7th International Walnut Symposium 2013

Report

Mamadzhanov Davlet

FENYANG, CHINA. 20-23 JULY, 2013
Contents

1. Introduction - Walnut Footprints in China
2. 7th International Walnut Symposium
3. Experience on propagation and breeding of walnut in China
4. Walnut processing in China
5. Exhibition
6. Contacts for cooperation
**Introduction**

China’s climate is extremely complex and diverse extending across six climate zones – equatorial belt, tropical zone, subtropical zone, warm temperate zone, temperate zone, cold zone. The complex and varied climate terrains and landforms have created a natural paradise for biodiversity. So you can find deciduous fruit crops in the North of China, such as apple, pear, cherry, walnut, almond, apricot and evergreen fruit crops in the South of China, such as lychee, jackfruit, durain, kumquat, mangosteen, longan.

Walnut are cultivated in more than 20 provinces in China including 6 agricultural regions which are the East Coast, Northwest, Sinkiang, Centre of South and Tibet. Among those, Juglans regia is most cultured walnut in the Northwest, especially in Shanxi, Shaanxi, Hebei, Shandong and the Liaoning province etc. In the Southwest, such as in Yunnan, Quanzhou province, J.sigillata is also popular.

There is a long history of walnut cultivation in China and there are plenty of walnut germplasm, they are called Juglans regia in ancient Chinese. It is said a famous legend that walnut was originated in the Western Han Dynasty (206 B.C.-A.D.24) in China, Zang Qian who served as an envoy abroad brought walnuts back to China from West in 138 BC. However it was verified by archeologists that it existed much earliest through excavations in cave fossil. A reference point in fossil plants in China showed that existed at the earliest in the third period of geological age (25 million years ago). There are six walnut species in Cina including: J. acuminata Al.Braum wx Vnger, J. mandshurica Maxim, J. mandshurica Maxim var. naorai Endo, J. mandshurica Endo, J. cathayenses Hu.et Chaney, J. shanwangensis Hu.et Chaney. Though many historians pinpoint that Persia was the country of the walnut’s origin, archeological walnut remains found in China is one of the walnut’s origin centers as well.

Walnut is also called ‘Qiang tao’, ‘Longevity fruit’ and ‘Viva son’ in Chinese. As one of the walnut origin centers in the world, China has a 7200-year old walnut fossil. According to textual research, ‘Fenzhou walnut in Shanxi province had a history of cultivation for 2000 years (Wang, J.C. 2003). There are many ancient walnut trees in Xinjiang and other provinces. Even so, the walnut was always regarded as a small nut or sundry fruit and therefore disregarded (Wang, K.J. and Hao, Y.B. 2006) until the foundation of New China (1949). Thereafter, walnut production developed slowly in a long historical process in China.

The main characteristics for the walnut breeding program in China are: large fruit size, proper thin nut shell, early bearing, good flower, strong resistance to cold and drought, etc.

Recently, the Chinese walnut industry has developed rapidly under the great financial aid of the governments based on release of various new walnut varieties in the market, introduction of new walnut propagation techniques and the gigantic market demand for walnut products. The walnut is playing a key role in the leading economic industry on more than 100 countries of a dozen provinces in China.

Before 1996, unsuccessful grafting techniques were responsible for the limitation of new walnut varieties popularization. Now many grafting methods for walnut have been successfully tested by walnut growers, such as square budding, twig grafting, seedling grafting on planted stock,
etc., which fundamentally solved the key problem for large-scale popularization of new walnut varieties (Wang and Hao, 2006).

China has the largest walnut cultural area in the world, yet as a result of the backward small-scale farmer economy, yield per unit is lower than average of the world. There is an enormous development potential for the walnut industry in China, along with the consistent perfection of agricultural productivity (Zhang, 2004). The total walnut production area has increased to 1300000 ha in 2005 from 918000 ha in 1991 (Xi and Liu, 2005). Presently, it is has grown to 3330000 ha, among those, there are about 2000000 ha of bearing and the rest are young orchards planted over the last 10 years. The rapid development of the walnut industry is attributed to the strong support given to the farmers by the government. The total walnut yield will have a huge increase as and when all orchards go into bearing.

Walnut production in China mainly shows the following aspects: (1) It has a long history and rich resources. There are 216 fine clonal varieties, 164 selections from private farmyards and 486 single plants lines in China (Han and He, 2004) (2). Confused varieties and poor energy-input management are the two main limitations of walnut cultivation in China (3). In China main commercial cultivars are as follows: Bofeng, Bokexiang, Zha343, Luguang, Xiangling, Hanfeng, Wen185, Jinboxiang series, Liaohoe series, Zhongling series, Jinlong series, Xifu series, Lipin Series, Luguo series, Jinmain series, etc.

In 2000, China became the 1st walnut production country with a yield of 310000 t, which exceeded that of the United States. Annual walnut output from each main production province is more 10000 tons. These include Shaanxi, Shanxi, Shandong and Hebei. The total yield of the top production provinces occupies 90% of the country. Among those, Yunnan is the 1st walnut producing province, which always accounts for around 20% of the total yield in China (Wang et al 2007). The walnut industry has already become the major income for many areas in China, which exports huge amount of nuts. For example, half of the income of farmers in Fenyang city, the site of the 7th International Walnut symposium, comes from the walnut industry. Plus income is more than 0.2 billion RMB. Walnut area exceeds six hundred walnut hectare in three hundred walnut producing counties. In total, it is more than six thousand hectare in 131 counties.

Fenyang was originally governed by ancient Fenzhou. It enjios fertile soil, abundant sunline, and dense water vapor. It is one places where walnut was originally produced. During Han, Tang, Song and Yuan dynasties, fragmentary records of walnut appeared in some old books. In the Ming and Qing dynasties, it was the tribute to the royal. In the 10th year of Xianveng in Qing dynasty, Tianjin port was opened. From then, Fenzhou walnut became the earliest labeling products for Fenzhou exports. During the Republic of China, the price of Fenzhou walnut skyrocketed. A jin of walnut could be exchanged for one silver yuan. The California walnut Society of US came to inspect a couple of the times and Fenzhou Walnut became a new like in North America. Relevant news was published by Dagong Newspaper from time to time.

Only six years after New China was founded, walnut trees round the country doubled, the number ha since reached more than 198.000. Since the 1969s experts like Zhang Yiping and Xishengke came to fenyang to carry our research on selecting fine seeds and breeding. With their help, Fenzhou Walnut inserted the science wing, the first in China.
In August 1972, general Wang Zheng inspected Fenyang walnut production. In March 1973, a walnut export experience meeting of the thirteen provinces and districts was held in Fenyang. From then on, Fenyang started forming the industrial blue print of “100-li Walnut Zone”. In the following 40 years, the walnut planting area of the whole city reached 500,000 mu, which yielded more than 10,000 tons every year. More than 30 scale sized processing enterprises such as Yuyuan, Teda and Yangguang process more than 30,000 tons of walnut yearly. 30 million seedlings can be produced every year. Late breeding fruit like Jinlong 1 and Jinlong 2 varieties have been bred. More than 3000 experts from Fenyang have been sent abroad to provide technology services.

In the process of promoting the industrialization of Fenzhou walnut, Fenyang city won many awards like “The China’s Walnut Home”.

By the end of the 12th Five-year Plan, the planting area of Fenshou Walnut will reach 600,000 mu, with an annual yield of 20,000 tons. The breeding of seedlings will be 20,000 mu. The processing capacity will be 50,000 tons. The walnut industry of Fenyang will be the leading industry of enriching the people, strengthening the city and beautifying mountains and rivers.

7th International Walnut Symposium

Founded by the International Society for Horticulture Science (ISHS), known as Olympics in the walnut community and held every four years, the International Walnut Symposium is an academic event showcasing the latest global high-tech achievements and leading global walnut industry development. Up to now, the Symposium had taken place for six sessions in Hungary, Spain, Portugal, France, Italy and Australia successively. Each symposium had effectively pushed forward the host country’s walnut industry, which will be held in Fenyang City of Shanxi, China from 20-23 July, 2013.

The 7th International Walnut Symposium (IWS) is hosted by:

- International Society for Horticulture Science,
- Chinese Society for Horticulture Science,
- The Shanxi Academy of Agricultural Sciences,
- The Forestry Department of Shanxi Province,
- The People’s Government of Lvliang City, Shanxi province,

Organized by:

- The Pomology Institute, Shanxi Academy of Agricultural Sciences,
- The People’s Government of Fenyang city, Shanxi province

Co-organized by:

- China International Conference Center for Science and Technology
SYMPOSIUM PROGRAM

July 19 – registration
July 20 – Opening ceremony, visiting exhibition, visiting the walnut demonstration garden
July 21 – Presentations
July 22 – Presentations
July 23 – Presentations

Presentations

More than 40 oral and about 70 poster presentations were submitted in the 7th International Walnut Symposium in Fenyang city, China.

Pic.1 Presentations of participants

Presentations include four sessions: 1. Germplasm, Genetics and Biotechnology,
   Session 2: Variety, Rootstock and Propagation
   Session 3: Water, Soil, Nutrition and Plant Physiology
   Session 4: Production, Defense

In session ‘Germplasm, Genetics and Biotechnology submitted 8 oral presentations.
“Research and Using Progress on the Walnut germplasm Resources in Sichuan”, H.B. Han, Z.Y. Chuan and other, China

“State of walnut diversity in Morocco”, Abdellah KAJJI, Morocco

“Walnut Genebank in China National Plant germplasm Repository”, X. Chen, China

“Selection and evaluation of five Promised Walnut Genotypes in Iran”, R. Mohmodi, Iran

“Genetic improvement of Persian walnut (Juglans regia L.) in Iran, D. Hassani, Iran

“Research Progress on Germplasm Resourse and New variety breeding of walnut in Hubei”, Z.Q. Qin, China

“Review of researches on breeding of walnut in Shandong Institute of Pomology”, M.Y. Zang, China

“Walnut breeding and rootstock development in California”, Charles A. Leslie, USA

Most speakers paid attention in breeding, rootstocks, micropropagation, genetics, clonal propagation, seed selection, superior genotype.

Poster presentations: submitted 16 poster presentations.

From Kyrgyzstan submitted: “Form diversity and selection of walnut in Kyrgyzstan”, D. Mamadzhanov

Pic.2 Poster presentation in the International walnut symposium
In session 3: Water, Soil, Nutrition and Plant Physiology there is a good presentation “The evaluation of Straw Pit irrigation method in walnut orchard in Loess Plateau Area”.

In the Loess Plateau Area the rainfall is 350-400 mm, the drought is the main limit factors to influence the yield and the quality of walnut. The research, through the analysis of cost and economic benefit of straw pit irrigation method (plastics film covering), flooding irrigation, sprinkling irrigation, regard the method of irrigation in vertical pit (with straw in, plastics film covering) is the best. The method can not only collect the rain in rain season of July, August, September, and use it in drought season of March, April, May, but also suit the situation in Loess Plateau Area with the relatively less land, more labor force and drought climate, which is very different from developed countries.

Pic.3 Straw irrigation

The farmer always plant their crop on the slope land, normally 5-10 mu (about a half of 1 ha) per household. Because it is very dry in crucial growth period and rainstorms, which not only erode the bare farmland, but also carry away the topsoil with the fertility and make the river unproductive. The poverty is in the vicious cycle.

The change of the soil moisture: sprinkle and drip irrigation system are the best. The soil moisture is changing between 80-100%, then the straw pit irrigation method (plastics film covering). The worst method are the natural rain and the flooding irrigation, it cannot satisfy the basic needs of the walnut trees for growth and development.

The irrigation systems strongly influence the weight of the shell and kernel, the light kernel percentage and thickness of the shell.

The cost of the straw pit irrigation method is mainly the labor and water cost, but it is “once and for all”.

The Chinese farmer and walnut industry always have a misunderstanding of walnut, they strive to look and breed a cultivar that “Run fast without feed”.

The straw acts as a king of water-retaining agent and will rot away to humus which will improve the structure of the soil.

The results are not only adaptable to walnut orchard, but also to apple, pear and orchard in the Loess Plateau Area.
In Kyrgyzstan walnut fruit forests grow in mountains region in 1200-2000 m and climate is not so drought. But there are not more plots for to make a walnut plantation in the belt of walnut-fruit forests. In valley region we can find plots where we can to grow plants of walnut. In valley region the climate is drought and for walnut plantations necessary irrigation. Therefore such method as straw pit irrigation method will be more useful.

Walnut (Juglans regia L.) use not only for nut production. Very importance to grow walnut for timber production also. In Presentation of N. Aleta “Using Walnut species for timber production in Southern Europe” explains the importance of Juglans for timber production. In Europe, Persian walnut (Juglans regia) has been used to make fine-wood furniture since the 14th century and this has imbued the idea that the true Juglans wood is that produced by this species. However, walnut timber still tends to come from trees obtained from walnut orchards and even from trees scattered across the countryside, although the latter are more and more scare.

Natural hybrid seeds are now being produced in planned clonal orchards and this has allowed many hectares to be planted with seedlings from forest reproductive materials, particularly in France, Italy and Spain.

Persian walnut has been selected for nut production since time immemorial and restoring their wild habit has been a major objective. The difficult vegetative propagation of this species has been an obstacle to nut production, although it has helped to save its genetic diversity.

Current research on Juglans regia breeding has focused on improving the homogeneity of the seedlings used in new plantations and their secondary growth. This kind of selection has enabled us to obtain J.regia progenies with forest growth habit; basic materials for reproducing there progenies have also been installed in different countries. A second aim is currently being pursued in order to minimize some of the environmental problems of the Mediterranean area: recurrent drought and sudden frost events, particularly in autumn.

A big form diversity of walnut in walnut-fruit forest of Kyrgyzstan is allows select different new walnut forms. Among different walnut form we can select forms with low-quality nuts, but with good growth and less affected by disease and pests. Such selection forms we can use for timber production.

Experience on propagation and breeding of walnut in China
Pic. 4 Budding of young trees of walnut
We visited some plots of China Fenzhou Walnut home. Our colleagues from China demonstrated the technique of budding of walnut in summer. The budding method is making in young trees of walnut as in the picture and successful about 70-75%.
In nursery they grows seedlings of walnut during 1,5 years, than these seedlings use for summer budding.

Walnut plantation in China.

Walnut plantation in China making in different plots – in slopes and on the plains plots with the good varieties of walnut. Placing tress usually 6x5 m and in 1 ha – 330 trees. In twenty years old plantation the harvest about 3000 kg of nuts from 1 ha.

Irrigation system in walnut plantations in valley region – flooding irrigation and drip irrigation also.

Pic.7 Walnut plantations in Fenyang

In mountain regions make planting trees on terraces. Terraces prepare before planting trees and during rain and snow moisture accumulates in terraces for plants.

Visit walnut processing company Fenshou Yuyuan

Company Profile Established in 1998, Fenzhou Yuyuan Native Produce Co., Ltd. is located in the famous Hometown of Chinese Walnut - Fenyang City of Shanxi Province. The company is specialized in processing and selling walnuts and kernels, apricot kernels, all kinds of beans and grains and other natural products, and is also engaged in importing and exporting business directly.
The factory covers an area of 25,000 square meters. They can process walnuts and kernels and other natural products totally 3500MT annually. The sales amount is more than RMB68 million Yuan per year. There is a plantation of green foods and high-quality walnut seedlings totally about 30,000mu (about 20,010,000 square meters). They have been elected as the group leader enterprise for the agriculture industry by government of Shanxi Province. This company also has passed the review and verification of Grade A Level of Green Food Standards by China Green Food Development Center. A new processing plant has been building in the west of Fenyang City. The plant covers an area of 36,700 square meters. Besides producing walnuts, kernels and other natural products, they have established a new company for processing biological products of walnuts and other plant protein lactobacillus beverages. The anticipative annual output is 5000MT.

Private walnut processing
There are shops where the split nuts, sorted and packaged kernel. Kernels are sold mainly in the local market. Interesting was the handle mechanism for splitting nuts, as shown in the first figure. The mechanism allows to split nuts in more than splitting hammer.

Visiting Exhibition
Pic.10 Products from different companies of China

Several companies presented their products in the exhibition. Products from walnut – nuts, kernel with sugar, honey kernel, salted kernels in banks and other products.

In exhibition presented a works of farmers on grow plants of walnut also.
Pic. 11 Activity of farmers on grow of walnut in China

Contacts for cooperation:

1. Chuck Leslie – Director Walnut Improvement Program, Department of Plant Sciences, USA
2. Han Hua Bo – Sichuan Academy of forestry, China
3. Heinrich Gubler-Merz – Schweizer Nuss-Invetar Internationale Varietaten uber 250 Sorten im Angebot, Switzerland
4. Yasar Akca – Gaziosmanpasa University, Department of Horticulture, Faculty of Agriculture, Turkey
5. Neus Aleta, IRTA, director Agroforestry, Barcelona, Spain
6. Kourosh Vandati – professor of Pomology, Department of Horticulture, University of Tehran, Iran
7. Darab Hassani – Department of Horticulture of Seed and plant Institute, Iran
8. Richard Moxham – Australian Walnut Industry Association, Australia
9. Sebastien Linard – Plant nursery director “BioTech”, France
10. Ren Cheng Zhong – Fenyang Forestry Bureau, Shanxi, China
11. Chang Yuemei – Shanxi Academy of Forestry Sciences, China
12. Selami Bayrak – Ceviz Badem Uzmani, Turkey
13. Okan Gundemir – Director, Ekiz Fendancilik, Turkey
14. Andrew A.G. Waring – Manager Strategic Sourcing & Marketing, Australia