Rijksdienst voor Ondernemend Nederland

Opportunity Report
Horticulture in Shandong Province

NBSO Jinan

>> Duurzaam, Agrarisch, Innovatief en Internationaal ondernemen

Colofon

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1 Introduction

For decades, the agricultural industry has been given top priority on the central government's agenda, because of its significant importance to a nation with over 1.4 billion people, but also as a core driving force to annihilate poverty and improve people's well-being in China. With persistent efforts, the agriculture in China gained great achievements in past years, and the vegetable output witnessed tremendous growth. Today, various fresh vegetables are in sufficient supply throughout China and easy to get for consumers all-year-round in either supermarkets or retail markets. In a sharp contrast to 30 years ago when seasonal and insufficient vegetable supply could only be acquired on the market. Solar greenhouses, good seeds, and utilization of technology made this big difference possible. To understand the development in China's vegetable production, Shandong province may be a good example for further insights.

Shandong Province lies on the east coast of China, with a long-standing reputation in agriculture and vegetable production, and also the wide use of solar greenhouses. This report is composed by the Netherlands Business Support Office in Jinan. All statistics and information are cited from government statistical agents, strategic plans and official reports. We hope to briefly sketch out an image of vegetable production and solar greenhouses in Shandong province, which will provide business opportunities for Dutch companies.

2 Vegetable production in Shangdong

Shandong province has been a consistent leading power in China's agriculture industry, as well as vegetable production. Since 1990's, the province's vegetable sown area, total output, value, commodity volume and other major indicators have ranked 1st in China.

Highlights

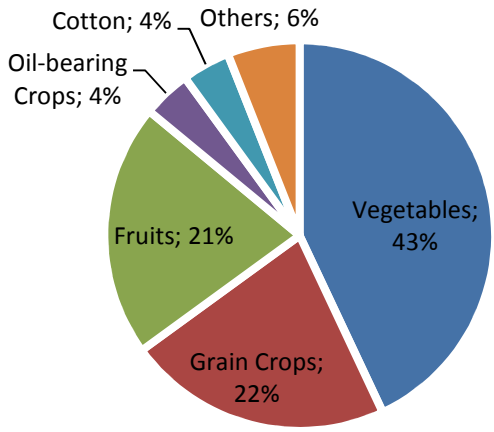
The vegetable sown area in Shandong makes up to 1/10 of China's total, with the output equivalent of 1/7 of China's total.

In 2015, its vegetable output value (including gourd vegetables) totaled 214 billion RMB, accounting for about 43% of the total agricultural output value of Shandong.

Shandong is also a leader in protected cultivation. Shandong has the largest surface area of greenhouses in China. The protected area totaled over 973,000ha (including 300,000ha solar greenhouses and the rest of different sized tunnels) in 2015, roughly 1/4 of nation's total.

Shandong has been the largest exporter of vegetables both in output and value for 15 consecutive years, which accounts for about 1/3 of nation's total. In 2015, over 3,000 processing companies exported vegetables and products worth 3.62 billion USD, to over 170 countries and regions across the globe.

Overview of Shandong Agriculture Output Value 2015



	China	Shandong	Rank & Percentage	
Sown Area (in million ha)	21.85	2.18	Nr. 1	10.0%
Output (in million tonnes)	758	117.88	Nr. 1	15.6%
Export Volume (in million tonnes)	10.2	3.7	Nr. 1	36.6%
Export Value (in billion USD)	13.3	3.6	Nr. 1	27.3%

Furthermore, Shandong has rich vegetable varieties that have gained a good reputation both at home and abroad. Onion, ginger and garlic, which have a persistent sown area of over 400,000ha, make up the main varieties in vegetable export.


Solar greenhouse



Tunnel Low tunnel and awning


Venlo greenhouses

3 Challenges

Shandong is in a leading position regarding the vegetable industry in China. However, technology and output it is still lacking behind developed countries, such as the Netherlands and Israel, which are set as benchmark for Shandong's future development. Some challenges that Shandong faces at this stage are:

1. The facilities in protected areas are in general of a low technical level. Early solar greenhouses were designed and constructed with no technical standards; consequently, this led to poor performance in vegetable production and to vulnerability of extreme weather conditions.
2. The innovation of vegetable production in Shandong is not yet on track. The innovative capability in new variety development, seed breeding, protected cultivation standardization and management, is still lacking behind developed countries.
3. The food quality and safety is still at risk. Achievements have been made to monitor and control the residue of pesticides, fertilizers and other chemicals, and the pass rate has improved gradually and steadily. However, comparing to developed countries, local growers still rely on chemicals and fertilizers in vegetable production and some food quality and safety accidents still happen occasionally.
4. Vegetable prices fluctuate intensively due to factors such as the increasing costs, extreme weather, and non-transparent markets. This may cause big losses for growers which in turn influence growers' behavior in coming seasons.
5. The labor shortfall and its consequences in rural areas has become one of the most compelling problems in Shandong and China, e.g. rising labor cost, poor education background and low technical skills of the workforce. Currently, farmers over 50 years old make up the backbone of the rural workforce.

4 Trends & Opportunities

Now, China's agriculture is coming to a new era, requiring knowledge and technology to manage food safety, environmental and economic challenges. Based on our investigation, trends and opportunities are described as below.

Trends

1. Agricultural production will be organized on a larger scale. In 2015, the new land circulation policy was taken into effect in China. It allows segmented farm lands under farmers to be acquired and centralized by big growers and operated on a larger scale. Hence, vegetable production will be expected to merge into larger scale as well.
2. Protected cultivation will be further promoted as good practice, in both total scale and technology level. It is expected that greenhouses will evolve to a higher technical level, for example tunnels will be upgraded into solar greenhouses and solar greenhouse upgraded into glass greenhouses. There are several Venlo greenhouse projects on their way in for example the regions of Dongying and Dezhou, and more can be expected in coming years.
3. Food safety and quality will be the top priorities. For many years, yield was the main concern for vegetable growers and that has led to abusive use of pesticides, fertilizers and other chemicals in production. But this has changed since the regulatory constraints and the rising of public awareness on food safety, and it will gain as a significant concern in the future.
4. Standardization and R&D will continue to be strengthened. Leading companies are paying more time and money to the standardization and R&D. In order to achieve this, local companies are keeping their eyes open on up-to-date technologies and learn from foreign counterparts.
5. The government will continue to emphasize its role as strong supporter of the vegetable industry. By building up agriculture sci-tech zones and hi-tech demonstration zones, advanced technology and experience can be better introduced to Shandong growers.

Typical solar greenhouses in vegetable production in Shandong

Glass greenhouses in Qingdao's agriculture zone

Opportunities

Shandong province has been providing considerable market opportunities to Dutch companies for over 20 years ago. It is the first province in China to widely use Dutch vegetable seeds, for example Rijk Zwaan and Bejo seeds. Till now, Dutch companies have been very active and successful in diversified businesses, from vegetable seed to complete Venlo greenhouse projects.

In general, Shandong will continue to provide market opportunities to a very wide range of agro-related companies in the Netherlands.

1. Shandong is the biggest owner of solar greenhouses and tunnels that are used for vegetable production in China. As previously mentioned, local greenhouses will be upgraded to a higher technical level in the future. This will create market opportunities for Dutch greenhouse and related companies, e.g. greenhouse builders (design, consulting, and construction) and sub-systems (irrigation and fertilizer, ventilation, climate control, energy supply, automation, logistics, and substrate).
2. Besides delivering hardware, consulting services and knowledge & experience sharing can be also useful for local growers to improve performance based on the current infrastructure. For example, how to use less resources -- land, water, energy, fertilizer and labor -- to gain more output and better quality.
3. Challenges should be properly managed in vegetable production, such as soil and water pollution caused by overuse of fertilizer and pesticide, and declining soil health after continuous cropping. These challenges will in turn influence the yield and quality of crops. Dutch companies that have expertise in sustainable agriculture will find market opportunities, for example in biological plant protection and other methods to minimize or replace the use of pesticides and fertilizers.
4. The governments in Shandong and China play a very active and dominant role in the upgrading and transformation of the agricultural industry, with lots of funds available for establishing agriculture sci-tech zones and hi-tech demonstration zones and subsidizing companies who implement advanced equipment and technologies in production. These agricultural zones are an ideal place to establish new facilities for growers where favorable policies and financial support can be negotiated. There will be opportunities for Dutch companies, local governments, and growers to work jointly to present Dutch state-of-the-art solutions in the future.

5 Agricultural Zones in Shandong

Following areas are the most clustered areas in protected cultivation in Shandong.

1. **Shouguang**

   Shouguang is a prefecture of Weifang city in central Shandong. It's well-known as the 'warehouse of vegetables in China'. The vegetable sown area stabilizes at about 56,000ha, with a total output of 4.5 million tons annually. The young plant propagation capacity is about 1.4 billion pieces a year. Shouguang is the pioneer in using greenhouses and imported seeds in vegetable production in China. The main varieties here include tomato, cucumber, eggplant, and pepper.

   Shouguang is an important distributing hub in North China. Distribution of the Shouguang vegetable wholesale market can reach out to Beijing, Shanghai and even Guangdong. Informal statistics shows that Shouguang vegetables make up 1/3 of Beijing's total vegetable supply.

   Dutch seed companies have nurseries in Shouguang and enjoy a good reputation and market penetration.

2. **Dongying Yellow River Delta Agro Hi-tech Demonstration Zone**

   The zone is located in the Yellow River Delta where the Yellow River flows into the Bohai Sea. It is China's 2nd state-level agro high-tech zone after Yangling in Shaanxi province in central China. The main purpose of Dongying zone is to explore and build up a model of modern agriculture which is adapted to China's conditions and which can be helpful to other regions in China.

   Dutch companies jointly with Chinese counterparts have successfully built a Venlo greenhouse project in the zone.

3. **Dezhou**

   Dezhou lies in the western part of Shandong. It was selected as the 3rd batch of National Demonstration Zone for Modern Agriculture in January 2015. Four months later, in the newly released 'the Outline of Collaborative Development of Beijing, Tianjin and Hebei Province' by the central government, Dezhou was positioned as the supply base for high-quality agricultural products for Beijing, Tianjin and Hebei province. The annual output of vegetables in Dezhou is more than 10 million tons. By 2020, the vegetable sown area in Dezhou is expected to be over 200,000ha, including 1/3 for (solar) greenhouses, 1/3 for tunnels and rest for field vegetables.

   High-end greenhouse projects are developing very fast in Dezhou. A mostly imported Dutch Venlo greenhouse built by a Dutch company will be completed and in operation in 2017.

4. **Lanling**

   Lanling is a prefecture of Linyi in the southern part of Shandong. The sown area in Lanling is about 87,000ha, with an annual output of 3.9 million tons. Main varieties in Lanling include garlic, pepper, mushroom, gourd, green onions, tomato and burdock. Lanling vegetables are exported to global market including EU, Japan, and Southeast Asia. Lanling is an important supply base for Shanghai, which accounts to 1/2 of Shanghai's market according to informal statistics.

Moreover, Agriculture Sci-Tech Zones and Agricultural Hi-tech Demonstration Zones which are on a smaller dimension than abovementioned areas should be given much attention. These agricultural zones are invested and operated by local governments and dedicated to developing modern agriculture and related businesses. Normally, favorable policies and financial support are available within these zones. By the end of 2016, Shandong has established 19 State-level Agriculture Sci-tech Zones and 12 Provincial-level Agriculture Hi-tech Demonstration Zones. Another 10 state level and 20 provincial level zones are to be established in the 'Five Year Plan 2016-2020'. Dutch companies should pay attention to these zones for potential opportunities.

6 Major Fairs

China (Shouguang) International Vegetable Sci-Tech Fair

Website: www.sgcbh.com (English available)

Date: annual April/May

The first session started in 2000. It has a total show area of 450,000m^2, including 165,000m^2 in-house area. The exposition has 13 areas, demonstrating the achievements of China's agriculture industry.

7 Relevant authorities

Several governmental authorities related to agro-business in China are as below.

1. **Ministry of Agriculture, China**

Supervision on general agricultural industry.

www.moa.gov.cn

2. **Ministry of Science & Technology of China**

Supervision on innovation in agriculture and agriculture hi-tech zones.

www.most.gov.cn

8 Local contact

If you have questions about this report or other questions, please feel free to reach us at:

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Sources

- Shandong Provincial Department of Commerce
- Shandong Statistic Yearbook 2015
- Action Plan for Upgrading and Transformation of Shandong Vegetable Industry 2016-2020
- Technical reports from China Academy of Agriculture Sciences (CAAS), Weifang Institute of Technology, Shouguang Vegetable Industry Group

Appendix: Main tasks 2017-2020

With the governments' persistent support and investment, as well as capital flowing into vegetable production, the transformation and upgrading of traditional vegetable production is speeding up. In August 2016, Shandong People's Government approved an action plan to improve the quality and efficiency and transform and upgrade Shandong's vegetable industry for the coming period 2017-2020. In the plan, 10 mains tasks are listed, covering the whole chain of vegetable industry, see overview below.

1. Construct and upgrade vegetable production bases.
   - Upgrade existing bases;
   - Upgrade technology and equipment;
   - Transform and upgrade development mode.
2. Construction of intensive nursery centers.
   - Expand nursery facilities;
   - Accelerate promotion of machinery and equipment, management and control system, substrates.
3. Seed innovation and R&D.
   - Strengthen germplasm resource innovation;
   - Improve breeding methods;
   - Increase breeding of new varieties;
   - Localize imported varieties, and use international intelligence to improve local varieties.
4. Soil improvement.
   - Promote the use of solar energy, dazomet, lime nitrogen to disinfect soil;
   - Promote the use of substrate, straw bioreactor technology to improve soil conditions;
   - Increase the use of organic fertilizers, bio-fertilizers and soil regulators to improve soil fertility.
5. Integration and promotion of cultivation technologies.
   - Carry out multi-disciplinary research on safe, high-quality, cost-efficient cultivation techniques.
   - Promote the use of a new type of solar greenhouse, water and fertilizer integration, organic substrate, biological pest control, bumblebee pollination, and other mature technologies.
6. Vegetable (deep) processing.
   - Carry out research and improvement on vegetable deep processing equipment and technology;
   - Expand processing varieties and improve quality;
   - Carry out technology research to extract multi-functional components from garlic, ginger, green onion, carrots, and dried chili.
7. Cold chain construction.
   - Construct pre-cooling facilities at vegetable production bases;
   - Improve the cold chain storage and logistic system;
   - Strengthen vegetable cleaning, grading, packaging and other commercial treatment;
   - Focus on the cold chain construction at vegetable standardized bases and wholesale markets.
8. Vegetable branding
   - Implement brand development strategy, consolidate old brands and create new brands, build well-known domestic and international brands.
9. Labor improvement
   - Carry out different levels of training to technical staff, growers, brokers, and those in service organizations.
10. Quality traceable project
    - Establish and improve standardized production systems, and speed up the construction of safe, high-quality standardized production bases and export bases;
    - Improve the quality and safety monitoring systems and agents.

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