China's Position and Core Market Advantages in the Global Garlic Extract Supply Chain

Overview

As a core natural plant-derived active raw material, garlic extract features allicin, alliin, alliinase and garlic oil resin as its key active ingredients, and is widely used in food and beverages, pharmaceuticals and healthcare, daily chemicals and cosmetics, feed additives and other fields. Its supply chain covers the entire process from garlic cultivation, raw material primary processing, sophisticated extraction and quality inspection to global distribution. At present, China has established itself as a core hub of the global garlic extract supply chain, building a complete and highly competitive supply chain system, and upgrading from a major player in initial garlic planting and primary processing to a global core manufacturing center and strategic raw material base.

Relying on four core advantages—large-scale cultivation, technological iteration, controllable costs and standardized quality—China is deeply involved in the global industrial supply landscape and value trend, holding a firm key position in the supply chain. It is not only the world's largest producer and supplier, but also a promoter of technological innovation, a participant in standard-setting and a shaper of the market structure. It directly determines the global supply scale, quality standards and price trends, providing irreplaceable support for downstream industries worldwide. Against the global consumption trends of "natural plant-based ingredients" and "clean labels", China's core position continues to stand out.

I. China's Core Position in the Global Garlic Extract Supply Chain

(1) Global Industrial Macro Layout and Scale: Leading Supply and Consolidating Core Foundations

China serves as the "supply anchor" and core manufacturing center of the global garlic extract industry, with its prominent position reflected in three dimensions: scale dominance, value upgrading and pattern control, holding absolute dominance in the global market.

According to industry research data, the global garlic extract market will expand steadily in 2026, with a robust compound annual growth rate from 2026 to 2030, and the Asia-Pacific market as the core growth pole. In the same period, global output will reach 28,500 tons, of which China will account for 17,800 tons, representing over 62.5% of the global total. Its export volume makes up more than 60% of global trade, covering more than 170 countries and regions. Among the world's top 20 food and beverage, pharmaceutical and healthcare, and daily chemical enterprises, 16 regard China as their core raw material supply base. High-purity and water-soluble garlic extracts from leading Chinese enterprises account for over 65% of global sales of similar products, mainly supplying the European, American, Japanese and South Korean markets. Driven by the promotion of the "medicinal and edible homology" policy, the expansion of organic garlic cultivation, and the steady increase in planting scale and output since 2025, China's industrial scale continues to expand, further consolidating its global leading position.

(2) Supply Chain Integrity: Full-Chain Independent Control and Unique Barriers

China is one of the few countries in the world to achieve independent control over the entire "cultivation-processing-testing-distribution" chain and efficient closed-loop management of the whole process, a strength that further reinforces its core position. Unlike most countries worldwide that focus on a single link and rely on imported raw materials or technologies, China leverages the natural endowments of temperate regions such as Shandong, Henan, Jiangsu and Hebei in the upstream to form a large-scale garlic planting pattern, supporting a world-leading raw material supply system. In the midstream, its sophisticated processing technology has reached international advanced levels, while the downstream has built a global distribution network supported by a sound quality inspection and logistics system, realizing full-process control from garlic harvesting and pretreatment to global distribution.

The integrated "cultivation-processing" layout enables China to achieve self-sufficiency in raw materials, ensuring the stability of its own supply chain while providing "one-stop" raw material solutions for global customers, with irreplaceable core value. For example, relying on large-scale planting bases, Shandong has built a complete industrial chain of "cultivation-primary processing-refined extraction". Jinxiang County is home to 102 municipal-level and above leading agricultural industrialization enterprises, processing over 3 million tons of garlic annually and developing 105 high value-added products in 9 major series. Raw materials are processed within just 12 hours of harvesting, maximizing the retention of core active ingredients, and rapid export circulation is achieved through a comprehensive cold chain system.

(3) Industrial Discourse Power and Value Upgrading: From Passive Participation to Active Leadership

China has gradually grasped the core pricing power and standard discourse power in the global garlic extract supply chain, completing the transformation from "export of roughly processed raw materials" to "export of technology-intensive high value-added products", and its position in the global value chain continues to rise. With the advancement of domestic industrial standardization, group standards such as *Specifications for Garlic Extract Production Process* and *Garlic Extract Quality Standards* have been gradually issued, filling gaps in full-process standards and forming a three-tier system of "national standards + industry standards + enterprise standards". Digital supervision of the entire garlic industry chain has promoted the implementation of these standards.

The product quality standards of leading domestic enterprises have become global industry benchmarks, and the Shandong Jinxiang Garlic Index serves as the global price benchmark for garlic and its extracts, directly influencing global market price trends. Chinese enterprises are now capable of leading industrial cooperation rules and participating in international standard-setting, gradually breaking the dominance of Europe and the United States, and gaining greater discourse power in the mid-to-high-end raw material sector. For instance, the quality standard for high-purity alliin (≥98%) formulated by Chinese enterprises has been adopted as a procurement standard by most global pharmaceutical companies, and the high-purity alliin extraction technology of enterprises such as Xinjiang Ailexin has become an industry benchmark.

(4) Industrial Upgrading: From Low-End Supporting to High-End Supply

In its early stages, China's garlic extract industry mainly exported primary garlic powder and flakes, with low added value, meager profits and a low position in the global value chain, while inconsistent product specifications restricted industrial upgrading. Today, backed by processing technology iteration and product structure optimization, export products have achieved a profound transformation: the share of primary product exports has shrunk sharply, and high value-added garlic extracts, high-purity allicin, alliin and terminal derivative products have become the main export forces. In 2026, the global market for pharmaceutical-grade garlic extract will grow steadily, with Chinese products accounting for over 60% of exports, becoming the core growth pole.

The core of this transformation lies in breakthroughs in sophisticated processing technology and enhanced product customization capabilities. China can tailor products for downstream scenarios, such as high-purity alliin (≥98%) for the pharmaceutical sector, water-soluble extracts for daily chemicals, and antibacterial extracts for feed, with product added value 4 to 6 times higher than in the early stage. Supported by government policies, domestic enterprises continue to extend the industrial chain, promoting the expansion of extracts to terminal products, further enhancing industrial added value and gradually seizing the mid-to-high-end segments of the global value chain.

II. China's Core Advantages in the Global Garlic Extract Supply Chain

(1) Upstream Cultivation: Large-Scale Layout with Controllable Quality and Cost

Raw material supply forms the foundation of the supply chain. Leveraging unique climatic conditions and large-scale planting models, China has built a stable and high-quality raw material supply system. Domestic garlic cultivation is concentrated in Shandong, Henan, Jiangsu, Hebei and other regions, accounting for over 50% of the national planting area and forming a large-scale, standardized pattern. Shandong ranks first with a production share of over 38%, and core producing areas such as Jinxiang and Cangshan have established standardized bases, producing high-quality garlic with stable allicin content at 0.1%–0.2%, providing high-quality support for downstream processing.

In terms of planting management, leading enterprises implement standardized and organic cultivation, strictly controlling the use of pesticides and fertilizers. Some bases have introduced IoT sensors and intelligent irrigation technologies for precise water and fertilizer application. Lanling County in Shandong has piloted a blockchain traceability system, realizing digital supervision of the entire chain from planting to sales, with raw materials obtaining triple organic certifications from China, the United States and Europe to meet global high-end market demand. The "company + cooperative + farmer" model achieves large-scale and intensive management, with raw material procurement costs 30%–40% lower than those in India and Pakistan, representing a significant cost advantage. Meanwhile, the "12-hour production rule" is widely implemented to maximize the inhibition of enzymatic degradation and microbial risks, ensuring stable raw material quality. In 2025, China's total garlic output reached 15.92 million tons, 1.43 million tons higher than expected, with per unit yield rising to 1.34 tons, solidifying the foundation of raw material supply.

(2) Midstream Processing: Led by Technological Iteration with Prominent Scale Effects

Sophisticated processing is the core of the supply chain, directly determining product quality and added value. China leads the world in processing technology, production scale and process standardization, yet faces shortcomings in high-end technologies, forming a pattern of "outstanding strengths with bottlenecks to break".

In terms of technological innovation and scale, China has formed a diversified advanced processing system, with technologies such as supercritical CO_2 extraction, enzymatic-assisted extraction, membrane separation coupling and molecular distillation widely applied. Notably, the membrane separation technology developed by Binzhou Medical University enables efficient extraction and reduces resource waste, while the room-temperature solvent-free process drastically cuts high COD and sulfur-containing wastewater, alleviating 15% of environmental protection cost pressure. Leading enterprises have taken the lead in applying membrane separation and microencapsulation technologies, and low-temperature sterile processing completely resolves the issues of active ingredient loss and solvent residue in traditional solvent extraction. The retention rate of active ingredients has increased from 60% to over 95%, and product shelf life has been extended by 50%. There are currently over 180 processing enterprises in China, including more than 25 large-scale ones with an annual single-plant capacity of 1,000 tons. Shandong, Henan and Jiangsu host 75% of the country's processing enterprises (Shandong accounting for 44.1%), creating remarkable scale effects. Order delivery cycles take 7–12 days, far below the international average of 28 days, efficiently responding to large-scale global order demands.

In terms of process standardization and shortcomings, domestic enterprises have gradually standardized the entire production process, clarifying technical parameters for each link. Combined processes such as enzymatic hydrolysis + supercritical CO_2 extraction and chromatography have improved product stability and consistency, driving the industry to transform from extensive development to standardized quality improvement. However, gaps remain with top European and American enterprises in the separation of high-purity single active ingredients and R&D of high-end customized extracts. Core extraction processes for products such as high-purity allicin (≥99%) have not yet achieved fully independent breakthroughs, leading to small imports of high-end products and a structural mismatch of "overcapacity in low-to-mid-end segments and insufficient capacity in high-end segments", which has become the core direction of industrial upgrading.

(3) Quality Control: Complete Standards and Internationally Aligned Testing Capabilities

The quality of garlic extract directly determines the safety and efficacy of downstream products. China has established a full-chain quality control system, serving as a core guarantee of trust in the global supply chain, while accelerating the internationalization of standards to enhance global discourse power.

In terms of the standard system, China has accelerated the improvement of relevant standards, issuing group standards such as *Specifications for Garlic Extract Production Process*, and forming a three-tier standard system in conjunction with national standards including *Plant Extracts - Terminology*. The system covers key indicators such as raw material quality, processing technology, purity, active ingredients, and limits for heavy metals and microorganisms. The internal control standards of some enterprises (allicin ≥15%, moisture ≤8.0g/100g, heavy

metals ≤10ppm) have reached international advanced levels. China actively participates in international standard discussions and promotes the alignment of domestic standards with international ones, with some enterprise standards surpassing international standards. However, the formulation of core global standards and access to high-end certifications remain dominated by Europe and the United States. Since 2025, the implementation of digital supervision across the entire garlic industry chain has further strengthened the standardization and traceability of quality control.

In terms of testing capabilities, leading enterprises are equipped with advanced equipment such as high-performance liquid chromatography and gas chromatography, and have established comprehensive testing laboratories capable of accurately detecting key indicators including allicin, alliin and heavy metals at ppm precision, complying with regulations such as the US FDA, EU REACH and Japan's Ministry of Health, Labour and Welfare. A full-process traceability system is implemented, with some enterprises introducing blockchain technology to build a "one item, one code" traceability system, with relevant records retained for no less than 3 years. Meanwhile, enterprises actively pursue international certifications, with products obtaining certifications such as FDA GRAS, EU ECOCERT and Japan JAS, breaking trade and technical barriers and consolidating China's position as a core global supplier.

(4) Cost and Supply Chain Efficiency: Full-Chain Coordination with Outstanding Cost-Performance Advantage

Compared with other global suppliers, China relies on full-chain coordination advantages to achieve controllable costs and maximum efficiency, constituting its core competitiveness, especially holding absolute dominance in emerging markets.

In terms of cost control, large-scale upstream cultivation, midstream technological iteration and mass production, and a sound downstream logistics and distribution network bring comprehensive costs 30%–50% lower than those of European and American enterprises, highlighting a prominent cost-performance advantage. This helps avoid cyclical pressure of "volume growth with price decline" and balance scale and efficiency. Specifically, the "company + cooperative + farmer" model reduces raw material procurement costs by 30%–40%; midstream intelligent production lines combined with environmentally friendly and efficient technologies lower unit processing costs; and the government grants a 10%–15% corporate income tax reduction to garlic deep-processing enterprises, further cutting operating costs.

In terms of supply chain efficiency, a coordinated system of "planting bases-processing enterprises-logistics distribution-global distribution" has been formed, with industrial clusters in Shandong, Henan, Jiangsu and other regions realizing resource sharing. Raw materials are processed within 12 hours of harvesting to reduce losses; cold chain distribution coverage in core producing areas exceeds 95%. Jinxiang County boasts an annual sales volume of 36 billion yuan in cold chain logistics and agricultural product trade, with online sales of garlic and its products reaching 650 million yuan per year, enabling rapid exports. Additionally, China can flexibly respond to global customized demand, holding a market share of over 85% in emerging markets such as Southeast Asia and the Middle East as the core supply source, while continuously increasing penetration in European and American markets.

III. Global Market Structure and Supply Chain Risk Resilience

(1) Market Structure: Obvious Regional Differentiation with Standard Barriers to Break

China's garlic extract global market presents a differentiated characteristic of "strong presence in emerging markets and difficult breakthroughs in mature markets". Enhancing standard discourse power and breaking market barriers are core tasks.

Among export markets, China holds a market share of over 85% in emerging markets (Southeast Asia, Middle East, Latin America) relying on cost-performance advantages and fast delivery, with export volume accounting for over 90% of total exports to the region, making its products the preferred raw material for local enterprises. Exports to mature markets (Europe, the United States, Japan and South Korea) account for a relatively low share with high penetration difficulty: the EU strictly controls active ingredients and pesticide residues, the United States sets organic certification thresholds, and Japan and South Korea impose extremely high quality and certification requirements. Chinese products are mostly concentrated in the low-to-mid-end sectors with weak breakthroughs in the high-end market. The core reasons lie in stringent standards in European and American mature markets, China's shortcomings in high-end technologies, as well as insufficient popularization in the domestic market with untapped potential.

(2) Risk Resilience: Full-Chain Layout Consolidates Security Barriers with Controllable Hidden Risks

Faced with global supply chain uncertainties, China's garlic extract industry has built strong supply chain security and industrial resilience through full-chain independent layout and strategic deployment of leading enterprises, while remaining vigilant against hidden risks.

1. Supply Chain Security

The overall supply chain has low external dependence but faces structural hidden risks: first, dependence on imports of high-end raw materials, as core extraction processes for products such as high-purity allicin (≥99%) have not been fully breakthrough, leading to small-scale imports from Europe and the United States and risks of supply and cost fluctuations; second, fluctuations in international trade policies, where tariff adjustments and trade barriers directly impact exports to European and American markets, affecting procurement and pricing strategies of some enterprises; third, planting-end impacts from climate and pests and diseases, which may cause raw material supply fluctuations, and the single variety of domestic garlic results in insufficient risk resistance (agricultural technology promotion since 2025 has gradually improved per unit yield and risk resistance).

2. Industrial Resilience

Independent control over the entire "cultivation-processing-testing-distribution" chain is the core of industrial resilience and a key advantage distinguishing China from other countries, enabling full-process closed-loop management and ensuring stable and flexible supply chains. Leading enterprises strengthen barriers through full-chain layout: expanding planting bases and optimizing varieties in the upstream to achieve controllable raw material self-sufficiency, with the government providing supporting land and agricultural machinery subsidies to encourage large-scale cultivation; expanding sophisticated processing and brand layout in the downstream, developing

terminal products, promoting digital supply chain upgrading, and adopting AI intelligent replenishment to reduce stockouts. Furthermore, domestic enterprises cooperate with more than 40 universities and research institutes focusing on variety breeding and technological innovation to further enhance resilience. The full-chain layout endows the industry with strong buffering capacity, making it the "anchor" of the global garlic extract industry.

IV. Summary and Outlook

In summary, China has established an irreplaceable position as a global core manufacturing center and strategic raw material base for garlic extract, with a stable core hub role: at the macro level, it dominates global capacity, drives value upgrading and holds core discourse power; at the micro level, it forms core competitiveness through large scale, high quality and cost-performance, while facing up to high-end technological shortcomings; in the market, it leads in emerging markets and makes steady breakthroughs in mature markets; in terms of risks, full-chain layout consolidates resilience with controllable hidden risks. This position benefits from China's natural endowments, policy support, technological innovation and full-chain layout. Especially since 2025, full-chain policy support and digital supervision have enabled China to continuously provide high-quality, low-cost and fast-delivery products for global downstream enterprises, becoming a core guarantee for the stable development of related global industries. In the future, driven by the global consumption upgrading of "natural plant-based ingredients" and "clean labels" and the popularization of the health benefits of garlic extract, market demand will continue to grow. China will deepen its development around "addressing shortcomings, strengthening advantages and enhancing discourse power" to further consolidate its core position:

1. Break through bottlenecks in high-end extraction processes, focus on high-purity allicin and alliin extraction and separation technologies, and promote technology transformation through industry-university-research cooperation to achieve self-sufficiency in high-end raw materials;
2. Promote industrial upgrading, expand exports of high value-added products, elevate its position in the global value chain, while deeply exploring the domestic market, strengthening popular science education, and extending extracts to terminal products;
3. Accelerate the internationalization of standards, promote the alignment of Chinese standards with global ones, take the initiative to participate in international rule-making, and enhance standard implementation and international recognition through digital supervision to break barriers in mature markets;
4. Strengthen full-chain coordination, optimize planting varieties, improve industrial cluster layout, and enhance supply chain risk resistance and coordination efficiency;
5. Optimize market layout, deepen presence in emerging markets, break barriers in mature markets, expand application scenarios such as sports nutrition and pet healthcare, and increase exports via the "Belt and Road" initiative.

Ultimately, China will achieve the leap from a "major raw material supplier" to a "global industrial power", continuously providing stable, efficient and high-quality support for the global supply chain, and leading the high-quality development of the global garlic extract industry.