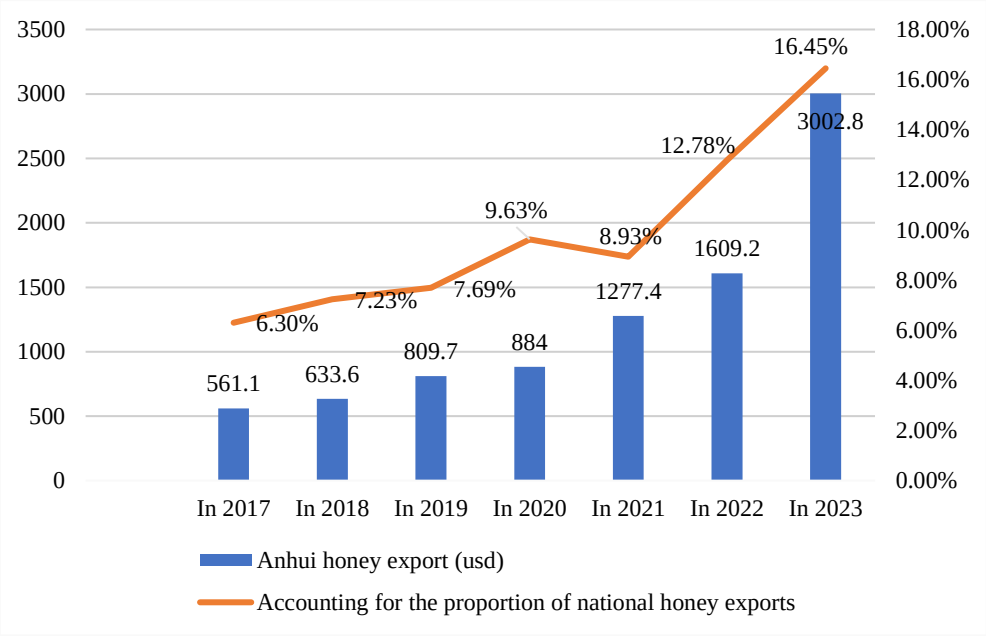
Figure 3.1 Honey export volume and its proportion in Anhui Province from 2017 to 2023

Source: China Statistical Yearbook (2018-2024), China Customs (http://www.customs.gov.cn/)

3.1. Analysis of honey export volume in Anhui Province

First, Anhui Provinces honey export value has shown a significant growth trend, increasing from $5.611 million in 2017 to $30.028 million in 2023. This expansion primarily stems from Chinas growing international influence, which has expanded from single-traditional markets like ASEAN and the EU to trade under the Belt and Road Initiative (Belt and Road). Such development has created a favorable environment for foreign trade overall.

Secondly, Anhui Provinces share in Chinas national honey export volume rose from 6.30% in 2017 to 9.63% in 2020, but declined in 2021 due to the global pandemic and reduced international trade. However, with policy support and productivity upgrades, the province achieved strong growth again in 2022, reaching 16.45% by 2023. This rebound not only demonstrates Anhuis rapid recovery in the post-pandemic honey industry but also highlights its enhanced competitiveness in international markets. The provinces technological advancements in honey production have gradually won overseas consumers favor. These trends reflect Anhuis efforts in improving product quality, expanding global market channels, and addressing green trade barriers.

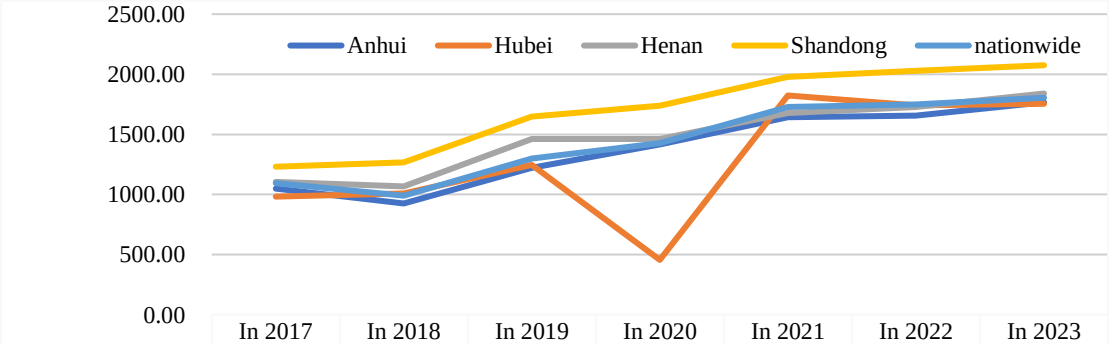


graph 3.2. Export volume and proportion of Anhui provinces honey in China from 2017 to 2023
Source: National Bureau of Statistics website: https://www.stats.gov.cn

3.1.3. Analysis of unit price of honey export in Anhui Province

First, examining the export prices of Anhui Provinces honey exports, Figure 3.2 shows a price drop from 1,049.36 yuan to 925.52 yuan between 2017 and 2018. After 2018, prices began rising annually, mirroring the initial phase of trade boom. The strict quality standards imposed by green trade regulations initially caused most products to fail international export requirements. Subsequent technological improvements enabled compliance with global export norms, driving price recovery. Notably, significant price increases in 2021 and 2023 were closely linked to Anhuis efforts in enhancing product quality, strengthening brand development, and optimizing export strategies.

Secondly, when comparing Anhui Provinces honey export prices with other provinces, the 2017 average price stood at 1,049.36 yuan per unit, ranking second-lowest among five provinces while below the national average. Despite this, Anhui maintained a significant pricing advantage. However, in 2018, constrained by green trade barriers, the provinces honey exports failed to meet quality standards, leading to a sharp decline in export prices. From 2019 to 2020, Anhuis honey prices rebounded as product quality improved, restoring its position as the lowest-priced exporter and establishing a strong brand advantage. In 2020, despite COVID-19 causing a price crash in Hubei Province, Anhui retained its competitive edge. Between 2021 and 2023, while maintaining steady growth in price competitiveness, Anhuis honey prices remained the lowest among three neighboring provinces. Although the price gap with other regions remained narrow, the province consistently achieved annual price increases, demonstrating its sustained pricing advantage in the market.



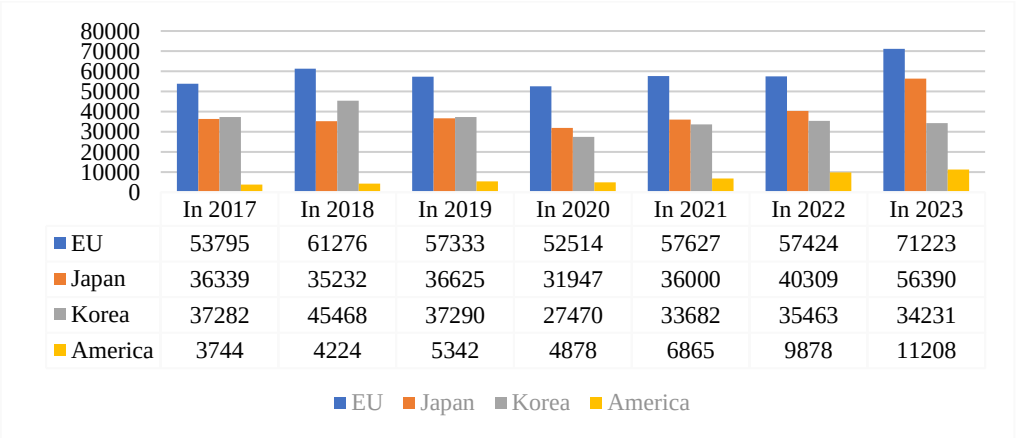
	In 2017	In 2018	In 2019	In 2020	In 2021	In 2022	In 2023
Anhui	1049.36	925.52	1222.12	1417.51	1643.63	1655.99	1767.08
Hubei	981.88	1008.76	1247.32	456.27	1823.68	1741.67	1753.49
Henan	1105.01	1067.43	1461.1	1461.73	1677.01	1729.26	1839.71
Shandong	1231.29	1266.44	1646.8	1738	1978.59	2029.03	2075.22
nationwide	1094.49	990.16	1298.45	1425.87	1727.47	1749.55	1804.65

graph 3.3 Comparison of average unit price of honey export in Shandong, Henan, Hubei and Anhui from 2017 to 2023 (Unit: Yuan)

Source: China Statistical Yearbook (2018-2024)

3.1.4. Market analysis of honey export in Anhui Province

Anhui Provinces primary honey export markets include the European Union, Japan, South Korea, and the United States. As shown in Figure 3.3, the provinces honey exports to the EU remained stable with minor fluctuations from 2017 to 2023. After 2018, however, the EU implemented stringent inspection standards that severely impacted honey exports due to green trade barriers. Nevertheless, Anhui addressed these challenges through multifaceted solutions, achieving export growth in 2020 despite pandemic-related disruptions. Exports to Japan experienced a decline between 2017-2018 but rebounded annually thereafter. Exports to South Korea followed a fluctuating upward trend from 2017 to 2022, though saw a decrease in 2020 when both countries enforced rigorous inspection protocols amid COVID-19. Post-2020 improvements in Chinas foreign trade policies contributed to sustained growth in Anhuis honey exports. Exports to the United States maintained an upward trajectory, particularly showing significant increases in 2022 and 2023. Notably, all four countries experienced export declines from 2019 to 2020, primarily due to pandemic-induced trade restrictions. While exports recovered slightly in 2021, they continued to rise steadily over subsequent years.

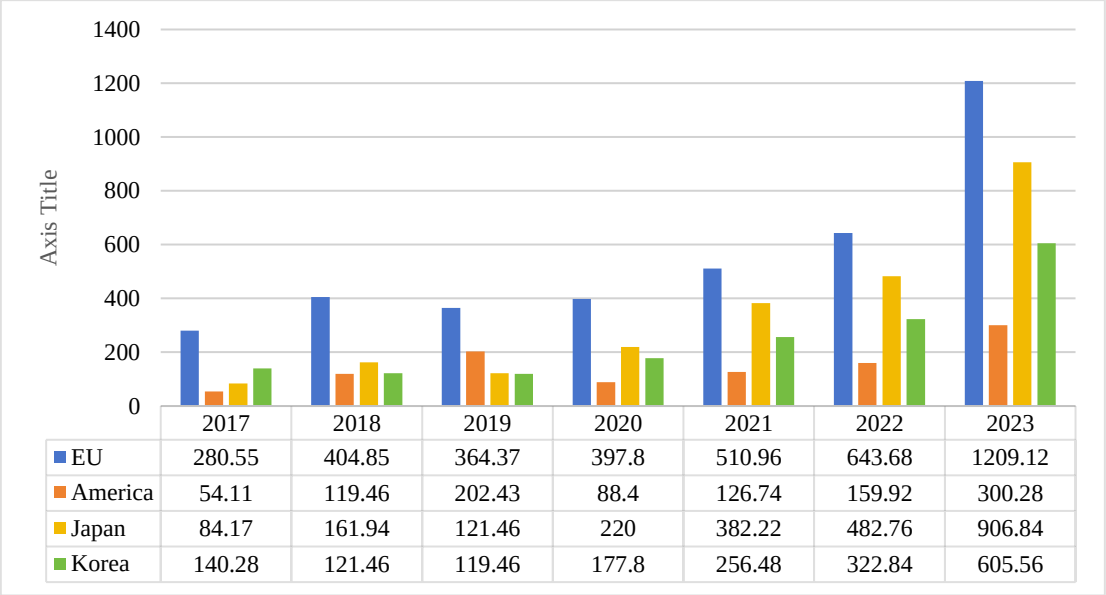


	In 2017	In 2018	In 2019	In 2020	In 2021	In 2022	In 2023
EU	53795	61276	57333	52514	57627	57424	71223
Japan	36339	35232	36625	31947	36000	40309	56390
Korea	37282	45468	37290	27470	33682	35463	34231
America	3744	4224	5342	4878	6865	9878	11208

graph 3.4 Main export markets and export volume of Honey in Anhui Province from 2017 to 2023 (Unit: ton)
Data source: China Statistical Yearbook (2018-2024), relevant data from China Chamber of Commerce for Import and Export of Food, Native and Animal Products https://www.stats.gov.cn

Furthermore, in terms of export volume, Anhui Provinces trade with major exporting countries saw significant growth. Exports to the United States increased substantially from $541,100 in 2017 to $3,002,800 in 2023. In 2017, the U.S. market expanded rapidly, driving growing demand for honey. However, by 2020, pandemic impacts and U.S. trade protectionism—including tariff wars—severely affected Anhuis honey exports, causing a decline to multi-year lows. After rebounding post-2021, exports continued rising through 2023, demonstrating substantial potential for Anhuis honey exports to the United States. Regarding the EU, exports surged from $2,805,500 in 2017 to $12,091,200 in 2023. Despite the EUs stringent export standards and green trade barriers targeting Anhuis honey industry, the province successfully navigated these challenges to boost exports. Over seven years starting in 2017, Anhuis honey exports to the EU quadrupled. The country also outperformed Japan and South Korea, where limited domestic honey resources drove massive imports. Japans exports skyrocketed from $841,700 in 2017 to $9,068,400, while South Koreas rose from $1,402,800 to $6,055,600 during the same period, both achieving remarkable export growthThe range has increased.

The annual export value of Anhui honey in major export markets has shown steady growth, reflecting the industrys growing competitiveness and gaining international recognition for its premium quality. The successful compliance with stricter environmental trade barriers imposed by countries like the EU and Japan is attributed to continuous innovation, industrial upgrading, and enterprises enhanced adherence to global standards.



	2017	2018	2019	2020	2021	2022	2023
EU	280.55	404.85	364.37	397.8	510.96	643.68	1209.12
America	54.11	119.46	202.43	88.4	126.74	159.92	300.28
Japan	84.17	161.94	121.46	220	382.22	482.76	906.84
Korea	140.28	121.46	119.46	177.8	256.48	322.84	605.56

graph 3.5. Main export markets and export volume of Honey in Anhui Province from 2017 to 2023 (Unit: US$10,000)

Source: China Statistical Yearbook (2018-2024) and relevant data from China Chamber of Commerce for Food, Native Products and Import & Export https://www.stats.gov.cn

3.2 Green trade barriers encountered by Anhui honey exports

3.2.1 The EU market implements TBT to China

Under the backdrop of green trade barriers, countries have begun implementing technical barriers to trade (TBT) for green products to meet high-quality standards. In recent years, the EU has increasingly tightened its TBT on Chinese agricultural products, significantly impacting Anhui Provinces honey exports. The EU has established stringent technical regulations and standards such as the CE mark and EN standards, requiring imported products to comply with these requirements to enter the EU market. These regulations typically cover product safety, environmental protection, and health aspects, raising standards for product performance, quality, and safety. To meet the mandatory chemical registration requirements under the REACH Regulation, companies must screen over 400 pesticide residues in honey, resulting in a 2.3-fold increase in per-batch testing costs compared to conventional methods. Taking a leading enterprise in Mingguang City as an example, its third-party testing expenses surged by 1.27 million yuan in 2023, increasing its proportion of total production costs from 3.8% in 2019 to 8.6%. The EUs green TBT directly restricts the quantity and variety of Anhui honey exports. Given the stringent technical standards and cumbersome certification procedures, a significant amount of Anhui honey fails to meet EU market entry requirements, leading to export obstaclesSuch quantity restrictions have affected the competitiveness of Anhui honey in the EU market and restricted the growth of Anhui honey exports.

3.2.2 Increased difficulty of export in the US market

In recent years, the United States has repeatedly imposed additional tariffs on Chinese exports, significantly impacting Chinese exporters and cross-border e-commerce companies. The U.S. market has tightened its regulatory oversight on Chinese agricultural imports, particularly with increasingly stringent inspection standards for food products like honey. When Anhui Provinces honey attempted to enter the American market, it faced rigorous quality inspections and lengthy approval processes, which not only increased export costs but also prolonged product launch timelines, leading to declining market competitiveness. The U.S. market imposes more complex requirements on honey labeling and packaging. To comply with the FSMA (Food Safety Modernization Act) regulations requiring full supply chain traceability, the retention period for records from hive disinfection to product filling has been extended to two years. This resulted in a 22% increase in warehousing management costs. According to statistics from Ma anshan Customs, the average customs clearance time for honey exports in 2023 rose to 21.5 days—65% longer than in 2019. Port detention fees caused a 1.8 percentage point decrease in working capital turnover rates, forcing Anhui-based exporters to invest more resources to meet these requirements. These combined factors have substantially increased export barriers for Anhuis honey products in the U.S. market.

3.2.3 Japan has increased food import control standards

In recent years, Japan has implemented increasingly stringent regulatory standards for imported food products, particularly in food safety and quality control. When Anhui Province honey enters the Japanese market, it must meet a series of rigorous testing and certification requirements. As stipulated in Article 27 of Japans Food Sanitation Law: "Any food, food additives, food equipment, food containers, or food packaging intended for sale or commercial use imported into Japan shall be notified to the Ministry of Health, Labour and Welfare."

All food products entering the Japanese market must submit import declarations. Without such declaration, neither imported foods nor related products may be sold in Japan. Import declaration forms for these items must be submitted to the Quarantine Office of the Ministry of Health, Labour and Welfare (MHLW). Inspectors at the office review submitted documents to verify compliance with the Food Sanitation Law. Imported foods and related products entering the Japanese market via mail must also follow procedures outlined in Article 27 of the Food Sanitation Law, with declarations submitted before customs clearance. These enhanced import control standards not only raise market entry thresholds but also increase compliance costs and operational complexities for exporters. Consequently, Anhui Province honey exports to Japan face significant challenges, requiring companies to continuously improve product quality and strengthen compliance management to meet increasingly stringent import regulations. Following 2020 amendments to Japans Positive List System introducing 18 new pesticide residue testing indicators, manufacturers must retrofit sterilization facilities and adopt supercritical CO_2 extraction equipment.

3.2.4 High standards for honey exports in the Korean market

South Korea applies identical export standards to Anhuis honey exports as the EU, primarily testing for antibiotic residues like chloramphenicol and nitrofurans. This mirrors previous restrictions imposed by Japan and the EU on Anhuis honey exports due to similar testing requirements. South Korea mandates that honey exporters obtain international health certifications (e.g., HACCP) and origin traceability documents. However, Anhuis honey industry suffers from fragmented supply chains dominated by small-scale beekeepers, with standardized management lagging behind certification requirements. Multiple Anhui-based honey companies faced mandatory destruction or repatriation of products exported to South Korea after exceeding the 0.3 μg/kg threshold set by the Korean Food Code for chloramphenicol residue levels, resulting in losses exceeding 500,000 RMB per case. In recent years, South Korea has expanded antibiotic testing to include 62 additional indicators such as nitrofurans metabolites, creating a chain of technical blockades with markets like the EU and Japan.

IV. Reasons for green trade barriers encountered in honey export of Anhui Province

When addressing issues arising from green trade barriers, the primary focus lies in production processes, standard systems, comparisons with foreign exporting countries, export structures, and international policies. Internal factors play a dominant role. With global trade becoming increasingly interconnected, inconsistent industrial policies on green trade among nations have become major obstacles to exports. While the market itself addresses environmental impacts through macroeconomic regulation, countries impose restrictions on green product imports by establishing varying import standards. Only through continuous adaptation can we break free from the constraints imposed by these green trade barriers.

In terms of external conditions, trade protectionism and unilateralism are prevalent. Some important trading countries have adopted tariffs, export restrictions and higher export standards to restrict export products. We have adopted corresponding policies to break through the adverse effects of these products.

4.1 The production process of the product needs to be improved

The production of honey in Anhui province still generally adopts traditional processing technology, and there are technical shortcomings in key links such as raw material screening, sterilization treatment and residue control. Few enterprises are equipped with vacuum low-temperature concentration equipment in line with EU standards, resulting in the content of hydroxymethylfurfural (HMF) in honey often exceeding the EU limit standard of ≤40mg/kg.

Among the 23 batches of substandard Chinese honey reported by Japans Ministry of Health, Labour and Welfare in 2022,9 batches originated from Anhui Province. Six of these batches exceeded Japans stringent standard of ≤0.1 μg/kg for chloramphenicol residue (tested at 0.3-1.2 μg/kg). Some honey production enterprises in Anhui still use outdated processing technologies and equipment that fail to meet international market requirements for product quality and safety standards. This has led to Anhuis honey products being subject to rigorous inspections and restrictions during exportation, ultimately affecting their export volume and market competitiveness.

4.2 Honey standard system is backward

The current development and implementation of Anhui Provinces honey quality standards lag behind international market demands. The existing National Food Safety Standard (GB14963-2011) imposes relatively narrow limits on pesticide residues, veterinary drug residues, and microbial indicators, which significantly deviates from the testing criteria specified in EU regulations, the U.S. Food Safety Modernization Act (FSMA), and Japans Food Sanitation Law.

The standardization of the entire honey production process remains underdeveloped. Most small and medium-sized enterprises lack traceable standardized operating procedures for raw material collection and processing sterilization. The international certification coordination mechanism is still incomplete, with some companies failing to obtain certifications due to unfamiliarity with IFOAMs international organic production standards. This significantly hampers their efforts to capture high-end market share.

4.3 Unreasonable export structure

Anhui Provinces honey export structure exhibits structural imbalances, primarily manifested in dual imbalances of market concentration and product distribution patterns. The export market demonstrates a highly concentrated pattern characterized by "single core dominance with three auxiliary poles." In 2023, the four major markets—EU, Japan, South Korea, and the United States—accounted for over 80% of total exports, with the EU alone contributing 51.2%. This trade framework, heavily dependent on a few developed economies, exposed significant vulnerabilities when the EU revised its Honey Composition Standards in 2022. The new regulation requiring pollen content to match local botanical profiles triggered a sharp 23% decline in Anhuis exports to the EU that year.

The product form tends to be single. In 2023, Japan implemented the "Affirmation List System", which added 18 pesticide detection indicators. As more than 70% of the honey exported from Anhui province is raw honey without deep processing, which directly caused a decrease of 37% in the annual export batches of 12 enterprises to Japan.

Trade protectionism prevails in all countries of the world

In recent years, amid the complex and volatile global economic landscape, numerous countries have intensified green trade protection measures to safeguard their ecological environments. Global green trade protectionism has shown a trend of institutionalization and covert escalation. According to the World Trade Organization (WTO) 2023 Trade Monitoring Report, 83% of agricultural exports face at least one green trade barrier in goods trade among WTO members. The volume and proportion of trade affected by import restrictions continue to grow steadily. In 2023, the EU raised its testing standards from 482 to 586. Currently, pesticide residue exceedances and antibiotic positive results remain critical issues hindering honey exports. Meanwhile, enhanced detection technologies have created technical barriers for quality assurance under green trade protections. This situation poses systemic challenges to Anhui Provinces honey exports, manifested in three key aspects:

First, developed countries have implemented collective trade restrictions through "standard alliances". In 2023, the EUs Green Deal Industrial Plan categorized honey as a "sensitive agricultural product" and established a cross-regional mutual recognition mechanism for sustainable agricultural standards with Canada, New Zealand, and other countries. The plan requires imported honey to meet 12 new standards, including carbon footprint accounting for origin and biodiversity conservation certification. This coordinated trade barrier has imposed significant compliance pressures on Anhui Provinces honey enterprises. In 2023, the average customs clearance time for exports to these countries reached 47 days, marking a 62% increase compared to 2021.

Secondly, green technical trade measures exhibit the characteristic of "extending the traceability period forward". Taking the FDAs Modernization of Imported Food Safety Act as an example, it requires honey-exporting countries to establish a full-process digital control system covering beekeeping site selection and nectar source tracking. However, since only a few enterprises in Anhui Province could meet these requirements, their products were directly rejected during export.

Thirdly, regional trade agreements have created exclusive barriers. Under the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), while implementing tariff reduction measures for honey from member countries, China has raised pesticide residue testing standards for domestic honey from 62 to 89 items. This differential treatment has weakened the price competitiveness of Anhui Provinces honey in the Japanese market. The escalation of such trade protectionism creates a dual resonance effect with Anhuis export structure, as its honey exports are concentrated in countries implementing strict trade protections like the EU, the US, Japan, and South Korea. This market concentration continues to amplify trade risk exposure.

V. Development strategies for honey export to deal with green trade barriers in Anhui

Province

5.1 Encourage the development and production of organic products

To address barriers created by green trade policies, Anhuis honey enterprises should actively promote the development and production of organic products. This initiative will not only enhance product value-added but also align with global market demands for high-quality, eco-friendly products. Key strategies include improving product quality, overcoming technical bottlenecks, and increasing R&D investment. The government should establish dedicated research funds to support technological innovation in honey production, particularly in raw material selection, sterilization processes, and residue control. By guiding traditional processing methods toward modernization and intelligent upgrades, enterprises can adopt imported and localized advanced technologies to improve critical quality indicators like hydroxymethylfurfural (HMF) in honey. These measures will ensure products meet standards required by major importing countries such as the EU and Japan.

Encourage enterprises to intensify independent R&D and establish an innovation system integrating industry, academia, research, and application. Through collaboration with universities and research institutions, implement joint efforts to overcome technical bottlenecks in green trade barriers. Strengthen research on international environmental standards and regulations to ensure companies can promptly understand and adapt to emerging environmental demands in global markets. Identify trends in organic product demand and adjust product structures and marketing strategies accordingly. For instance, by participating in international exhibitions and building overseas marketing networks, enterprises can expand the market share of organic honey globally, enhancing their competitive edge in international markets. This approach integrates environmental concepts into product design and production phases, thereby strengthening the competitive advantage of products in global markets.

Government and relevant industry associations should provide certain policy and financial support for organic honey production enterprises, such as implementing favorable measures such as R&D subsidies and tax incentives to reduce production costs and market risks of enterprises. They can also build organic honey demonstration bases to spread cutting-edge production technologies and management experience, so as to drive the upgrading and transformation of the whole industry.

5.2 Enhance the environmental awareness of enterprises

First, enterprises continuously invest in environmental protection equipment by adopting advanced technologies and installations such as wastewater treatment facilities and exhaust gas purification systems. These measures ensure proper disposal of waste generated during production processes, thereby reducing environmental pollution from manufacturing activities. Furthermore, companies enhance staff training programs to improve both environmental awareness and operational skills, ensuring effective operation and maintenance of eco-friendly equipment.

Secondly, enterprises should prioritize the selection and procurement of raw materials, giving priority to environmentally compliant options to minimize ecological impact. During material collection processes, companies must strengthen environmental protection measures at source locations to prevent local ecological damage caused by harvesting activities. Furthermore, they need to enhance quality control standards to ensure raw materials meet stringent international market requirements for product quality and safety compliance.

Thirdly, enterprises actively engage in environmental public welfare initiatives by promoting core eco-friendly concepts, which accelerates the rise of social environmental awareness. Through collaboration with local governments and environmental organizations, companies implement various environmental projects such as afforestation programs and river management measures. These efforts have significantly improved local environmental quality, not only enhancing corporate social image but also earning greater public support and recognition from society.

During the environmental awareness campaign, Anhuis honey enterprises should intensify their study of international environmental standards and regulations. This ensures timely adaptation to emerging global requirements in eco-friendly practices. Through collaborative channels with international counterparts, companies can systematically adopt advanced environmental technologies and concepts, thereby achieving continuous improvement and advancement in their environmental management efforts.

5.3 Improve the standard system of honey

To address the green trade barriers faced by Anhui Provinces honey exports, the primary focus should be on improving the honey standard system. This requires expediting revisions to Chinas current "National Food Safety Standards" to raise the threshold for pesticide and veterinary drug residues as well as microbial indicators, aligning with international standards. Specifically, these improvements must meet the testing requirements of major export markets like the EU, the United States, and Japan. Such measures will not only elevate the overall quality level of Anhuis honey products but also reduce returns and losses caused by non-compliance with standards.

To enhance product competitiveness in global markets, enterprises should standardize the entire honey production process—from raw material collection to processing and sterilization—by establishing traceable standardized operational guidelines for each stage. By obtaining international quality management certifications such as ISO and HACCP, companies can elevate their production management standards. This approach ensures products meet rigorous international requirements for quality and safety, while strengthening partnerships with certification bodies. Furthermore, securing organic production certifications like IFOAM (International Organic Farming Movement) qualifications will further boost a companys competitive edge in the international market.

Establishing an internationally aligned honey quality inspection and regulatory framework is crucial for refining the standardization system. By introducing advanced testing equipment and technologies, we can enhance detection capabilities to ensure exported honey products pass rigorous inspections in importing countries. Furthermore, fostering communication and collaboration with importers inspection authorities will enable information-sharing mechanisms. This approach allows real-time tracking of regulatory updates, enabling enterprises to receive targeted guidance and support tailored to their needs.

5.4 Accelerate the industrialization process of beekeeping

At present, the development of beekeeping industry in Anhui province is facing the bottleneck of low industrialization. Therefore, to enhance the international competitiveness of honey industry, it is necessary to accelerate the industrialization process of beekeeping industry.

The first is to promote the industrialized growth of honey industry. Relying on policy guidance and financial support, we advocate and subsidize honey production enterprises to cluster in specific regions, so as to catalyze the industrial cluster model. This can not only reduce production costs and promote production efficiency, but also facilitate the construction of scale effect and brand effect, and enhance the comprehensive competitiveness of the whole industry.

Second, enhance the coordination and linkage between upstream and downstream industries of the industrial chain. In the stages of raw material collection, processing and manufacturing, market sales, etc., strengthen the cooperation and integration among enterprises to build a closely connected industrial network. Through cooperation in information interaction, technology exchange and market exploration, improve the working efficiency and coordination effect of the whole industrial chain.

Third, we will drive technological innovation and its commercialization by scaling up R&D investments in the honey industry. This includes fostering industry-academia-research collaboration between enterprises, universities, and research institutions to accelerate technology transfer. By adopting and integrating internationally advanced production techniques, we aim to enhance product quality and value-added features, aligning with global market demands for high-quality, eco-friendly products.

Fourth, intensify efforts in brand development and market expansion. We will incentivize and support honey producers to enhance brand recognition and reputation, actively expand into international markets through participation in global exhibitions and establishment of overseas marketing networks. By leveraging brand building and market extension strategies, we aim to increase the global market share of honey products and strengthen the international competitiveness of Anhui Provinces honey industry.

5.5 Build an internationally renowned brand

When building an international famous brand for the honey industry in Anhui Province, the honey enterprises in Anhui province should do the following:

First, enterprises must clearly define their brand positioning and prioritize brand cultivation. By building a unique brand identity through compelling brand narratives, they can enhance brand awareness and reputation. Through measures such as improving product quality, optimizing packaging design, and intensifying promotional campaigns, Anhui Province honey can boost its international market recognition and positive reputation. Additionally, companies should strengthen brand protection by implementing international trademark registration initiatives to prevent malicious infringement and safeguard their legitimate interests.

Secondly, product quality serves as the cornerstone for building internationally renowned brands. Enterprises should establish robust quality management systems and strictly adhere to international standards in production and testing to ensure consistent product reliability. By adopting advanced technological equipment, companies can elevate manufacturing processes, thereby enhancing product value-added features and competitiveness. Strengthening raw material procurement and supply chain management ensures compliance with global quality benchmarks, establishing a foundation for product excellence. Furthermore, active participation in international exhibitions and exchange programs will highlight Anhui Provinces unique honey charm and quality advantages, attracting greater attention and recognition from global buyers and consumers.

Thirdly, enhancing market sales and brand promotion requires enterprises to strengthen partnerships with internationally renowned brands through collaborations such as co-branded products, technology integration, and market sharing. To boost the market influence and competitiveness of Anhui Provinces honey

brands, companies should leverage new media platforms like the internet and social media for online marketing campaigns. This approach will attract more international consumers attention and recognition. Enterprises must prioritize corporate culture development, promote a pioneering spirit to strengthen employee cohesion and sense of belonging, actively fulfill social responsibilities by focusing on environmental protection and public welfare initiatives. By building a positive corporate and social image, businesses can enhance brand recognition and satisfaction in the global market.

VI. Conclusion

Currently, Anhui Province still accounts for a significant share of Chinas honey exports, yet it faces substantial challenges. International trade operates as a game of strategy between nations. With escalating green trade barriers and increasingly stringent environmental and food quality regulations, Anhui is confronting greater challenges. This situation has compelled honey enterprises to enhance environmental awareness, accelerate product innovation, and meet increasingly rigorous standards.

The European Union, Japan, South Korea and the United States are the main export countries of Anhui honey in recent years, with annual growth. Among them, the EU has exceeded the 10 million mark, which is also an achievement of Anhuis honey export. Due to the green trade barriers in Anhui province, its requirements for product technology and honey standards have been improved, and it has been improving its own capabilities.

To enhance the global competitiveness of its honey industry, Anhui Province requires coordinated efforts from government agencies, industry associations, and enterprises. Effective strategies should include: encouraging R&D of organic honey products, establishing comprehensive quality standards, advancing honey export trade, and adopting flexible approaches to address green trade barriers. As international trade dynamics evolve and environmental regulations tighten, Anhuis honey producers must strengthen technological innovation and brand development, while continuously improving environmental awareness and quality control systems to better meet global market demands.

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