

Seminar on Protection of New Plant Varieties, 2018



Breeding of wolfberry varieties and industrial development trend

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Outlines



- 1、 Introduction
- 2、 Wolfberry Germplasm Collection, Conservation and Evaluation
- 3、 Breeding and Protection of Wolfberry Varieties
- 4、 Wolfberry standardized cultivation
- 5、 Wolfberry planting area, production and exports
- 6、 Wolfberry's deep processing research and development
- 7、 Wolfberry industrial development trend

1 Introduction

Lycium barbarum is a Solanaceous defoliated shrub.

耐盐碱

耐旱寒

耐沙荒

药食性



耐盐碱，在0-10cm土层土壤含盐量8.9%、10-30cm土层土壤含盐量5.1%的盐碱地上能够生长，是盐碱地、沙荒地改良的先导树种。

Alkali resistance:
0-10cm Soil salinity :8.9% ; 10-30cm Soil salinity : 5.1%



宁夏枸杞 (*Lycium barbarum* L.) 适应性很强，能忍耐42.9℃高温；耐寒性亦很强，在-41.5℃下无冻害；

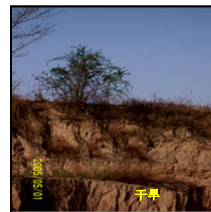
Peak temperature : 42.9℃

Minimum temperature:-41.5 ℃



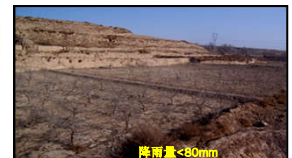
November

耐干旱，在荒地仍能生长；
Drought resistance



0.5m

干旱




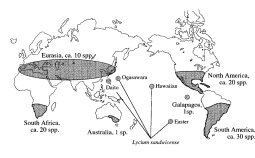
降雨量<80mm



沙质土

There are approximately 80 species in the world .The genus *Lycium L.* is widely distributed in Eurasia, South America , southern Africa, and North America.

Seven species and three varieties are found in China, which is mainly distributed in arid and semi-arid of northwestern China.




Distribution of the genus *Lycium*
Tatsuya Fukuda et al 2001

Pictures of *Lycium barbarum L.*

The fruit of *Lycium barbarum*, also called wolfberry or goji berry, is a well-known traditional Chinese medicine (TCM) for more than 2000 years. Many functional components in *L. barbarum*, including polysaccharides, flavonoids, and carotenoids et al.




In Chinese medicinal monographs "shen nong ben cao jing", "ben cao gang mu" and "ben cao hui yan", *L. barbarum L.* was recorded as "nourishing liver and kidney, enhancing eyesight, enriching blood, invigorating sex, reducing rheumatism" and so on.

shen nong ben cao jing ben cao gang mu ben cao hui yan

Bencao Guangmu discussed the habitat, the use history, manufacturing, and usage of *Lycium*. The fruit , leaf, root bark and young shoot of *Lycium barbarum L.* have long been used as foods and medicines.

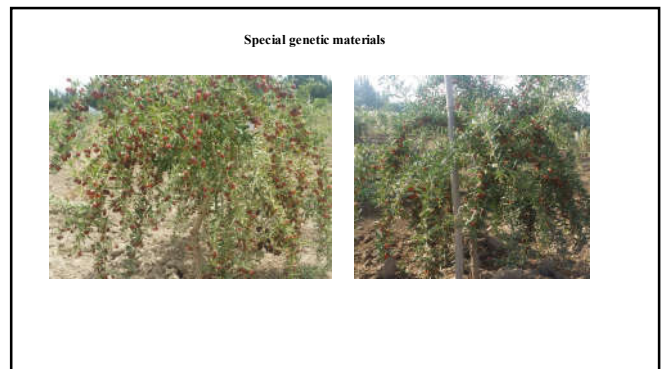
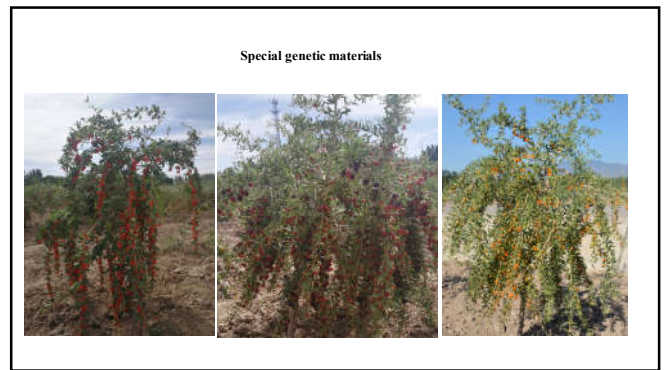
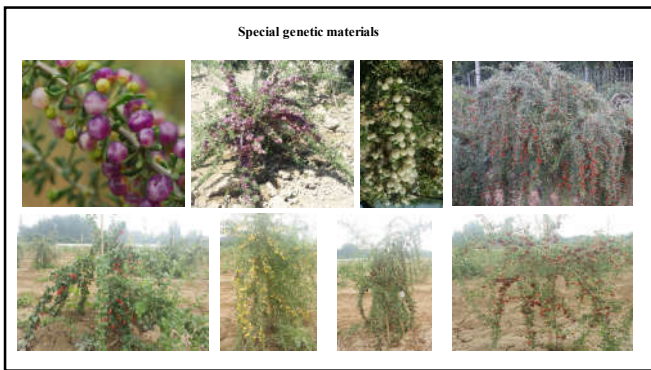
2 **Wolfberry Germplasm Collection, Conservation and Evaluation**

● **Germplasm Collection , Conservation and management**
It was established 33.3 acres wolfberry germplasm nursery which is the only one in the world.



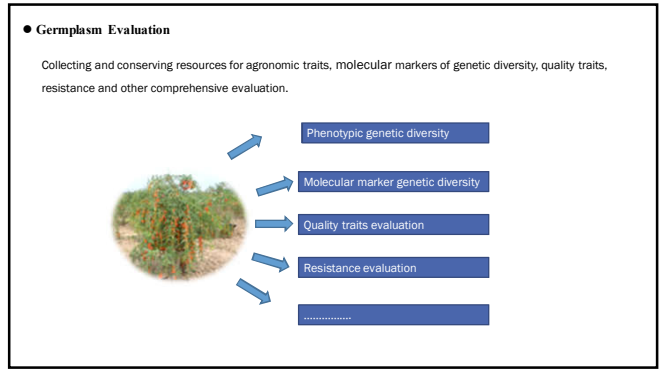
Core germplasm resources nursery







In 2012, the nursery has been integrated into the National Forest Genetic Resources Platform.



枸杞种质资源农艺性状调查

果实	枝条	叶片	种子	花
单果质量	新梢年产量	叶长	种子千粒重	花径
单果纵径	枝条附性	叶宽	种子厚度	花筒长
单果横径	感伤力	叶厚	单果种子数	花筒颜色
果柄长度	一年生枝条	叶柄长	种子饱满率	花筒形状
果目	一年生枝条数	叶宽		
果皮颜色	单年结果率	叶面积		
果肉厚	年产量	叶长径		
果肉一致性	颜色	叶长径		
总果柄长	叶长径			
第一级果柄数				
子叶长				
子叶质量				
二次结果率				

Fruit phenotypic genetic diversity

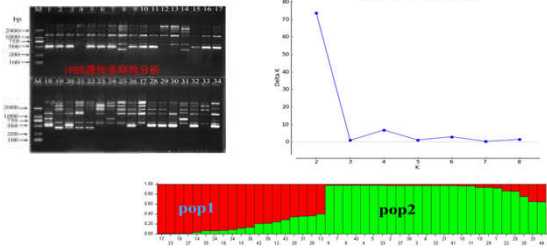


Variations in fruit colors and shapes

Variations in flower shapes

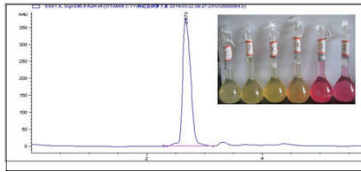
Molecular marker genetic diversity

Many kinds of molecular marker such as SSR, iPBS, Scot et al were used to evaluate genetic diversity.



Quality traits evaluation

The analysis and comprehensive evaluation of polysaccharides, total sugars, fructose, glucose, sucrose, rutin, betaine, neoxanthin, lutein, zeaxanthin, β -cryptoxanthin, β -carotene.



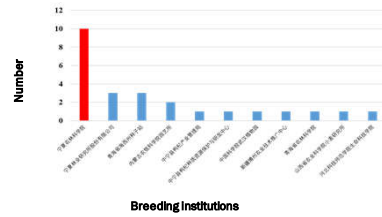
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Breeding and Protection of Wolfberry Varieties



Breeding of Wolfberry Varieties

In the past 30 years, a total of 25 new *Lycium barbarum* cultivars were cultivated by hybrid breeding and group selection, among which 22 were fruit varieties and 3 were vegetable varieties.



'Ningqi 1'

The characteristics of 'Ningqi 1' high yield, stable yield, large fruit, adaptability and other advantages. It was preferred by the state to promote varieties. National large-scale promotion of planting, promotion of the area has accounted for more than 80% of the national planted area.



'Ningqi 5'

The average fruit weight of fresh fruit 1.1 g, the largest single fruit weight 3.2 g. Fresh fruit thick, beautiful shape, usage of fresh and dry. It is a male infertility genetic material.



'Ningqi 7'

'Ning Qi 7' large particles of fruit, commodity grade rate, to adapt to a wide area, significant economic benefits per mu than 'Ning Qi 1' income increased 2000-4000 yuan.



Since the approval of this variety, it has been widely popularized and applied in the main producing areas of Ningxia, Xinjiang, Qinghai and Gansu .The accumulated extension cultivation area of Ningqi 7 has reached 82372 acres with the output value having reached CNY12 billion.



Breeding new lines







***L.ruthenicum* M. new lines 'Lr-12-01'**

- ◆ Average fruit weight 0.64g, the average fruit diameter 8.3mm, the average fruit length 11.97mm;
- ◆ Fruit yield per plant 2.6kg, fresh and dry ratio: 7.6: 1, dry fruit per plant 342.1g, dry fruit per mu (444 plants / mu) 151.9kg.

Lr-12-01

● Protection of Wolfberry Varieties

Ningnongqi 2

The average fruit weight 1.11 g
 The average fruit diameter 2.5 cm
 The average fruit length 1.1 cm
 The ration of fresh and dry 4.6: 1

Heat-resistant Variety

Ningnongqi 3


The average fruit weight 1.08g
 The average fruit diameter 2.3 cm
 The average fruit length 1.10cm
 The ration of fresh and dry 4.26: 1

Ningnongqi 4

The average fruit weight 1.08 g
 Flavonoids content 0.94 mg /g
 Juice rate 80.5%


Ningnongqi 5

The average fruit weight 0.54 g
 Flavonoids content 0.85 mg /g
 Juice rate 86.79%





Ningqi cai

Yield: 1695Kg


4 Wolfberry standardized cultivation


Through the implementation of the project, scientific researchers, after years of repeated experimental studies, technical integration and demonstration, formed eight key technologies such as seedling propagation and plastic trimming in large scale in accordance with the principle of "safety, efficiency, stability and controllability."






Standardized cultivation technology system **Eight key technologies**

(1) Propagation

The establishment of micro-cuttage seedling technology system, research and development of intelligent temperature and humidity control system, so that the germination cycle of medlar from 1 to 1 anniversary of the annual production, survival rate increased from 30% to 80%.

Tissue culture 组织培养 

Softwood cutting 嫩枝扦插 

Hardwood cutting 硬枝扦插 

We have built 1 national seedling breeding base and 15 nursery bases with more than 4 million seedlings per year, driving more than 100 million seedlings per year in Ningxia with an output value of 300 million yuan.



(2) Pruning



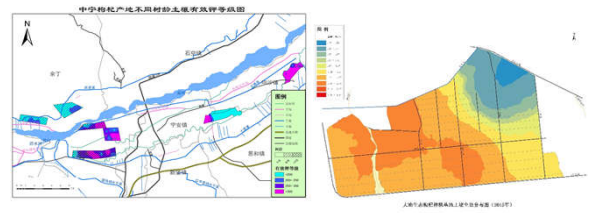
(3) Hedge cultivation



(4) Growing season all year



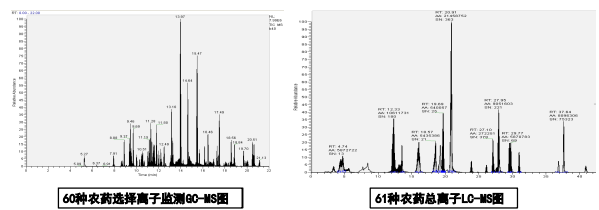
(5) Fertilizer and water integration



(6) Integrated pest control and Management



(7) Product quality testing



(8) Information platform construction



New varieties show (Bairuiyuan)



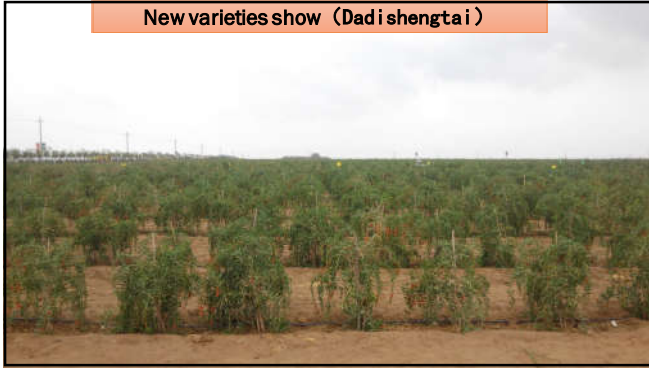
New varieties show (Qitai)



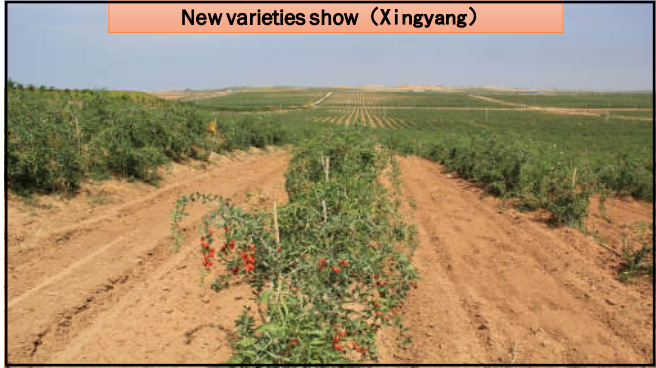
New varieties show (Zhongqi)

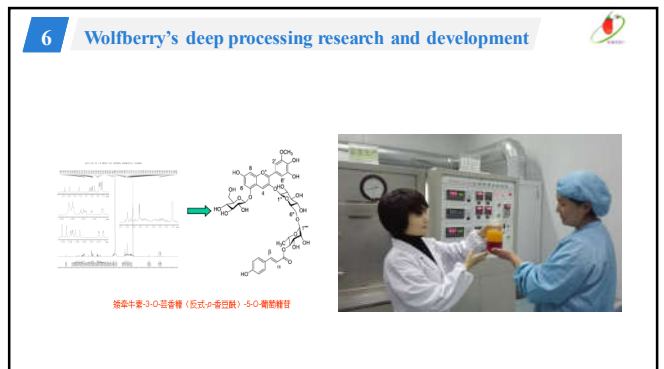
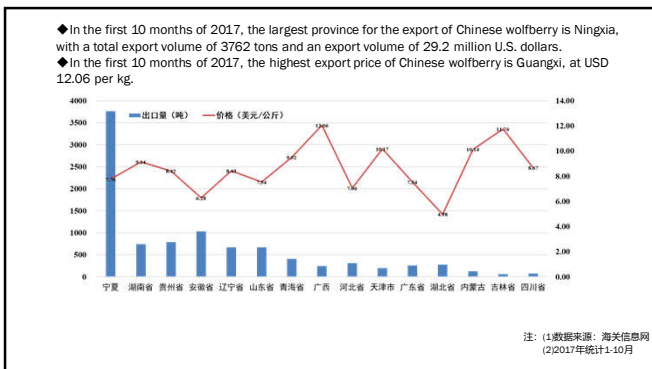
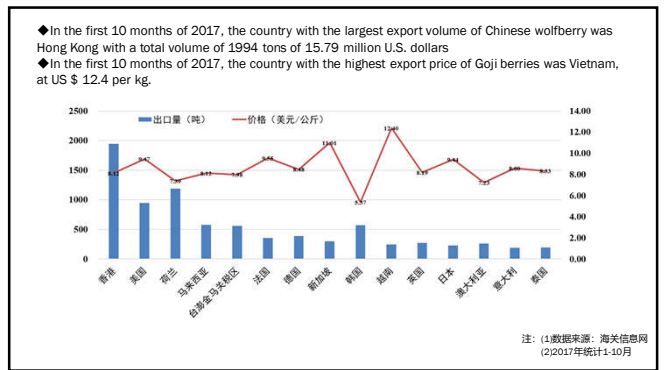
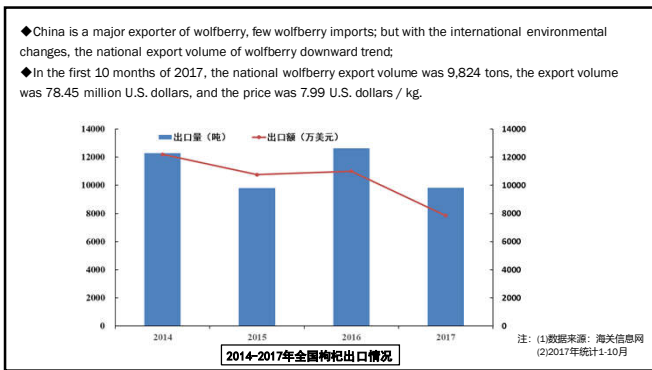
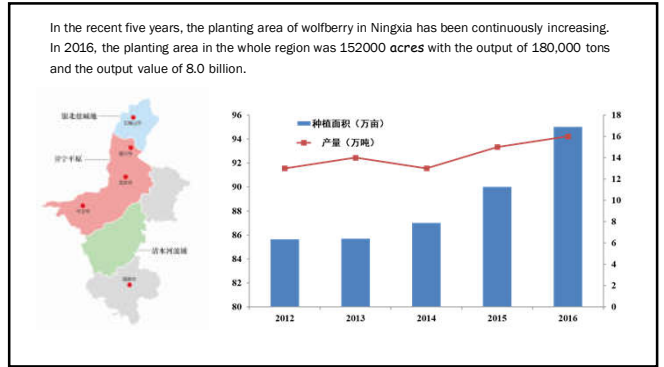
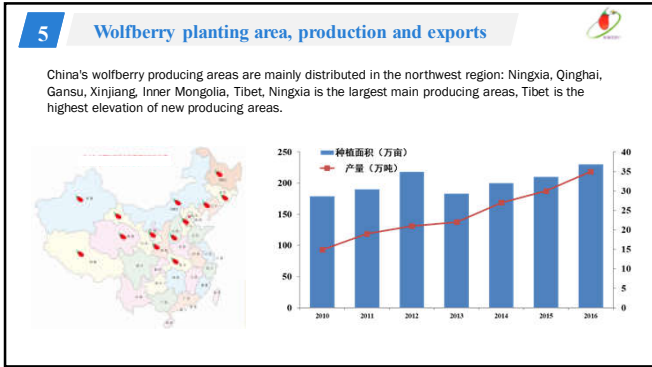


New varieties show (Dadishengtai)



New varieties show (Xinyang)





[wolfberry fruit health wine](#)



[Lruthenicum M. tablet](#)



[Wolfberry powder tablets](#)



[Wolfberry soft capsules](#)



[Fresh fruit juice](#)



[Wolfberry flowers & leaves tea](#)





7 Wolfberry industrial development trend

◆ **The contradiction between supply and demand in industry gradually reversed**

Wolfberry acreage and production will increase substantially, wolfberry dried fruit demand growth slowed, wolfberry functional health foods and health products and other emerging markets are in the incubation period of development, the short term increase in market demand difficult to digest the rapid expansion of wolfberry supply.

◆ **Innovation has become the new impetus for the development of Chinese wolfberry industry**

◆ **Green and ecological will become the new trend of industrial development**

Wolfberry is a representative of healthy green food and medicine, green development will be the future development trend of wolfberry industry.

Greening and ecologicalization are the inevitable choices for the sustainable development of Chinese wolfberry industry.

◆ **The development of industrial integration will become the new growth point of Chinese wolfberry industry in the future**

Information technology and Chinese wolfberry industry to accelerate the integration of Chinese wolfberry industry information continues to increase.

Wolfberry industry and the second and third industries to accelerate integration.

Wolfberry industry will accelerate the integration of agriculture and tourism industries, the formation of leisure agriculture wolfberry, wolfberry culture and other emerging formats.

◆ **The industrial chain will achieve differentiation and reorganization, and the division of labor in the regional industrial chain will be further optimized**

Ningxia wolfberry industry by virtue of technological superiority, brand advantages, the market center as a national lawn industry planting, processing base and market center;

Qinghai and Tibet have the advantages of ultra-clean natural ecology and the natural advantages of developing original ecology and organic wolfberry.

Gansu, Inner Mongolia, Xinjiang will play their own regional characteristics, as the emerging wolfberry industry planting and processing base.

