Competitive Advantages and Future Market Development Prospects of Mulberry Leaf Extract Products

Mulberry Leaf Extract is a standardized functional raw material derived from the leaves of *Morus alba L.*. It is produced by isolating and enriching core active ingredients such as **1-Deoxynojirimycin (DNJ)**, flavonoids, polysaccharides, and alkaloids through physical, chemical, or biological methods. It is widely used in food, pharmaceuticals, health products, cosmetics, and other fields. Its R&D and commercialization process is a typical example of the transformation of medicinal and edible homologous resources from traditional empirical applications to modern high-value-added industries. It boasts competitive advantages encompassing traditional heritage, technological barriers, industrial clusters, and policy dividends, and is poised for high-quality development alongside the upgrading of health consumption and technological iteration.

I. Core Competitive Advantages: Building an Industrial Moat with Multi-dimensional Barriers

(I) Resource and Raw Material Advantages: A Global Core Supply Base

1. **Outstanding resource endowment**: China is the world's largest mulberry grower, with a mulberry plantation area exceeding **1.2 million hectares**. Large-scale planting clusters have formed in major producing areas such as Guangxi, Sichuan, Zhejiang, and Jiangsu. Among them, Hechi, Guangxi, had a mulberry plantation area of **850,000 mu** in 2024, with an annual output of over **120,000 tons** of dried mulberry leaves, ensuring an abundant raw material supply and significant cost advantages.
2. **Superior raw material quality**: Mulberry leaves from traditional producing areas such as Hubei and Jiangxi have higher contents of active ingredients like DNJ. The coverage rate of special high-polysaccharide varieties has increased to **31%**, providing a high-quality source for the R&D of high-purity products.
3. **Synergistic utilization of by-products**: Relying on the foundation of the sericulture industry, the coordinated development of resources such as mulberry leaves, silkworm chrysalises, and silkworm excrement has been realized, improving raw material utilization efficiency and industrial added value while reducing production costs.

(II) Technological and Process Advantages: Full-chain Technological Barriers

1. **Mature iteration of extraction processes**: A collaborative system of traditional processes and green advanced processes has been formed. Technologies such as supercritical CO_2 extraction, enzymatic hydrolysis-membrane separation coupling, and microwave/ultrasound-assisted extraction have been popularized. The DNJ extraction rate has increased by more than **30%** compared with traditional processes, and the extraction efficiency has been shortened by more than **60%**.

2. **Breakthroughs in purification technologies**: Technologies such as simulated moving bed chromatography, high-speed countercurrent chromatography, and preparative HPLC have been applied industrially. The purity of pharmaceutical-grade DNJ can reach over **98%**, with a recovery rate increased to **90%**, and some enterprises have achieved mass production of DNJ with a purity of over **99%**.
3. **Leading stabilization technologies**: Technologies such as microcapsule embedding, liposomes, and nano-embedding have solved the problems of easy oxidation and poor stability of active ingredients. The room-temperature storage stability has been extended from **6 months** to more than **24 months**, expanding application scenarios.
4. **Layout of synthetic biology**: The cloning of key genes for DNJ biosynthesis has been completed. High-purity DNJ is prepared through microbial fermentation by modifying microorganisms, breaking the dependence on natural raw materials and reducing the risk of raw material fluctuations.

(III) Efficacy and Application Advantages: Empowering Value in Multiple Scenarios

1. **Clear and diverse efficacy**: Verified by modern pharmacology, it has core efficacies such as auxiliary blood sugar reduction, anti-oxidation, anti-inflammation, immune regulation, and blood lipid reduction. DNJ, as a natural core raw material for blood sugar control, delays carbohydrate decomposition by inhibiting α-glucosidase activity.
2. **Full coverage of application scenarios**:
    - **Pharmaceutical field**: Used in adjuvant diabetes treatment drugs and hypoglycemic traditional Chinese medicine preparations. In 2024, the procurement volume in the pharmaceutical field reached **2,847 tons**, a year-on-year increase of **26.8%**.
    - **Health products field**: The proportion of products for immune regulation, blood lipid reduction, and blood sugar control continues to rise. The annual sales growth rate on e-commerce platforms has exceeded **30%** for three consecutive years.
    - **Food field**: As a natural preservative and blood sugar control raw material, it is used in sugar-free beverages, blood sugar control meal replacements, and elderly noodles, replacing chemical synthetic additives.
    - **Cosmetics field**: As an anti-oxidation, whitening, and anti-inflammatory raw material, it is used in creams, essences, and sensitive skin care products, with its market share increasing year by year.
3. **Policy support for medicinal and edible homology**: In 2024, the National Health Commission included mulberry leaves in the **List of Medicinal and Edible Homologous Substances**, removing regulatory barriers for ordinary food applications and broadening market boundaries.

(IV) Industrial and Policy Advantages: Superposition of Development Dividends

1. **Significant industrial cluster effect**: Major producing areas such as Zhejiang, Jiangsu, Sichuan, and

Guangxi have formed a collaborative R&D model of **"research institutions + enterprises + planting bases"**. The industry's CR10 has increased from **42.3%** in 2023 to **46.7%**, highlighting the technological and production capacity advantages of leading enterprises.

2. **Continuous favorable policies**: It has been included in the *Outline of the "Healthy China 2030" Plan* and the *Development Plan for the Modernization of Traditional Chinese Medicine*. The industry standard *Mulberry Leaf Extract* has been issued to standardize industrial development. The RCEP agreement has reduced trade tariffs with Japan and South Korea, promoting the facilitation of export trade.
3. **Improved international recognition**: The U.S. FDA has granted **GRAS certification**, the EU has approved it as a **Novel Food**, and Japan and South Korea have improved the standards for health food raw materials. Global market access barriers are gradually being eliminated.

(V) Quality and Standard Advantages: Enhancing Global Discourse Power

In the first half of 2025, China's export volume to RCEP member countries increased by **28.6%** year-on-year.

III. Future Market Development Prospects (2025–2030)

(I) Technological Development Trends: High-end, Green, and Intelligent

1. **High-end**: The proportion of high-purity monomers, targeted preparations, and compound synergistic products continues to rise. Synthetic biology achieves industrialized mass production. DNJ biosynthesis technology is expected to break through industrialization bottlenecks around 2027.
2. **Green**: Green technologies such as enzymatic hydrolysis-membrane separation coupling, low-temperature countercurrent extraction, and vacuum freeze-drying will fully replace traditional processes, achieving "high-efficiency, energy-saving, and environmentally friendly" production and promoting the sustainable development of the entire industrial chain.
3. **Intelligent**: AI and IoT technologies are applied to optimize extraction processes and supply chain management. Online near-infrared spectroscopy (NIR) monitoring and intelligent control systems are popularized, improving production efficiency and quality consistency.

(II) Expansion of Application Scenarios: Diversified and Precise

1. **Deepening in the pharmaceutical field**: In addition to adjuvant diabetes treatment, clinical research on new efficacies such as anti-atherosclerosis, neuroprotection, and anti-Alzheimer's disease is advancing, becoming new growth points.
2. **Explosive growth in emerging scenarios**: Applications in pet health, biological plant protection, precision medicine, and high-end cosmetics are accelerating. The sales of neurohealth products (such as mulberry leaf gummies) increased by **193%** year-on-year, becoming a hot track.

3. **Precise product layout**: Specialized products are developed for specific groups such as the elderly, diabetic patients, and sensitive skin groups. Differentiated products are launched based on ingredient differences in different origins to enhance product competitiveness.

(III) Evolution of Industrial Pattern: Globalization, Clustering, and Closed-loop

1. **Deepening globalization**: Leading enterprises accelerate overseas layout, break through trade barriers through technical cooperation and overseas factory construction, promote the internationalization of Chinese standards, and enhance global market discourse power.
2. **Upgrading of clustering**: The synergy between the East China manufacturing cluster and the Southwest raw material base is released. The central and western regions accelerate the construction of high-quality mulberry gardens, forming a regional collaborative pattern of "raw materials-processing-application".
3. **Closed-loop of the entire industrial chain**: A closed-loop ecosystem of "planting-extraction-application-by-product utilization" is constructed. Digital traceability ensures quality, realizing efficient resource utilization and maximizing industrial value.

(IV) Growth Drivers: Three-wheel Drive of Demand, Technology, and Policy

1. **Upgrading of consumer demand**: Global demand for "natural, additive-free, medicinal and edible homologous" products is rising. The demand for chronic disease prevention and control is strong. Mulberry leaf extract replaces chemical synthetic additives and some western medicines, and the market continues to expand.
2. **Continuous technological breakthroughs**: The iteration of extraction, purification, and stabilization technologies reduces production costs, improves product quality, and supports the expansion of high-end markets and new scenarios.
3. **Continuous policy empowerment**: Policies such as the modernization of traditional Chinese medicine, Healthy China 2030, and RCEP promote market access and trade facilitation, standardize industrial development, and provide growth momentum for the industry.

IV. Challenges and Countermeasures

(I) Core Challenges

1. **Raw material fluctuation risk**: Affected by climate and market supply and demand, mulberry leaf prices fluctuate greatly annually. The quality of raw materials from different origins and harvest periods is uneven. Heavy metals and pesticide residues occasionally occur, affecting production stability.
2. **Homogeneous competition**: Overcapacity in the low-end and mid-end sectors leads to fierce price competition and compressed profit margins. Core technologies for high-end products rely on imports, and the degree of refinement is insufficient.

3. **Strictening international barriers**: European and American regulatory standards are stringent, with increasing requirements for solvent residues, heavy metals, and active ingredient contents. Some small and medium-sized enterprises face export restrictions.
4. **Insufficient efficacy verification**: New efficacies such as anti-tumor and neuroprotection lack large-scale human clinical trial evidence, limiting in-depth applications in the high-end pharmaceutical field.

(II) Countermeasures

1. **Raw material end**: Establish standardized planting bases, promote organic cultivation, adopt futures hedging to cope with price fluctuations, and strengthen raw material quality traceability and testing.
2. **Technology end**: Increase R&D investment, break through high-end purification and synthetic biology technologies, build patent barriers, and promote product refinement and differentiation.
3. **Market end**: Expand emerging markets, optimize export channels, comply with international regulatory standards, and transform from raw material suppliers to solution providers.
4. **Compliance end**: Improve the quality system, carry out large-scale clinical research, standardize efficacy promotion, and enhance the overall credibility of the industry.

V. Future Summary

With its five core advantages of resource endowment, technological barriers, efficacy value, industrial clusters, and policy dividends, mulberry leaf extract has become a core functional raw material in the big health industry. In the next 5–10 years, with technological iteration, consumption upgrading, policy empowerment, and global expansion, its market scale will continue to expand, application scenarios will be fully extended, and the industry will evolve towards high-end, green, intelligent, and globalized development.

As the global core of mulberry leaf extract R&D and production, China needs to continuously strengthen technological innovation, improve quality standards, and build a closed-loop of the entire industrial chain. Seizing the growth opportunities of Healthy China and the global plant extract market, it will promote the transformation of mulberry leaf extract from a “traditional medicinal and edible homologous resource” to a “global plant-based core raw material for metabolic regulation”, achieving dual breakthroughs in high-quality industrial development and global layout.