

# Agricultural high-tech zone shows country the future of farming

Intelligent technology and automation harnessed to help multiply crop yields and increase efficiency in Taigu district of Jinzhong city, Shanxi



By YUAN SHENGGAO

Using advanced machines and the latest artificial intelligence, a newly established agricultural industrial zone in Shanxi is setting an example in modern farming for other regions in the province and the rest of the country.

After its development proposal — which was put forward by the Shanxi Committee of the Communist Party of China and the provincial government — was approved by the State Council, Jinzhong National Agricultural High-Tech Zone was founded in November 2019 in the Taigu district of Jinzhong city.

The zone, which locals call Shanxi Agricultural Valley, is among the first batch of national agricultural high-tech zones in China and the only one of its kind in the province, according to Li Chenghai, head of the zone's administrative committee.

The official said that Shanxi Agricultural Valley is designed as a demonstration zone for water-conserving agriculture.

"Shanxi is located in a semi-humid zone, which features less precipitation than the humid regions in China's south and east," Li said. "So an irrigation system with efficient and economical use of water is crucial for agricultural development in Shanxi."

In Shanxi Agricultural Valley, water-saving agriculture is being made possible with automated greenhouse farming and digitally controlled spraying or dripping facilities.

The agricultural zone boasts a number of advanced greenhouses. One glass-roofed greenhouse, equipped with all kinds of digital and automatic devices, is dedicated to strawberry farming. Measuring 10,000 square meters, it contained more than 50,000 pots of strawberry seedlings that were set on the ground. A close look revealed no soil in the pots.

According to Yang Yuhao, head of the company that operates the greenhouses, this greenhouse is a demonstration base for soil-free farming.

He explained that all the crop pots are connected to plastic pipes, which are used for irrigating and fertilizing, and a wire network for sensing crop conditions.

"Connected with a number of sensors, the wire network can monitor the fluid volume at the bottom of the pot," Yang said. He added that the fluid is a mixture of water, organic fertilizers and other ingredients to support the growth of crops.

"Real-time data can be sent to the control center of the greenhouse via the network. Irrigating, fertilizing and other operations can be automatically carried out through the pipes, based on the analysis of fluid volume in the pots," Yang said. "It takes only three to five minutes to finish irrigation of the entire greenhouse."

The executive noted that the water conservation efficiency of the automatic irrigation system can be several times higher than conventional methods.

Yang said that there are other connected and automatic devices for temperature, moisture and light control. "Because everything is automatic, one farmer is enough to look after this huge greenhouse," he said.



Jinzhong National Agricultural High-Tech Zone is among the first batch of national agricultural high-tech zones in China. CHEN JINHUA / FOR CHINA DAILY

In addition to its performance in water conservation and work efficiency, this new type of smart farming features a much larger output.

"In a greenhouse with automatic temperature, moisture and light control, crops can grow throughout the year," Yang said. "The output can be at least five times higher than that of conventional greenhouses."

Behind the increased farming efficiency is modernization driven by Shanxi Agricultural Valley's research, development and innovation abilities.

The high-tech zone's innovation system is bolstered by not only a number of public research institutions but strong corporate R&D teams.

Juxin Weiye Agricultural Technology is one of the leading high-tech companies in the agricultural valley.

"At the beginning of our operations in the agricultural high-tech zone, we positioned ourselves as an

"incubator company," said Ji Fubao, board chairman of Juxin Weiye. "This means we are a technological solutions provider to aid the zone's growth."

Ji said what makes the company a "technological driver" of the zone is its R&D team composed of high-profile scientists and researchers.

Shang Yongjin, head of the R&D team, for instance, is a scholar returning from Australia. As an expert in crop virus elimination research, Shang founded Shanxi's first virus-free crop breeding center in the agricultural high-tech zone.

According to Ji, crop growth can be often affected by viruses. "So virus elimination is crucial to increasing output and improving quality of crops," he said.

Shang's team has cultivated more than 60 virus-free crop varieties with patented molecular biological technologies over the past few years.

"As a result, we have played our unique role in boosting Shanxi Agricultural Valley's development by offering high-quality, high-output and virus-free crop seedlings to local farmers," Ji said.

Xinquhe village in the township of Fancun in Taigu district is one of the beneficiaries of the new technologies being developed in the agricultural high-tech zone.

The village now boasts vegetable-farming greenhouses covering a total area of nearly 50 hectares.

"The use of new technologies and new crop varieties developed by companies in Shanxi Agricultural Valley has led to substantial increases in output and farmers' income," said Xue Rongsheng, head of the village. "The average per-household income surpassed 50,000 yuan (\$7,635) for the first time last year," he said.

Wang Pei contributed to this story.

## Changzhi sets pace in new energy industries

By YUAN SHENGGAO

Responding to Shanxi's strategies of industrial transformation and energy revolution, the city of Changzhi in the southeast of the province is now highlighting its efforts in developing new energy and energy-conserving industries.

One prime example of such initiative is Lu'an Solar Energy Technologies, the new energy arm of local coal-mining giant Lu'an Group.

A recent report released by China's authoritative solar power research and consultancy institution, PV InfoLink, shows that Lu'an Solar Energy Technologies now ranks fifth globally in the sales volume of photovoltaic cells.

According to Shen Fangtao, an executive of the company, Lu'an Solar Energy Technologies uses the latest technologies, including robots and various kinds of intelligent equipment, to produce a new generation of photovoltaic cells. The photovoltaic cells are now extremely popular in markets throughout the world.

"To meet the strong demand from clients in more than 30 countries and regions, all six production lines of our company are now running at full capacity," Shen said. "Our current output is about 720,000 cells a day."

The executive said Lu'an is installing another two production lines to meet the increasing demand. In addition, the company has focused on the research and development of high-efficiency and high-performance photovoltaic cells.

"A recent breakthrough is the development of a large-sized cell, which can improve power generation capacity by 10 percent," Shen said.

He explained such a breakthrough has been made possible by the use of aluminum oxide purification technology to avoid electricity loss caused by higher-resistance components.

Shen noted that the company's strong R&D competence is the driving force for its rapid and sustainable growth. It owns a number of R&D platforms that include three provincial-level research and innovation centers.

The company boasts more than 140 core technologies with national or international patents. It also holds a place as one of the pacesetters of the industry by drafting the industrial standards on behalf of the sector it represents.

Another industrial pacesetter in Changzhi is Rishengda New Energy, a producer of photovoltaic glass and panels.

According to Song Mingsheng,



Gaoke Huaye has more than 3,000 packaging machines for the production of LED devices. LI JIANGMI / FOR CHINA DAILY

general manager of the company, the company's output of 2-millimeter photovoltaic glass is more than 20 million pieces a year.

"Photovoltaic glass with a thickness of 2 mm achieves much better light transmittance compared with the 4-mm variety that is commonly used in the industry," Song said. "This results in much higher energy utilization efficiency."

The executive added that the company has already developed the 1.6-mm photovoltaic glass, which will be put into mass production in its second-phase project that will begin operations in the near future.

Song noted that the second-phase plant will also be a demonstrative project of its own cutting-edge products.

"We have installed our own photovoltaic glass panels on the roof of

the plants," Song said. "That constitutes a solar farm, which can generate 19.5 million kilowatt-hours of electricity a year."

Also involved in the energy conservation industry is Gaoke Huaye, one of the leading LED device producers in Changzhi.

"LED lighting devices feature greater energy use efficiency than any conventional lighting devices," said Cui Chengyuan, deputy general manager of the company.

According to the executive, Gaoke Huaye now boasts more than 3,000 packaging machines, which produce 210 billion pieces of LED a year.

Changzhi is home to more than 20 large LED manufacturers, which produce about 95 percent of LED products in Shanxi province.

Guo Yanjie contributed to this story.

## Medicinal herbs boost revenue across county

By YUAN SHENGGAO

When the flowers from *dangshen* plants, or hairy asiabell, bloomed in April, the Shanxi county of Pingshun welcomed a growing number of tourists.

They were there to visit the *dangshen* farms in the county. The large clusters of bell-like, yellow and purple flowers made a perfect setting for visitors to take pictures.

But Zhang Ting, a farmer in the village of Fotangling, sees this plant as not only grounds for rural tourism, but more importantly, a cash crop to help his family increase their revenue, as it is a high-value-added herb for making medicines.

The roots of *dangshen* are used in the production of many varieties of traditional Chinese medicines and health foods.

Pingshun is one of the major *dangshen* production bases in Shanxi province. The local variety, which is called *Lu dangshen*, is acclaimed throughout the country for its excellent quality. The local authorities applied for a geographical indication for the variety in 2011. Since then, the product has seen growing popularity in the domestic market.

"I planted about 2 *mu* (0.13 hectares) of *Lu dangshen* last year," Zhang said. "The revenue from selling the herbs was able to support the yearly expenditure of my entire family."

Zhang Zhijian, Party secretary of Fotangling, said that growing *Lu dangshen* generated a per capita annual income of more 5,000 yuan (\$762) for residents, making it an important source of revenue

growth in the village.

"We are planning to increase the planting area of *Lu dangshen* and build processing plants for the herbs," Zhang said. "These initiatives are expected to further increase revenue for our villagers."

The planting and processing of *Lu dangshen* and other medicinal herbs is one of the major agricultural sectors in Pingshun county.

Local statistics show that the county has 10 *Lu dangshen* plantation bases covering a total area of 1,500 hectares. Total annual output of the herb surpassed 3,000 metric tons in recent years, which generates a combined annual revenue of 120 million yuan for growers, manufacturers and dealers in the whole industrial chain.

Shanxi province is one of the major production bases for growing medicinal herbs in China. Renowned and successful medicinal herbs from Shanxi also include forsythia, wolfberry and Chinese thornflower.

The province has a long history in developing traditional Chinese medicines based on medicinal herbs. There are a number of local TCM brands with wide recognition throughout the country.

Yishengtang, based in the city of Jinzhong, for instance, is a time-honored brand with a history of more than 300 years. It was recently certified by the China Enterprise Product Quality Certification Center as a renowned Chinese brand for the market recognition of its range of products.

Wu Jia contributed to this story.

## Fortress' merchant history charms visitors

By YUAN SHENGGAO

When talking about the history of the Great Wall, people will often think of wars and conflicts because the greatest defensive project in ancient China was used to fend off invasions by nomads from the north.

But the ancient Great Wall fortress of Zhumabao, located in today's Zhumabao village in Xinrong district the northern Shanxi city of Datong, tells another story: that of commercial and cultural exchanges between the farming Han people in the south and the nomads in the north.

With a total length of more than 20,000 kilometers, the Great Wall began construction in the Spring and Autumn Period (770-476 BC). The latest renovation and reconstruction of the project was made in the Ming Dynasty (1368-1644).

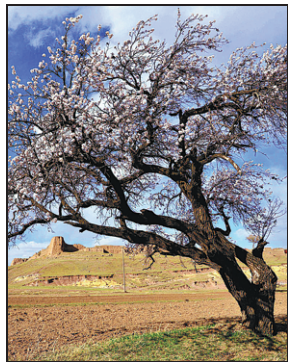
Indeed, like other sections of the Great Wall, the fortress of Zhumabao was a witness to numerous wars and conflicts before the Ming Dynasty.

Not long after the latest reconstruction, Zhumabao developed into a cross-border trade hub for the Han people in the south and the Mongolians in the north. Traded commodities included grains, tea and silk from the Han; and horses, cattle, sheep, camels and leather products from the Mongolians.

Despite short intervals of conflicts, the fortress maintained its role as a trade hub for more than 300 years. Its name, Zhumabao, translates as horse-trading fortress.

Relics related to the business is an old street called Mashi, or horse market; and the Mashilou, or horse-trading watchtower, standing on the Great Wall gate.

According to local residents, the trade was looked after by the military officers stationed in the watchtower. Every morning, the officers would come to open the gate, letting in the Mongolian traders and announcing the beginning of transactions.



A lone plum tree blooms near the Zhumabao section of the Great Wall. ZHAO YU / FOR CHINA DAILY

Many local merchants accumulated great wealth during that period. Their fortune is demonstrated in many ancient residential buildings in the village of Zhumabao. Some well-preserved residences

have now been turned into rustic lodges to accommodate tourists.

In today's Mashilou site, the gate is still there, but the watchtower is gone. And there is no more horse trading and no more building structures along the ruined street. Sometimes local herders lead their cattle through the gate, reminding people that this used to be the passageway of traded animals.

Even the Great Wall is no more intact. Its discontinuous sections are now surrounded by farmlands, grasslands and shrubs. Some scarcely scattered plum trees stand alone out of the shrubs, drawing visitors' speculation whether they were ones that offered shade to traders hundreds of years ago.

This picture of ruined beauty still appeals to tourists. The discontinuous walls and lonely trees on the grasslands offer a perfect setting for visitors to take photos.

Peng Ke'er contributed to this story.



Workers in Pingshun county sort and grade hairy asiabell roots before being delivered to TCM factories. SHI XIAOBO / FOR CHINA DAILY