

## **GIAHS Proposal**

# **Globally Important Agricultural Heritage Systems (GIAHS) Initiative**

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## **Jiaxian Traditional Chinese Date Gardens**

Location: Jia County, Shaanxi Province, P.R. China,



People's Government of Jia County

March, 2013

## SUMMARY INFORMATION

<p><b>Name/Title of the Agricultural Heritage System:</b></p> <p>Jiaxian Traditional Chinese Date Gardens</p>
<p><b>Requesting Agency/Organization:</b> People's Government of Jia County, Shaanxi Province, P.R. China</p>
<p><b>Country/location/Site:</b> Nihegou Village, Zhujiagua Town, Jia County, Shaanxi Province, within 38°11'12"N, 110°28'01"E in the west, 38°11'12"N, 110°30'02"E in the east, 38°10'12"N, 110°29'30"E in the south and 38°13'03"N, 110°29'30"E in the north (see Annex 1 for the map)</p>
<p><b>Accessibility of the site to capital city or major cities:</b> Linked by the Yujia National Highway with the Yulin Airport, which is 97 kilometers away. It's 650 kilometers from Xi'an. The Yujia Road and Jiawu Road run from its south to the north. The Taijia Road and Jiami Road run from its east to the west.</p>
<p><b>Approximate Surface Area:</b> 2.4 hm<sup>2</sup> (core area)</p>
<p><b>Agri-Ecological Zone/s:</b> Hilly area of the interplanting of jujube with grains</p>
<p><b>Topographic features:</b> on the loess plateau, in the earth-rock mountainous region along the Yellow River</p>
<p><b>Climate Type:</b> semi-arid continental monsoon climate</p>
<p><b>Approximate Population:</b> 795 people in the core area</p>
<p><b>Main Source of Livelihoods:</b> jujube production (80% of the farmers' average net income per capita)</p>
<p><b>Ethnicity/Indigenous population:</b> Han (majority), Meng, Hui, Zang, Wei, Miao, Yi, Korean, Man, Dong, Menba. The core area is habituated by Han people.</p>

**Summary Information of the Agricultural Heritage System**

Jujube is a unique fruit species native to China. Located in the Jinshaan Canyon at the middle reach of the Yellow River, the Jia County is recognized as the place with the longest history of jujube cultivation. It boasts a large over-one-thousand-year-old jujube community. The community presents the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube, cultivated sour jujube to cultivated jujube. The Jia County suffers frequent drought, making the jujube trees “life-saving plants” for the locals, who place their hope on the jujube trees. Meanwhile, the jujube trees are significant in preventing sandstorms and conserving water and soil on the loess plateau sparsely vegetated.

The proposed GIAHS (the System) is a strong evidence of China being the origin of jujube, its domestication and scale cultivation. It also constitutes an important germplasm bank for the future development of the jujube industry. Besides, the System is of outstanding eco-functions, and culture significance. In conclusion, the System is worthy of protection efforts.

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## I .Characteristics of the Proposed GIAHS

**Long cultivation history.** Jujube is a unique species native to China. Located on the west bank of the Jinshaan Canyon at the middle reach of the Yellow River, the Jia County is thought to be the hometown of cultivated jujube.

**Rich germplasm resources.** The System presents the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube to cultivated jujube. There are two species of jujube in the ancient orchards of the Jia County: jujube (*Zizyphus jujube* Mill) and sour jujube (*Zizyphusspinosus* Hu). To be specific, there are three cultivar groups of sour jujube, consisting of 16 endemic varieties, and 13 cultivar groups of jujube, consisting of 35 endemic varieties.

**Large populations of ancient jujube trees.** In the Nihegou Village, there are 36 mu of ancient jujube trees. Among the 1100 of them, the oldest is over 1400 years old. The trunk diameter of two of them is over three meters, and thirty is over two meters, with the largest being 3.41 meters.

**Special emotional connection.** As the Jia County is drought stricken, jujube trees have been the life-saving plants in the people's eyes. They have special emotional connection with jujube, and place their hopes on the jujube trees. Jujube fruit have become indispensable for the Spring Festival, birthday parties and other ceremonies.

**Crucial eco-functions.** In the sparsely vegetated loess plateau, and the slopes along the Yellow River, the jujube trees' functions of wind breaking, soil and water conservation are of great significance.

**Exquisite traditional art and crafts.** The folk proverbs and crafting have reflected the interplanting of jujube with crops, orchard management, jujube cultivation and processing, etc.

## 1.1 Food and Livelihood Security

### (1) Diversified Products

The locals have developed the catering culture of jujube to the extreme. Food made of jujube fruit include jujube cake, jujube powder, jujube bun, jujube rice dumpling, jujube rice, jujube jam, jujube honey and liquor saturated jujube, etc (Figure 1).



Figure 1 Jujube Culinary Culture

Meanwhile, the interplanting of jujube with grain crops, and the courtyard complex economy have provided the locals with diversified products. The shading of the jujube trees is small, leaving plenty of space for the sunshine to shine on other crops. Surveys show that in the orchards and forest, the farmers plant, under the trees, potato, soy bean, rice, green bean, yam and vegetable. They also raise poultry under the trees. In the courtyards, the farmers interplant the jujube trees with grape, pear, apple, apricot and vegetable. Vegetable, like potato, can also be planted under the trees. Poultry can also be kept in the courtyards. These provide the farmers with food for their daily lives.

### (2) Livelihood Security

Jujube has always been the “life-saving plant”, the “hard-core crop” for the Jia County, which suffers drought very often as it’s located on the loess

plateau. The grain yield is low, making the jujube especially important for the locals' livelihood. The jujube trees are very adaptive and resilient. During 1997 and 2001, the County suffered continuous high temperature and drought. The harvest of jujube fruit was cheering, even when the yield of other crops was close to zero.

Nowadays, jujube holds a central position in local agriculture. The income from the jujube cultivation accounts for 80% of the average net income per capita of local farmers. The average income per capita of the jujube farmers is RMB5000. The average income of the households is over RMB20,000, while that of some has exceeded RMB100,000, even RMB200,000. The jujube trees have become a major source of economic gains.

### (3) Nutritional and Medicinal Values

The jujube fruit boasts great nutrition and medicinal values (Table 1). The fruit of the ancient trees are even more widely used in traditional Chinese medicine. According to the History of Beijing Tongrentang, "the jujube fruit of Jia Area can ease the symptoms of all disease."

Table 1 Nutritional and Medicinal Value of Jujube Fruit

Item	Nutritional and Medicinal Values
Nutritional Values (fresh fruit)	fat (g/100g) 0.3, protein (g/100g) 1.1, dietary fiber (g/100g) 1.9, Carbohydrates (g/100g) 28.6, Carotene (mg/100g) 0.01, Depending flavonoids equivalent ( $\mu$ g/100g) 0.24, Sulfur Ansul (mg/100g) 0.06, Riboflavin (mg/100g) 0.09, Ascorbic acid (mg/100g) 0.243, Vitamin E (mg/100g) 0.001, Calcium (mg/100g) 14, Phosphorus (mg/100g) 23, Iron (mg/100g) 0.5, Vc (mg/100g) 380~800.
Medicinal Values	Rich in organic acids and triterpene compounds, thus can inhibit bacterium, protect the liver, reduce lipid, raise leukocyte level, and enhance immunity. Contains cAMP that prevents cancer cell division, and thus has anticancer effects. Rich in vitamin content, which is good for blood capillary. Flavonoids have sedation, hypnosis, depressurization, diuretic and cancer prevention effects.



## 1.2 Biodiversity and Eco-Functions

Biodiversity of the System include the diversity of jujube variety, germplasm resources, and related species. The eco-functions of the System include maintenance of biodiversity, soil and water conservation, and prevention of sandstorms. This is of great significance to the loess areas along the Yellow River. Besides, the interplanting of jujube with crops boasts distinct eco-functions.

### 1.2.1 Biodiversity

#### (1) Diversity of Species

There are two species of jujube in the ancient orchards of the Jia County: jujube (*Zizyphus jujube* Mill) and sour jujube (*Zizyphus spinosus* Hu). To be specific, there are three cultivar groups of sour jujube, consisting of 16 endemic varieties, and 13 cultivar groups of jujube, consisting of 35 endemic varieties (table 2). They present the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube, cultivated sour jujube to cultivated jujube. This is a strong evidence of China being the place of origin, domestication and scale cultivation of jujube. The varieties also constitute an important germplasm bank for future development of the jujube industry.

##### ● **Sour Jujube (*Zizyphus spinosus* Hu)**

The drought-resistance and cold resistance of sour jujube (*Zizyphus spinosus* Hu) are much higher than jujube (*Zizyphus jujube* Mill). It can be found in the loess hilly gully area, mountainous area, river source and loess gully area covered by sand sheet. The sour jujube is with richer germplasm resources than jujube. As ecological conditions change, the trees are now in three forms: shrub form, semi-dwarf form and cultivated form. After hundreds of years of selection, there are now three cultivar groups, 16 endemic varieties,

Table 2 Jujube Varieties at the Jia County

Species	Cultivar	Variety	
		Variety Type	No.
Sour Jujube ( <i>Zizyphus spinosus</i> Hu)	cultivated sour jujube	Sour-Sweet Jujube, Tuan Sour Jujube	2
	Half-cultivated sour jujube	Tuan Sour Jujube, Tuan Sour Jujube ,Big Tuan Sour Jujube, Tuan Sour Jujube, Small Tuan Sour Jujube, Tuan Sour Jujube ,Sour Jujube, Big Sour Jujube, Tuan Sour Jujube, Obovate Sour Jujube	10
	Wild sour jujube	Round Sour Jujube, Sour Jujube, Extra Sour Jujube, Sour Jujube	4
Jujube ( <i>Zizyphus jujube</i> Mill)	Mu Jujube	Fangxing Jujube, Changxing Jujube, Zhuixing Jujube, You Jujube, Heiyou Jujube, Xiyaoyao Jujube, Ruanhu Jujube, Lvnaitou Jujube	8
	Tuan Jujube	Tuan Jujube, Miantuan Jujube, Shatuan Jujube, Bianyuanxing Tuan Jujube, Sour Tuan Jujube, Cu Jujub, Sour Tuan Jujube	7
	Ya Jujube	Daya Jujube, Xiaoya Jujube, Guzixing Jujube, Gouya Jujube, Luanxingya Jujube	5
	Cui Jujube	Cui Jujube	1
	Zanhuang Jujube	Zanhuang Jujube	1
	Huping Jujube	Huping Jujube	1
	Jun Jujube	Jun Jujube	1
	Li Jujube	Li Jujube	1
	Yunaling Jujube	Yuanling Jujube	1
	Bai Jujube	Ruanxingbai Jujube	1
	Short Shoot Jujube	Short Shoot Jujube, Jiuyuehong Jujube, Gougou Jujube, Zhui Jujube	4
	Yihen Jujube	Mojiji Jujube, Momo Jujube, Tanwenwen Jujube	3
	Fenghe Jujube	Fenghe Jujube	1

of sour jujube. They are consists of three types: wild sour jujube, half-cultivated sour jujube and cultivated sour jujube.



Figure 2 One-Thousand-Years-Old Sour Jujube Tree

**Wild sour jujube:** The wild sour jujube cultivars are relatively complex and diversified. They have broad distribution, and are often harmed by mankind's activities like cutting firewood and grazing. In addition, lacking of management, the ones left often grow at the margins besides the cave dwelling or on the cliff edge. There is no natural wild sour jujube forest. There are four species of them, whose fruit are in two shapes: round and oval (Table 2).

**Half-cultivated sour jujube:** The locals had selected sour jujube trees that produce fruit that are relatively big, fleshy and sweet, keep them, and cultivate them to a certain degree. These trees are cultivated into semi-dwarf sour jujube trees and produce fruit every year, generating income for the famers. These trees are mostly located in or near the jujube orchards, places easy to access. There are now ten cultivars whose fruit can be in six shapes: oval, round, olive, cylindrical, egg-shaped and obviate (Table 2).

**Cultivated sour jujube:** There is only one cultivated sour jujube orchard. The tree didn't grow out of stool shoot, nor from the sour jujube pit fallen from the tree. Therefore, it's categorized as cultivated. There are two varieties of them: Sour Sweet Jujube and Tuan Sour Jujube (Table 2).

#### ● **Jujube (*Zizyphus jujube* Mill)**

In Jia County, there are currently thirteen jujube cultivar groups: Mu Jujube, Tuan Jujube, Ya Jujube, Cui Jujube, Zanhuang Jujube, Huping Jujube, Jun Jujube, Li Jujube, Yuanling Jujube, Bai Jujube, Duanzhi Jujube, Yihen

Jujube, and Fenghe Jujube. There are 35 species of them (Table 2).

The Mu Jujube is the oldest endemic jujube species in China. Standard tree surveys show that it is the main jujube species, accounting for 98% of the production areas and jujube trees, in the jujube production areas in the Yellow River, Wuding River, Tuwei River and Kuye River. The main product is dried fruit. In some areas, the elder farmers also called the Mu Jujube with higher content of sugar and finer fresh as You Jujube (Figure 3).



Figure 3 You Jujube in Jia County

## **(2) Related Biodiversity**

The jujube trees, planted in the wild or in the courtyards, create rich ecological niches for other crops, resulting in rich biodiversity (Figure 4).

According to local survey (Table 3), when the trees are young, the farmers plant, under the trees, short-stem crops, like potato, soy bean, rice, green bean, yam and vegetable. When the trees are six or seven years old, the farmers raise



Figure 4 Biodiversity of the System

Table 3 Agricultural Bio-Diversity of the System

	Species	Varieties	Common Name	Endemic Variety?
Grain	Foxtail Millet ( <i>Setaria italica Beauv</i> )	Xiaoxianggu Millet	Xianggu Millet	No
		Linqiubian Millet	Fangu Millet	Yes
		Kagu Millet	Fangu Millet	Yes
		Zhangzagu No.5 Millet	Fangu Millet	No
		Jingu 21 Millet	Fangu Millet	No
		Longzhuagu Millet ( <i>Eleusine coracana L.</i> )	Sagu Millet	Yes
	Green Bean ( <i>Vigna radiata</i> )	Daming Green Bean	Qingxiaodou Green Bean	Yes
		Small Green Bean	Green Bean	Yes
	Soy Bean ( <i>Glycine max</i> )	Lianjiatiao Bean	Black Bean	Yes
		Jiyaobai Bean	White Black Bean	Yes
		Laoheidou Bean	Yellow Bean	Yes
	Potato ( <i>Solanum tuberosum</i> )	Zihuabai Potato	Potato	No
		Longshu No.3 Potato	Potato	No
		Dongbeibai Potato	Potato	No
		Xinge No.6 Potato	Potato	No
Economic Plants	Tomato ( <i>Ycopersici Susceptibili</i> )		Tomato	No
	Pepper ( <i>Capsicum annuum</i> )		Lazi Pepper	No
	Pepper ( <i>Zanthoxylum bungeanum</i> )		Huajiao Pepper	Yes
Fruit	Grape ( <i>Vitis</i> )		Grape	No
	Pear ( <i>Pyrus sorotina</i> )		Pear	Yes
	Apple ( <i>Malus pumila Mill</i> )		Apple	Yes
	Apricot ( <i>Siberian Apricot</i> )		Apricot	Yes
Poultry	Chicken		Chicken	Yes

poultry under the trees instead. In the courtyards, the farmers interplant the jujube trees with grape, pear, apple, apricot and vegetable. Vegetable, like potato, can also be planted under the trees. Poultry can also be kept in the courtyards.

### **1.2.2 Ecosystem Functions**

Jujube not only provides grain and medicinal food for the people living along the Yellow River, but also provides ecological values. It's especially so for the loess plateau in the north of Shaanxi, where the other tree species can barely survive. In the Jia County, the jujube trees mostly grow on the barren slopes along the Yellow River. Therefore, they play an important role in maintaining biodiversity, water and soil conservation, and preventing wind and sand storms.

#### **(1) Biodiversity Maintenance**

There are two species of jujube in the ancient orchards of the Jia County: jujube (*Zizyphus jujube* Mill) and sour jujube (*Zizyphusspinosus* Hu). To be specific, there are three cultivar groups of sour jujube, consisting of 16 endemic varieties, and 13 cultivar groups of jujube, consisting of 35 endemic varieties. They present the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube, cultivated sour jujube to cultivated jujube. In addition, the jujube trees create many ecological niches for other species. Thus, rich biodiversity is formed.

#### **(2) Soil Conservation**

The Jia County is located on the west bank of the middle reach of the Yellow River. It's in the typical loess plateau in the northeast of Shaanxi Province. About 35% of the County is slopes over 15%. It's located in the



semi-arid continental monsoon climate zone. Rainfall during June and September accounts for about 71.9% of the total, mainly in the forms of shower and storms. This makes it China's, and the world's center of desert rainstorm. The County suffers most serious soil erosion. This is because of scarce rainfall, sparse vegetation, the vulnerability of loess to erosion and the rainstorm in the summer.

The horizontal roots of the jujube spread widely. Those of the trees six years old could be over four meters, while those of trees forty to fifty years old could be as long as 15 to 1 meters. There is a saying which means that the different villages are connected by the root of jujube. The jujube trees also have a considerable number of creeping roots, and lateral roots. This gives the jujube trees strong ability to hold soil. In addition, the jujube trees can have many stool shoots, which even when removed, would leave roots that would help hold the soil. These physiological features make jujube very important for the loess plateau, which is sparsely vegetated. The research of FENG Jianmin in 2010 points out that, where jujube trees grow, the soil erosion is less severe. It's especially so in the ancient jujube orchards, with no or light erosion. It can be seen that jujube trees have significant effects in soil conservation on the loess plateau.



Table 5 Water and Soil Conservation Functions

### **(3) Water Conservation**

Compared with other plants, jujube trees have stronger performance in water conservation. They hold water by the canopies, litter and non-capillary porosities. Jujube trees are tall, have large and dense crowns, concentrated branches, and high leave area index. As a result, they have stronger canopy

interception capacity. According to the study of MU Xingmin, etc, in 1999, on the loess plateau, the older natural and artificial forests have stronger capacity of water conservation. The ancient jujube orchards have formed unique ecosystems during their over-one-thousand-year history. The ecosystems can effectively regulate surface runoff, and store the rainfall in summer rainstorms. Therefore, they are of great value in the loess plateau.

#### **(4) Prevention of Sand Storms**

The County is located at the border of the Mu Us Desert, in the loess hilly-gully region covered by sheet sand. The soil is mainly aeolian sandy soil. The area is often harassed by high wind, especially in the winter and spring, when the wind can build up to the ninth or tenth level. The sandstorms are very severe, worsening the environment. In 2010, WU Qing did a research in the Yulin region, and found out that the height and crown, especially the latter, of the trees determine their capacity as windbreaks. Jujube trees are tall with large crowns, and are planted contiguously in the ancient jujube orchards. The largest crown diameter people have ever seen is 13.4 meter. In short, jujube trees are effective windbreaks.

#### **(5) The Eco-Functions of the Interplanting of Jujube with Crops**

Jujube trees bud late and defoliate early. Thus, they have different demand schedule for nutrition and water than other crops, making it reasonable to plant them with other crops. The interplanting (Figure 6) change the two-dimensional layout of planting only one species, to three dimensional agriculture composed of trees and crops. This not only improves production and economic gains, but also produces a series of eco-benefits.

First, it can reduce wind speed, regulate the temperature and humidity, and replenish carbon dioxide, creating a favorable environment for the crops.



Second, the area of interplanting has lower monthly average temperature, and higher humidity, which is very conducive for increasing the grain weight and yield. Third, it lowers the evaporation potential, and thus reduces evaporation, which helps maintain soil moisture and thus increases yield. Fourth, this is a practice that makes full use of the space, resulting in higher efficiency of natural resource utilization. Fifth, it reduces sandstorms and surface runoff, lowering the loss of water, soil and nutrition caused by rainstorms, thus protects the field.



Figure 6 Interplanting of Jujube with Grains

### 1.3 Knowledge Systems and Adapted Technologies

In Jia County, people began to pick and eat the jujube fruit as early as the Neolithic Age in over 7000 years ago. The jujube was cultivated as early as over 3000 years ago, according to written records. In the Warring State Period (about 2500 years ago), jujube fruit have become important fruit and medicine, and was known as one of the five most important fruit (the other four being peach, apricot, plum and walnut). In the Han Dynasty (2000 years ago), the cultivation techniques of jujube trees had been spread across the country. In the North Wei Dynasty (1500 years ago), a traditional cultivation technology system had taken shape. Many of the technologies are still being used.

Meanwhile, the cultivation and management technology of jujube have been spread to other countries with jujube trees.

### 1.3.1 Knowledge Systems

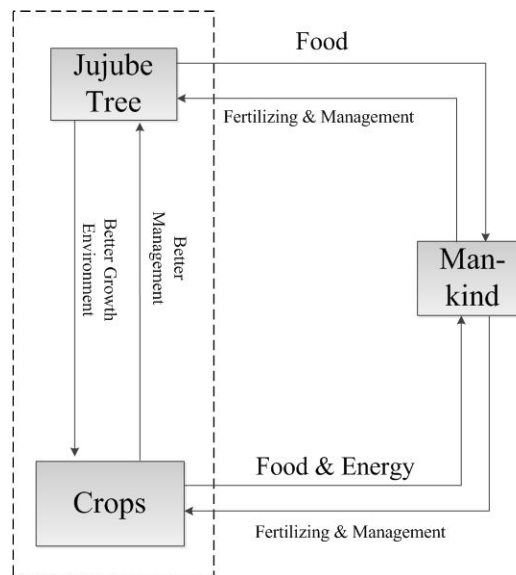
#### (1) Interplanting of Jujube with Grain Crops

The interplanting of jujube and grain crops is invented by the locals considering the local situations, the difference of growth progress and physiology. By planting the crops with grain in a certain layout, the farmers create a complex ecosystem in which the crops and the jujube trees support each other's growth. There are three arrangements of the interplanting:

The first arrangement puts jujube as the main species and the crops as the supplement. The jujube trees are planted in high density, with a line spacing between seven and ten meters, and a row spacing between three and four meters. Thus in one mu, about 20 to 30 trees will be planted.

The second arrangement lays equal stress on jujube trees and crops. The line spacing is larger, at 10 to 20 meters, while the row spacing is smaller, at three to four meters. In one mu, there will be 10 to 15 trees.

In the third arrangement, jujube is the supplement to the crops. The line spacing of the jujube trees will be even larger, at about 30 meters. Some will even adopt double line with the spacing at 30 or 50 meters. The row spacing is about three to four meters.



#### (2) Courtyard Cultivation

Table 7 The Interplanting of Jujube with Grains

It's a harmonious pattern that plant jujube trees with apricot or apple trees in people's courtyard. Poultry are raised in the courtyard.

Interplanting jujube trees with other species, like apricot trees, not only

doesn't affect the growth of these species, but also improves the diversity of courtyard landscape. It also increases biodiversity, expands income channels and lowers economic risks. Raising poultry in the garden provides eggs and meat for the owners and helps prevent pest. It's a healthy system composed of jujube trees, poultry, other tree species and mankind.

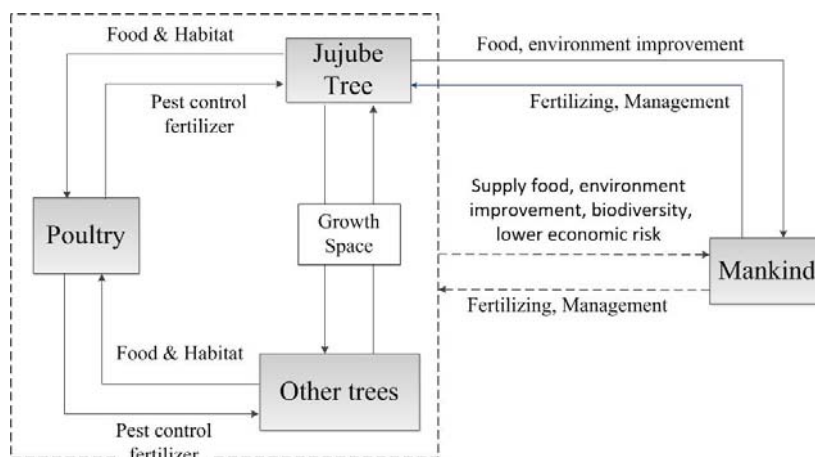


Figure 8 Courtyard Cultivation of Jujube

### (3) Management of the Jujube Orchards

As to selecting the site of the orchards, the Qi Min Yao Su (Important Agricultural Technologies) mentions that on the patches of land on which cannot grow crops, farmers can plant jujube trees for they are drought-resilient.

As to the timing of transplanting jujube trees, the book recommends a later time. It believes that if they are transplanted too early, they bud later for the soil is hard. Modern technologies also advocate later transplanting for they are suitable for jujube trees. There is a saying which means that one needs to wait a year to be certain that a jujube tree is dead after the transplanting. We can see that the vitality of jujube trees' underground part is strong.

### (4) Resources Circulation and Sustainable Management

The farmers have adopted advanced agricultural technologies in jujube cultivation. For example, they have aligned the cultivation with soil, nutrition,

water, soil microbes, and climate, and have increased the usage of organic fertilizer. They have also become particular about the timing and dose of fertilizing. This has increased resources efficiency, reduced agricultural pollution, and improve agricultural environment. By interplanting jujube with crops, the farmers can return the organic matter in the branches of the jujube trees to the land. This practice has optimized the usage of land, water and other agricultural resources. It has also significantly increase organic content of the soil, making it more fertile, thus realizing sustainable utilization of land. The jujube trees have brought soil erosion under control, benefiting the sustainable development of the loess plateau. These technologies adopted by the farmers are ones that would increase the efficiency of resources and energy usage, and reduce environmental pollution and degradation.

### **1.3.2 Adapted Technologies**

#### **(1) Planting Technologies**

In terms of planting density, there is a local saying “one tree per three mu, and plant the trees in line”. Three bus equal to five meters.

To increase fruit sets, the ancestors created the grafting technology of jujube. The doctrine behind it is the same with the girdling technology presently use.

The fruit sets are less than the flowers. So, to increase fruit setting, the ancestors use disbudding to focus the nutrition. In the Qi Mi Yao Su (Important Agricultural Technologies), the grafting technology is recommended to use together with disbudding.

The jujube trees are used as stock to graft other species on it. The Qi Mi Yao Su (Important Agricultural Technologies) records that grafting pear on jujube or pomegranate can produce best pear. It also records that only 10 to 20% of the grafted branches will survive. Though distant grafting often fails, it

demonstrates the innovation and advanced technologies of our ancestors.

## **(2) Storage and Processing**

There are many ways of jujube processing. In ancient times, people smashed and kneaded the jujube fruit, and smear them on the silk. When dried up, they turned into jujube paste, very similar to jujube cake. This processing method, according to the literatures, was invented over 2000 years ago, and was widely used. The jujube fruit are also mingled with other grains. As to sour jujube fruit, they can be made into powder.

## **1.4 Agri-Culture, Value System and Social Organizations**

Originated in China, jujube has a long history and is intertwined with people's lives. In ancient times, people ate the jujube fruit picked on wild trees. Then, according to Qi Min Yao Su, people started to select the ones with wonderful flavor, and cultivate them. As time passed by, jujube fruit gradually became a popular food, and were presented to the royalty as tributes in the Ming and Qing dynasties. The ruling class at the time used to give jujube fruit to each other as gifts. Besides, jujube was used in funerals and sacrifices. In conclusion, jujube is indispensable in people's lives and has gradually forms a jujube culture.

The System is an ecology-culture complex created by the locals as they adapted to the nature while creating their culture. It's inseparable from people's lives. The material culture, customs, behavior, catering culture, history and other cultural factors relating to jujube have already penetrated into the social and individual behaviors, such as production, knowledge, festivities and rituals. Therefore, the System is not only the treasure of the County, of China, but also of the whole world.

### 1.4.1 Agri-Culture

The locals have a special emotional connection to jujube. There is a catch phrase that goes like this “gold globules, silver globules, they are no competition to our red globules.” The red globules refer to the jujube fruit. The dry weather in the Jia County makes the yield of other crops low. The jujube trees, however, grow well in arid weather, and produce cheering yield every year. So, jujube has always been the “life-saving plant”, the “hard-core crop” for the Jia County. The locals believe that as long as there are fruit on the jujube trees, they won’t starve. These explain the special emotional connection of the local to jujube.

Jujube has provided the source of livelihood, and has enriched the loess culture (Figure 9). For the Jia County, jujube is a treasure.

Along the Yellow River are mountains of jujube trees. They are not only a source of livelihood, a favorite food of the locals, but also an important part of the folk culture and customs. For example, the people worship the jujube god on the first and fifteenth days of the first lunar month. Also, many villages and areas are named after jujube, like Jujube Wood Village, Jujube

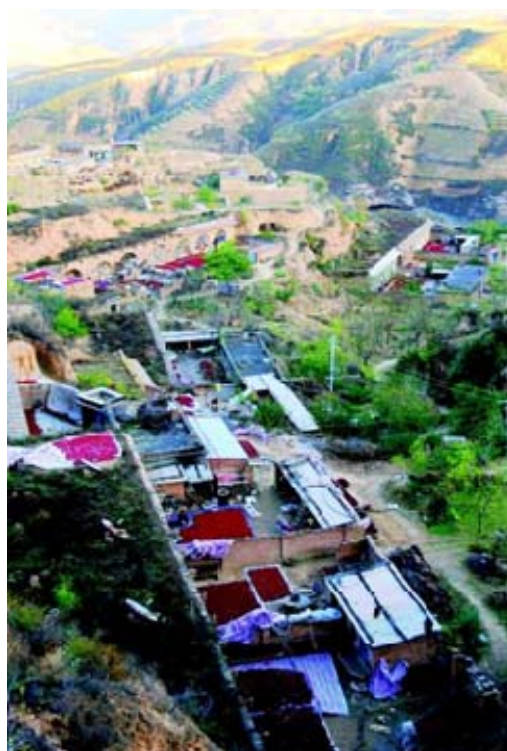


Figure 9 Loess Slope, Cave Dwelling and Jujube Fruit

Tree Area and Jujube Bay, etc. Some even name their children after jujube, like Chunzao, Zaoer (the Chinese character Zao means jujube). In the first day of the lunar year, children will hang strings of jujube fruit and black bean on their necks. This is a wonderful scene.

Jujube is a component of local landscape. Around the Mid-Autumn Festival, the mountains and valleys are dotted with red jujube. What a beautiful

view it is!

In recent years, the Jia County vigorously promotes the cultivation of jujube. The motivations are to reserve soil and water, and to develop an economy with local characteristics. More and more farmers are getting rich thanks to jujube.

## **1.4.2 Value Systems**

### **(1) Culture and Spirit**

The System is of profound historic and cultural relevance. For one thing, the orchards and jujube trees have lived with the locals for generations, witnessing their hard work and bearing their emotional connection. For another, the System is the essence of the Jia County, demonstrating the County's adaption to the tough environment, and fights against the odds caused by the environment. In addition, with their powerful trunks, strong vitality, and resilient to drought and flood, the ancient jujube trees demonstrate the profoundness of history. These add to the locals' sense of belonging and proud, making jujube their spiritual ballast.

### **(2) Daily Life**

In the autumn, the County is a flourishing scene of prosperity. In the orchards, the air is filled with people's happiness of harvest. The pickers climb by ladders, or on bear hands, on to the trees. Once on the trees, they use specially made rod to hook the branches, and shake them, making the fruit fall. Under the trees, people would sit in groups, and gather the fallen fruit into big bamboo baskets. In between are filled with people's talks and laughter. What a cheering sight of harvest!



### (3) Customs and Rituals

The locals have placed their hope on jujube, and connect it with festivities. The jujube fruit are indispensable for the Spring Festival, and ceremonies like engagement ceremonies, weddings, and birthday parties for seniors. In the Spring Festival, the elders will give jujube fruit to the children as gifts. Children wear necklaces made of jujube fruit, decorate their outfits with jujube fruit, and fill their pockets with jujube fruit. It's believed that by doing so, the children can grow up earlier, and have wonderful and upward lives.

The jujube fruit are a symbol of luck in engagement ceremonies and weddings. The gifts the man gives to the woman in the engagement ceremony must contain jujube bun. In the wedding, people scatter jujube fruit in the bridal chamber. At the evening of the wedding, the bride and groom eat the jujube fruit, hoping to have children as soon as possible, and have a wonderful life together.

At the birthday parties for the seniors, people make a big jujube cake to celebrate the long life of the seniors. The women can also make exquisite and innovative crafts out of the jujube fruit, branches, and leaves.

### (4) Art

Locals have incorporated jujube into distinguished art forms, such as the Spring Festival Paintings and paper-cutting (Figure 10). Meanwhile, Jujube has been the object in many poems and songs. For example, LI Xin of the Tang Dynasty, ZHANG Lei of the Song Dynasty, and LI Ludu of the Qing Dynasty had all written famous quotations on jujube.



Figure 10 Local Painting of Jujube



### **1.4.3 Social Organization**

In the past, the social structure of China was favorable for the conservation of the ancient jujube orchards. In the feudal society, distinct features of the folk society were the enclosed small-scale peasant economy and extended families, with the latter being the elementary unit of the society. It's a symbol of happy and thriving families. Therefore, the orchards and backyards where the four generations worked side by side became a major place of work and life. This social structure is relatively enclosed and isolated, and provides a solid foundation for the preservation of the System.

At the meantime, in the small-scale peasant economy, people got most of daily necessities through their own labor. This resulted in interplanting of jujube with other trees, crops and vegetable. The farmers also raised their livestock in the orchards. These increased the biodiversity of the System.

## **1.5 Landscape, Land and Water Resources Management**

### **1.5.1 Landscape Features**

The System presents a scene with vitality as its theme. Especially, the trees over hundreds or even one thousand years old grow stronger with time passes by. They are thriving with lush foliage, abundant fruit and strong vitality. The ancient jujube trees are in peculiar shapes. Some are tall and upright, while some have many untamed branches. The root and branches of some are intertwined, looking like tigers and dragons. Some have broken limbs, and grow out new branches, which give them peculiar shapes. Some, though grow out of the stone cleavages, never give up. Some continue to thrive, and are in luxuriantly green, even though they suffer severe disfigurement (Figure 11).



Figure 11 Landscape of the System

The scenes in the System are beautiful, yet different, in different seasons. In early spring, when the willow and polar trees grow new shoot, the jujube tree remain in serenity. They wake up in late spring, and welcome the summer with tender shoot, simple yet elegant flowers, and refreshing fragrance. Bees busy among the trees, making sweet honey. In the autumn, the fruit turn from green, via white, to red, and glitter in the sun like agate (Figure 12). There is a poem for this scene: “Several houses hide in the tens of thousands of green trees. The red carpet of jujube fruit covers the field and houses.” The poem shows a vivid picture of the harvest in the orchards.

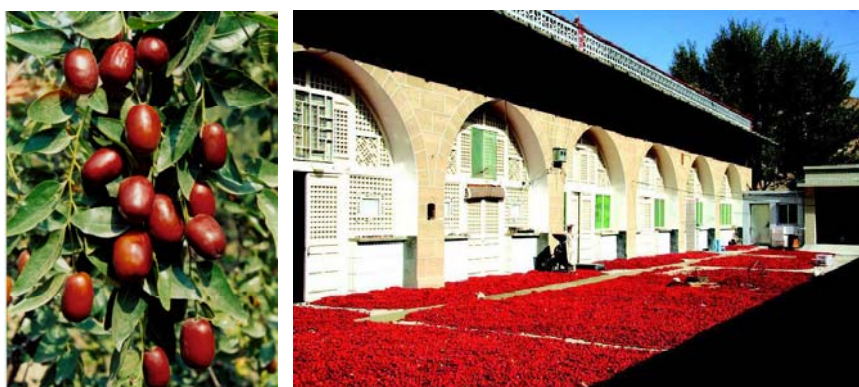


Figure 12 Ripened Jujube Fruit, and Sun-Drying the Fruit

The orchards also display a splendid artificial landscape. The jujube industry is one with most potential in enriching the people. At the end of the eleventh five-year plan period, the County committee and government put

forward a strategy to “bring the jujube westward, and build standardized jujube orchards”. This has brought the industry to a new level. In 2010 alone, the area of the newly constructed standardized orchards reached 70,000 mu, and that of reconstructed orchards reached 100,000 mu. In the new orchards, thousands of fish scale pits were lined up on the vast loess plateau. From afar, the mountains, with the pits scattered from their foot to the top, look like a grand wall painting.



Figure 13 New Jujube Trees Planting

### 1.5.2 Land and Water Resources Management

Jia County is located on the loess plateau, which is not suitable for the growth of crops, because of the dry weather and barren soil. Fortunately, jujube is very adaptive and arid resilient. It can grow on both acid and alkaline soil. Thanks to these, there are mountains of jujube trees on the loess plateau. Furthermore, the jujube trees change the micro-climate and soil in the forests, creating rich ecological niches for other crops. The interplanting of jujube with other crops has provided diversified agricultural produces on one hand. And on the other, it has created a distinct agricultural landscape. In addition, since there is little rainfall, people sun-dry the jujube fruit. In the harvest season, against the yellow loess plateau are the red jujube fruit, green jujube trees, and grey cave dwellings. This is a distinct rural landscape.

## **II . Historic Relevance**

Jujube is a unique species of China. In the Jia County, people began to pick and eat the jujube fruit as early as the Neolithic Age in over 7000 years ago. The jujube was cultivated as early as over 3000 years ago, according to the Book of Songs, Erya (the earliest dictionary), and the Book of History. In the Warring State Period (about 2500 years ago), jujube fruit have become important fruit and medicine, and was known as one of the five most important fruit (the other four being peach, apricot, plum and walnut). In the Han Dynasty (2000 years ago), the cultivation techniques of jujube trees had been spread across the country. In the North Wei Dynasty (1500 years ago), a traditional cultivation technology system had taken shape. Many of the technologies are still being use, recorded in the Compendium of Material Medica and Shennong Materia Medica, and the QI Min Yao Shu (Important Agricultural Technologies).

### **2.1 An inevitable choice in hostile environment**

Jujube is the soul of the Jia County, witnessing its fight against the hostile environment. Therefore, jujube is of profound historic and cultural significance.

The barren soil left the people no other choice. The Jia County is located on a loess plateau, with poor site conditions, arid climate, and barren soil. Especially, long-term soil erosion has caused soil degradation, heavily impacting people's life and agriculture. The jujube trees can stand rough soil conditions, and can bear a temperature threshold from 40°C to 30°C. Also, it can grow in areas with an annual rainfall between 200 to 800 millimeter, which is why it's known as the "tough crop" and "woody grain". It's fair to say that jujube was an inevitable choice for the locals who were trying to service in the hostile environment.

The weather condition of the Jia County is perfect for jujube. In different phases, the jujube trees require different heat. The Jia County meets this condition perfectly. Its temperature ranges from 39.7°C to -24.3°C, and averages at 10.2°C. In addition, the jujube trees also demand different rainfall and humidity in different phases. The Jia County, once again, meets this condition. Its annual rainfall is 386.6 millimeter. In September, which is the mature period, the weather is sunny, with relatively low humidity. The jujube trees grow well in this condition. Third, jujube is a heliophilous species. The Jia County's annual sunshine duration reaches 2711 hours. In August and September, the daily sunshine duration is as long as 9-9.5 hours. In conclusion, the Jia County is a perfect place for jujube.

## **2.2 The place with the longest history of jujube cultivation**

Jujube is a unique species of China. The History of Fruit Tree: Jujube believed that jujube cultivation was originated along the middle and lower reaches of the Yellow River. It also specifies that the cultivation was started in the Jinshaan Canyon and was spread to Henan, Hebei and Shandong, etc.

The earliest record of jujube cultivation appeared in the Book of Songs: Bin Song (a county in Shaanxi) (10th Century B.C.). The record states that the people of Shaanxi picked jujube in August and harvested rice in October. From the other classics, such as the Rites of Zhou, and the Book of Rites, one can see that Shaanxi and Shanxi were the first to cultivate jujube. They had not only domesticated sour jujube into jujube, but had also produced fine breed, and used jujube fruit as sacrifice offerings and gifts.

Currently, there are still many sour jujube trees and jujube trees in the Jinshaan Canyon, that are over several hundred years old, or even one thousand years old (Figure 14). In this area, the jujube trees are distributed sparsely, with years old. They are mostly wild. The cultivation technologies are quite



primitive and are much more backward than that in the Hebei and Shandong Plain. This is consistent with the record of the literatures.

There is a jujube tree in the ancient orchard in Nihegou Village, Zhujiagua Town, Jia County. Between late 1970<sup>th</sup> and early 1980<sup>th</sup>, a main branch of it was blown off by wind. The experts of the Shaanxi Institute of Forestry Science counted the rings on the branch and dsicovered that the tree was 1360 years old. So, the tree is 1400 years old (right, Figure 14).

In 2012, another one thousand years old sour jujube tree was discovered in Xiangliushumao Village, Shanggao Town, Jia County. The tree is in good condition. Its height is 8.5 meter, trunk circumference 1.73 meter, and trunk diameter 54.1 centimeter. The surface of the tree is smooth and shows no sign of rotting (left, Figure 14). CHEN Guanglin, the village head, said that “The tree is in leafy and flowery profusion in summer, and dotted with fruit in late autumn”.



Figure 14 The One-Thousand Years Old Sour Jujube Tree (left) and Jujube Tree (right)

## **2.3 The ruling class' attention and advocacy**

According to the History of the Warring States and the History of the Three Kingdoms: Wei Dynasty, there was a scale cultivation of jujube in the Jinshaan Canyon as early as the Spring and Autumn and Warring States Period. At that time, jujube had become an important food crop. The industry is of a considerable scale, and a major source of tax.

Meanwhile, the ruling class attaches great importance to the cultivation of jujube in the Jinshaan Canyon. They even used political instruments in this regard. According to the History of Wei: Economy (the 6th Century), farmers must plant jujube trees on the land given to them, or the land would be taken back. This requirement had been practiced until about 500 years ago.

## **III. Contemporary Relevance**

The System is of great relevance in the following areas: increasing the employment rate and income of the farmers, giving play to the ecological functions of the jujube wood, developing leisure agriculture, and promoting the development of eco-civilization, socialist new countryside, and sustainable agriculture.

### **3.1 Increasing Employment and Income**

The jujube industry is a backbone industry of the Jia County, and is crucial for the poverty alleviation of the County. At present, the jujube cultivation area has exceeded 40 thousand hectare, covering 20 villages and towns, most of which are located along the Yellow River. Among the cultivation area, four thousands are planted with organic jujube trees. In addition to jujube cultivation, the County also promotes vigorously the development of downstream industries. So, there are now seven leading processors, such as the Zhongfu, Jiabao and Dongfanghong factories. Over 3000 ovens have been set

up with a capacity of over 50 thousand ton per year. In the main production areas, people have set up industrial cooperatives, and five comprehensive markets, along the main roads, for processing, wholesale and retail sale. The products include the Yellow River Jujube, crispy jujube, jujube drink, jujube wine, and jujube spice. They enjoy a promising market.

The Jia County's jujube is of high quality and standardized production. In December, 2006, it was honored as the National Demonstration Zone of Standardized Jujube Production by the National Standardization Administration. In 1996, the You Jujube of the Jia County won the gold award in the tasting event of famous, special, new and quality fruit of the economic forests of Shaanxi Province, the Yellow River Jujube and Jun Jujube won the silver award. In 2001, the County won an award for applying fine breed and the technology of dense planting and high-yield granted by the Forestry Department of Shaanxi Province. The Jia County's jujube is pollution free and organic, with health, medicinal values, endowing it with great advantages in the market. The industry has contributed greatly to increasing the income of local farmers. In 2010, the total yield reached 160 thousand ton, with a production value of RMB450 million. There were more than 120 households with an income of over RMB100 thousand, and over 1500 households RMB50 thousand. The industry contributed about 50% of the famers' average net income per capita. In the main production, the figure is over 80%.

### **3.2 Ecological Functions**

The jujube woods have high ecological values. They are effective wind breaks, for they are tall with large crowns, and are planted on contiguous land. It's especially so for the ancient jujube orchards. In addition, the jujube trees grow better than other species. The trees have great effects in soil conservation for their roots spread widely, with dense horizontal root and lateral root. The old woods have high water conservation capacity. In the sparsely vegetated



loess plateau, and the slopes along the Yellow River, these functions are of great significance. The jujube trees are among the trees most suitable for preventing and reducing dust, and are resilient to sulfur dioxide, as well as to chlorine and hydrogen chloride. As to carbon sequestration, oxygen generation, noise reduction and micro-environment regulation, the jujube trees are no second to other species.

### **3.3 Science Values**

The ancient jujube trees of the Jia County have recorded the changes of geography, climate and plant physiology, as well as the society. Therefore, they boast significant values in the studies of natural environment and society development. In addition, the trunk and root of the trees are hard, dense, and worm-proof. They keep the shape when dried, and preserve well. So, the trunk and root can be used in carving, making the trees highly valuable in art research. In conclusion, the jujube trees are of great values in the studies of nutrition, medicine, aesthetics, plant, ecology, geography, environment and society.

### **3.4 Developing Leisure Agriculture**

The jujube trees' economic benefits lie only on their fruit, but also in other ways. For example, their unique landscape feature and aesthetic values are important components of multi-functional agriculture. The jujube trees are tall, and can grow over ten meters. The crowns are circle or semi-circle. Their trunks, flower, fruit and leave present high ornamental values. They are always a wonderful view, no matter when they are planted alone or in groups. They compose an even better view when mingled with other objects. What's more, as their color, fragrance, and shape change with seasons, the orchards take on different but all beautiful looks. In spring, flowers of the jujube trees fill the

orchards with fragrance. Bees and butterflies can be seen everywhere. In the summer, the lush foliage provides shading for people. In the autumn, there is a flourishing scene of prosperity as the fruit hang, like red lanterns, on the trees, colored with leaves of different shades. Therefore, the jujube trees can even be planted purely for aesthetic. Meanwhile, the interplanting of jujube trees with crops also presents a wonderful view. In this scenario, one can appreciate the beauty of the jujube trees and the simple lifestyle of the rural areas. This is a wonderful service for urban residents who are trapped in the concrete buildings, polluted environment, and fast-paced life in the cities. On the other hand, people's yearning to be close to the nature provides an opportunity for the jujube orchards to develop into tourist sites. The Jia County, with its grand ancient trees, and rich culture background, is well positioned to develop leisure tourism.

The Jia County has a long history of jujube cultivation. In the Nihegou Village, there are 36 mu of ancient jujube trees. Among the 1100 of them, the oldest is over 1400 years old, with a 8.3 meter height, 3.03 meter trunk diameter, and 13.4 meter crown. It still produces over fifty kilograms of fruit every year. It's honored as the living fossil of jujube trees, and has been written in the History of Jujube Trees in China. For a long time, there is a culture centered on jujube, including jujube god worship, catering culture and customs, which provide a solid cultural foundation for leisure culture.

### **3.5 Promoting Sustainable Regional Development**

Social and economic development have raised a problem of mankind and nature harmony for, restrained by limited forest resources, the famers face a conflict between livelihood and ecological protection. To realize sustainable development, the Jia County has adopted the following measures. It aspires to develop a modern, comprehensive and efficient forestry centered on the jujube, appointed by the County as the economic species with largest potential. This is

of great significance to expanding the development room of the economy in mountainous area, and developing a forestry that is quality, efficient, eco-friendly and safe. The processing of green forestry products, like jujube, will be put at the central place. We will work hard to introduce into the County advanced agricultural technologies. The goals for this are the industrialization of agriculture, urbanization of villages and the empowerment of farmers with knowledge. Environmental protection and eco-village construction will be enhanced by the development of a modern forestry with characteristic and eco-agriculture. In addition, we will explore the development of leisure tourism, and rehabilitation industries from the perspective of urban and rural integration. In this way, the County can realize the sustainable development of the first, second and third industries.

## **IV. Threats and Challenges**

### **4.1 Local Threats**

#### **4.1.1 Low economic benefits subject the ancient jujube orchards to threats of reconstruction**

With a long history of jujube cultivation, over 60% of the jujube trees in the Jia County were planted before the reform and opening-up. Upgrading of the jujube orchards is urgent for most of the jujube trees are old ones, with low and inferior yield, low commodity rate and economy benefit. There are three sour jujube populations in the Jia County, with 16 endemic varieties, and 13 jujube populations with 35 endemic varieties. But only two of them, the You Jujube and the Crispy Jujube are fine varieties.

As a result, local farmers have increasingly stronger desire to remove the old jujube trees, and plant new varieties that are more competitive in the market,

which can bring them more economic benefits. In conclusion, the germplasm resources are threatened with destruction.

#### **4.1.2 The multiple functions and values of the ancient jujube orchards are not yet widely recognized**

Because of weak science and technology foundation, the local government and the public haven't recognized the multiple functions of the ancient jujube orchards. The jujube industry still stays at the fruit production, not making use of the historic, cultural and ecological values of the ancient jujube orchards. They have blindly replaced the old trees with new ones, which are said to be more competitive in the market. This is a threat to the ancient jujube orchards that cannot be overseen.

#### **4.1.3 The farmers are not well educated on science, technology and management**

In recent years, the County has organized many technology trainings in various forms for the framers, and has aggressively publicized advanced farming technologies. But the farmers are still wanting in science and technology literacy. This is because the farmers are not well educated at the first place. Also, many young people have gone into the cities to work, so the farmers are mostly senior people, who do not learn new technologies as fast. In addition, most farmers focus more on planting new trees, instead of taking care of existing ones. Therefore, the publicity of new technologies is low, which leads to low unit yield, and inferior products. It's especially so in the non-conventional jujube production area in the northwest.

#### **4.1.4 The organic jujube base progresses too slowly to bring economic benefits**

The County boasts a 60,000 mu base of organic jujube production, which in a normal year will produce a yield of 15 million kilogram. However, in 2008, only 150 tones are sold as organic jujube. And there are only two companies certified as organic jujube processors. This is too small a number for the 60,000 production base. In addition, because no chemical fertilizer or pesticide has been allowed in the base, the appearance of the jujube is not as good. So, they are not popular with the dealers each when they are sold as non-organic jujube. And the price is not as high. With low economic benefits, the farmers are not confident in the future of organic jujubes. So they are not keen to produce organic jujubes, which hampered the development of organic jujube production.

#### **4.1.5 Vulnerable to natural disasters**

Natural disasters that hamper jujube production mainly include pest, disease, hail, rainy and cloudy weather, etc. Especially, rainy weather during the mature period is destructive. For example, in 2004 and 2007, rainy weather lingered on for over ten days during the mature period of jujube. In these two years, almost all jujube cracked, or rot, leaving the yield at nearly zero. Every spring, during the shooting period, the trees are subjected to serious pest outbreaks, such as *Sucra jujuba* Chu, *Ancylis sativa* Liu and *Scythropus yasumatsui* Koneet Merimoto. In recent years, the Jia County was hit by several severe outbreaks of pest and disease in the spring. Also, the rainy weather in the autumn made many jujubes crack. The loss was aggravated for the farmers had not made adequate preparation.

#### **4.1.6 Backward infrastructure in the production area restrains the development of jujube industry**

The main production areas of jujube in the Jia County are mostly located at the mountainous area along the Yellow River. The arable areas are small and dispersed. Affected by rough natural conditions and remote location, the main production areas confront many problems, such as inconvenient transportation, backward irrigation systems, and information failure. These severely hampered the production, transportation, processing and sales of jujube, thus restraining the development of jujube industry.

### **4.2 National Threats**

Modern agriculture, driven by economic gain, has continuously impacted traditional agricultural practices. Short-term economic gains can be brought about by replacing old jujube trees with new varieties. But it would destroy the precious germplasm resources of the Jia County, and would damage the historic and cultural values of the ancient jujube orchards. In other words, long-term economic benefits are undermined.

The Jia County has earnestly promoted the development of eco-agriculture and organic jujube production base. It does so in the background of continuous development of a resource-conservative and environmental-friendly society, and popularization of harmonious development of mankind and the nature. But, the organic development of the Jia County is mired in difficulties. The County now has a production base of jujube that covers an area of 60,000 mu. But because no chemical fertilizer or pesticide is allowed, the product quality has dropped by a large margin, which has brought down the economic return significantly. This has reduced the interest of farmers on organic jujube.

### **4.3. Global Threats**

Global threats include climate change and unfavorable international economy, which will exert certain impacts on jujube production. The export of jujube was cut by international financial crisis and other factors. For example, overseas consumers place more importance on the medical effects and nutrition when choosing jujube products. But the jujube exports of China mostly contain high content of sugar, which makes them less popular in the international market.

## **V. Protection and Development**

### **5.1 Ongoing Efforts**

(1) A production cultivation and processing base of large-scale has taken shape.

(2) A leading group, headed by the forestry bureau and the agri-cultural heritage office has been set up to take in charge the application and protection of the agri-cultural heritage.

(3) Advertisement of jujube has been enhanced. The County actively participated in the exchanges on agri-cultural heritage held by the GIAHS China Office. A large amount of experts and scholars have been invited to visit the Jia County, to carry out in-depth studies on topics including: the origin of jujube; the history, culture and protection of ancient jujube orchards; cultivation and processing of jujube; the development of the organic jujube production base and the development of the jujube market.

(4) The County has worked with higher education institutions, like the Shandong University and the Northwest A & F University, to enhance science and technology support of jujube production.

(5) Scholars of research institutions, like the Institute of Geographic

Sciences and Natural Resources Research of the China Academy of Science, have been invited to give training on GIAHS to equip relevant personnel with knowledge of GIAHS.

(6) The County and its jujube have won numerous certification and awards of jujube products. Since 2001, the Jia County has won the title of “the hometown of jujube” honored by the State Forestry Administration, the certificate of “national organic jujube production base” honored by the Ministry of Agriculture, and the title of “national agriculture standardization demonstration zone of jujube production” honored by the Standardization Administration. The jujube has earned the certifications of “organic jujube”, “product of geographic indication-Jia County You Jujube” and JA certification from the above organizations and the Ministry of Agriculture, Forestry and Fisheries of Japan. In addition, the jujube has also won the gold and silver awards in the selection of famous, special, new and quality fruit produced by the economic forest in Shaanxi Province.

## **5.2 Potentials and Opportunities**

### **(1) Rich germplasm resources of jujube**

There are two species of jujube in the ancient orchards of the Jia County: jujube (*Zizyphus jujube* Mill) and sour jujube (*Zizyphus spinosus* Hu). To be specific, there are three cultivar groups of sour jujube, consisting of 16 endemic varieties, and 13 cultivar groups of jujube, consisting of 35 endemic varieties. They present the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube, cultivated sour jujube to cultivated jujube. This is a strong evidence of China being the place of origin, domestication and scale cultivation of jujube. The varieties also constitute an important germplasm bank for future development of the jujube industry.



## **(2) Recognized by several departments and organizations**

The fruit of the Jia County's jujube is crimson, oval shape, thin-skinned, fleshy, juicy, and sweet, with a small pit and a medium content of sugar. It's a world renowned traditional product that has been earned the following titles:

The Town Famous of Jujube, the State Forestry Administration, 1998;

China Green Food Certification, August, 2003;

China Organic Food Certification, China Organic Food Certification, Beijing Huaxia Wuyue Certification Center, October, 2005;

JAS Certification, the Ministry of Agriculture, Forestry and Fisheries of Japan, September, 2006;

National Base of Standardized Jujube Production, Standardization Administration of China, December, 2006;

Agricultural Product of Geographic Indication, Ministry of Agriculture, 2009;

National Demonstration County of Forestry Science and Technology, State Forestry Administration, 2009;

Advantageous and Distinguish Organic Production Base, China 100 Counties (Cities) Advantageous and Distinguish Industry Survey Office, 2010.

## **(3) Campaigns to protect GIAHS and China-NIAHS**

In 2002, the Food and Agriculture Organization (FAO) launched the GIAHS protection project. Since then, the values of agri-cultural heritage and GIAHS have been widely recognized in the international community. Many countries have been very active in the protection and proper utilization of agri-cultural heritage, which has presented opportunities for China to explore the international market for products of the GIAHS, and to attract international investment.

The protection and development of agri-cultural heritage have attracted

the recognition and participation of all walks of life. It's especially so since 2012, when the Ministry of Agriculture started a campaign to discover China-Nationally Importance Agri-Cultural Heritage System (China-NIAHS). This provides a precious opportunity and platform for protecting and developing China's agri-cultural heritage. The Jia County's ancient jujube orchards were among the first to be listed as a China-NIAHS. We are confident that this will have positive and far-reaching influence on the protection of ancient jujube orchards and old jujube trees in the Jia County, as well as on the development of the County's jujube industry and agriculture.

#### **(4) Vast international market**

There is a vast international market for China's jujube.

On one hand, China is the only exporter of jujube, with its production accounting for over one third of the world's total. There are only two other small producers: the Republic of Korea and Iraq. As a result, China dominated the world's jujube production and trade for quite a long time. The demand far exceeds supply. In the international market of jujube, China faces no competition for the other countries, lacking jujube fruit, provide no jujube products.

On the other, as China become more influential, the jujube products, being a representative of China's traditional medicine and catering culture, will certainly attract more attention in the international market. In addition, famous for their nutrition values, the jujube products will become more popular for people are enjoying better lives and pay more attention to health.

In conclusion, the jujube products enjoy a promising international market.

#### **(5) Generous support of the local government**

The Yulin Municipal Government attaches great importance to the jujube

industry. In this spirit, it has launched a project to “boost the south of Yulin”, and promised forceful support for the organic jujube production base in the Jia County. The county committee and government have made it a strategic goal to develop the County into one that famous of organic jujube, and is a major jujube producer. To achieve this goal, a series of policies have been adopted to promote the jujube base and the industrialization of the jujube industry. Great efforts have been make to carry out the project of “bring jujube westward”.

## **5.3 Expected Impacts on Society and Ecology**

Becoming a GIAHS will boost the protection and development of the Jia County’s ancient jujube orchards. It’s expected to exert multiple social and ecological impacts.

### **5.3.1 Promote the agri-culture of Jia County**

The Sixth Plenary Session of the 17th Central Committee of the Chinese Communist Party put forward the CCCPC’s Decisions on Several Major Issues of Deepening Cultural System Reform and Promoting Socialist Culture has stated the tasks as to outstanding traditional culture: develop a system for its inheritance, enhance the discovery and elucidation of its value, maintain its main factor, and make it the spiritual foundation for our people. The application of GIAHS is a measure to accomplish the tasks, and to promote development of the agri-culture. It’s also a demonstration of the local government’s strategy to “build the County using its eco-system, promote the County through tourism, and enriching the people through the jujube industry and animal husbandry”. Therefore, becoming a GIAHS will encourage the people to value, protect and pass on the agri-cultural heritage.

### **5.3.2 Complement agricultural modernization with ancient wisdom**

The jujube agri-cultural heritage of the Jia County provides advance philosophy for modern agriculture, for it contains rich production experience, traditional technology, and thoughts of harmonious development between mankind and the nature. Becoming a GIAHS will let the farmers have better understanding on traditional knowledge and managerial know-how, and use them in handling challenges confronting modern agriculture. In this way, traditional culture inheritance and innovation are combined to make the modern agriculture of the Jia County more comprehensive, coordinated and sustainable.

### **5.3.3 Increase the income of local farmers, and promote social and economic development**

The brand of ancient jujube orchards and GIAHS can be used in developing related products, which can improve the competitiveness and publicity of the jujube products, and thus increase the farmer's income. Meanwhile, as we continue to explore the other values of agriculture, we can incorporate the jujube products into tourism. This will enrich the connotation of tourism, and expand the channels through which we advocate and protect agri-cultural heritage. The result will be the progress of local economy.

### **5.3.4 Enhance biodiversity protection, and maintain ecological balance**

The jujube of the Jia County not only constitutes an importance source of livelihood, but is also vital for enhancing biodiversity protection and maintaining ecological balance. The jujube trees contribute greatly to the ecosystem. In the ancient jujube orchards, they are distributed sparsely,

providing room for other species. Their lush foliages provide shading for sciophilous plants. They ease soil erosion on the slopes. With tall trunks and dense branches, they constitute a natural reservoir, and wind break. Their leaves, when fallen, add organic content to the soil, and make it more fertile.

## **VI. Outline of the Dynamic Conservation Plan**

### **6.1 Basis of the Outline**

To protect the ancient jujube orchards, Jia County Government has carried out the following activities:

#### **6.1.1 Incorporating the protection of the proposed GIAHS (the System) into the annual government report**

In its twelfth five-year plan and 2012 work report, the Jia County Government especially stated that the jujube industry should received generous support, and the System should be studied and protected. The purpose was to highlight the importance of protecting the System, and to better protect the ancient jujube orchards in the Jia County.

#### **6.1.2 Setting up the leading group of the application of GIAHS**

A leading group, headed by the forestry bureau and the agro-cultural heritage office were set up. Their responsibilities are to publicize the application and the protection of the System, and to organize and promote related activities. The working group has promoted the jujube of Jia County on the many exchanges on agro-cultural heritage, hold by the Chinese Office of GIAHS.

### **6.1.3 Setting up an investigation team to understand the current development of the jujube industry and to identify the priorities of work**

In 2010, the Jia County Government has set up a strategic target to develop the Jia County into a county famous of organic jujube and a major producer of jujube in Shaanxi. Since then, the government has pooled the resources of the county to boost the jujube industry. The government understood that to better do so, a thorough understanding of the industry was indispensable. In this regard, an investigation team was set up. Their work has presented clear insight of the development status and problems of the jujube industry of the Jia County, and has spotted the constraints and the underlying causes. Based on their work, the leading group has identified the priorities of future work, and has formulated subsidiary policies which encourage the farmers to plant jujube trees and protect ancient jujube orchards.

### **6.1.4 Inviting higher education institutions to conduct researches on jujube in Jia County**

The Shangdong University, Northwest Agriculture and Forestry University and other higher education institutions have been invited to do field investigation at the Jia County. They have done in-depth studies on the origin of jujube, the history, culture and protection of ancient jujube orchards, the production and processing of jujube, and the development of an organic jujube production base, as well as the development of the jujube market. Their studies have provided science and technology support for jujube production.

### **6.1.5 Improving the influence by winning certifications and awards of jujube and related products**

Since 2001, Jia County has won the title of “the hometown of jujube” honored by the State Forestry Administration, the certificate of “national organic jujube production base” honored by the Ministry of Agriculture, and the title of “national agriculture standardization demonstration zone of jujube production” honored by the Standardization Administration. The jujube has earned the certifications of “organic jujube” and JAS certification from the above organizations and the Ministry of Agriculture, Forestry and Fisheries of Japan. In addition, the jujube has also won the gold and silver awards in the selection of famous, special, new and quality fruit produced by the economic forest in Shaanxi Province.

### **6.1.6 Inviting research institutions on field trips to the County**

Field investigation and studies on the application was organized, and research institutions have been invited for this purpose, such as the Institute of Geographic Sciences and Natural Resources Research of the China Academy of Science. Main achievements are as follows:

#### **(1) Clarifying the principles for next step**

The principles include sustainable development, dynamic conservation and participatory management. The latter two are important for agro-cultural heritage protection. The essence of dynamic conservation is to boycott enclosed protection, and advocate protection during development. It also demands to find out the stakeholders in the protection, and to clarify their obligations and

interests, so as to stimulate them in protecting GIAHS. As to participatory management, it is a basic principle of agro-cultural heritage protection.

## **(2) Identifying the multiple values of the System**

The values of the System include ecological, economic, social, cultural, scientific and demonstration significance. First, the jujube trees boast high ecological values. They are effective wind breaks, for they are tall with large crowns, and are planted on contiguous land. It's especially so for the ancient jujube orchards. In addition, the jujube trees grow better than other species. The trees have great effects in soil conservation for their roots spread widely, with dense creeping root and lateral root. The old woods have high water conservation capacity. In the sparsely vegetated loess plateau, and the slopes along the Yellow River, these functions are of great significance.

Second, there is a large population of ancient jujube trees. To be specific, there are three cultivar groups of sour jujube, consisting of 16 endemic varieties, and 13 cultivar groups of jujube, consisting of 35 endemic varieties. They present the whole domestication process of jujube from wild sour jujube, via half-cultivated sour jujube, cultivated sour jujube to cultivated jujube. The varieties also constitute an important germplasm bank for future development of the jujube industry.

Lastly, the jujube industry is important for sustainable development of the County. It presents reference for other areas in the world facing similar situations. It will promote global sustainable development and eco-agriculture, and will boost poverty alleviation in the arid and barren areas.

## **(3) Sorting out the situation of Jia County**

The investigation teams have sorted out the situations and major problems of the ancient jujube orchards in the Jia County. They did so by studying the



natural conditions (climate, soil, and ecosystem), socio-economic conditions (economic structure and level, population and ethnicity), and the conditions of the old jujube trees in the Jia County, the ancient jujube orchards, the planting of jujube trees in people's courtyards. In the Nihegou Village, the core zone of the candidate heritage site, they have also carried out investigation on the farmers, as well as door-to-door interviews.

## **6.2 Planned Activities**

### **6.2.1 Accelerate the formulation and implementation of protective planning and legislation**

The government plans to release and implement *Jia County's Planning on the Ancient Jujube Orchard Protection and Development*. The planning will specified the targets of protection, as well as the action plan and measures. Once the planning is approved by the people's congress of the County, it will be promptly implemented.

In addition, the *Jia County's Management Methods of Ancient Jujube Orchard Protection and Development (the Methods)* will be compiled as soon as possible. The *Methods* will contain policies and measures of protecting and developing the ancient jujube orchards, and comprehensive monitoring, rewarding and punishing rules.

### **6.2.2 Enhance publicity**

Different media and forms will be used to publicize knowledge of the ancient jujube orchard. This aims to involve the public.

The county is among the first to receive the certification of organic jujube, and to apply for the GIAHS. These provide it with opportunities to improve publicity. There are also other platforms, like the Investment and Trade Forum

for Cooperation between East and West China, China Yangling Agricultural Hi-Tech Fair, the poverty alleviation and public welfare advertisement on TV, and etc.

### **6.2.3 Censure and Sort out the Agro-Cultural Resources**

A database will be set up to store information like: the results of investigation on the space, number of jujube orchards in the Jia County, corresponding germplasm resources, agricultural landscape, land use, folk culture, folk art and traditional architectures. The ancient jujube orchards within the reserve are put on a protection list. The study of the history and evolvement of ancient jujube orchards will provide basis for further protection and utilization of them. The County will build an exhibition for this agro-cultural heritage, and will hold symposium on the jujube culture. Research will be carried out on thoughts, policies and measures to protect this heritage. The County will publish a series of related books to present the inheritance, protection and development of the agro-cultural heritage. Providing a comprehensive, systematic and multi-dimensional insight, the books will become a channel for people to learn about the Jia County's jujube industry, and a must-read for people studying agro-cultural heritage.

### **6.2.4 Set up a reserve to carefully protect the ancient jujube orchards**

The reserve is located mainly in the Nihegou Village, Zhujiagua Town, Jia County, Shaanxi Province, at the junction, about 20 miles in the north of the County, of the west bank of the Yellow River and the Chehuigou Village. It's within 38°11'12"N, 110°28'01"E in the west, 38°11'12"N, 110°30'02"E in the east, 38°10'12"N, 110°29'30"E in the south and 38°13'03"N, 110°29'30"E in the north.

The object of protection is an ancient jujube orchard with a history of over fourteen hundred years. It's located in the Nihegou Village, Zhujiagua Town, Jia County, at 110°29'30"E, 38°11'12"N. The ancient jujube trees take up an area of 36 mu. Among the 1100 trees, the trunk diameter of two is over three meters, and thirty is over two meters, 106 over 1.5 meters, and 300 over one meter, with the largest being 3.41 meters (Table 4).

A survey on the condition of the trees has been carried out. It shows that 43 trees, 29% of the trees covered, are in good shape; 106, or 71%, are cracked, hollow, rotted or dead. Among the latter, 60 suffer dry rot, 29 hollow, two half-dead, and two have second trunks.

The vegetative growth of the trees is weakening severely. The growth of the development branches is worrying, at about 20 centimeters per year. The mother spurs have aged, with those over 7 years old accounting for over 70% of the total. In addition, the yield has dropped while the fruit become smaller. The yield per tree is only over five to fifty kilograms, one fifth of that in full fruiting.

### **6.2.5 Develop model households of jujube cultivation and protection**

A mechanism will be put in place to support initiative farmers in policy, funding and market. This will have demonstration effects on other farmers, and will stimulate them to protect the ancient jujube orchards. Subsidiaries will be granted to ensure the protection work. The demonstration effects of the mechanism will be spread. In addition, the County will follow up on those selected farmers to learn the changes of their income and protection awareness. This will become scientific references for agro-cultural heritage protection.

Table 4 Old Jujube Trees with DBH over 2 meters

No.	Tree No.	Householder	DBH/cm	Height/m	Crown/m	Main Branch Number	Health Condition
1	001	WU Cunping	200	7	6×4	3	Rotted
2	005	WU Cunping	250	7	7×4.5	3	Healthy
3	006	WU Cunping	260	6.5	5×3	2	Hollow
4	019	WU Zhanyu	250	7.1	6×4	5	Healthy
5	030	WU Linzhi	228	6	5×4	2	Cracked, Rotted
6	042	WU Yaozeng	280	6	3×4	2	Hollow, Rotted
7	045	WU Yuelin	220	9	5×6	2	Hollow, Rotted
8	057	WU Guojin	220	7	3×3	3	Cracked, Rotted, Hollow
9	065	WU Guoxiong	261	10	8×5	4	Cracked, Rotted
10	066	WU Guoxiong	210	11	5×3	2	Cracked, Rotted
11	067	WU Guoxiong	205	9	6×6	3	Cracked, Rotted
12	082	WU Huasheng	210	6	4×4	1	Hollow, Rotted
13	095	WU Zhengxiong	204	10	5×4	1	1/2 Hollow, Rotted
14	097	WU Zhangong	244	9	6×4	2	Cracked, Rotted
15	098	WU Zhangong	242	12	8×6	2	Cracked, Rotted
16	099	WU Zhongliang	289	11	8×6	3	Cracked,
17	103	WU Shijing	223	12	18×9	4	Healthy
18	105	WU Zhangwu	280	9	9×8	5	Hollow
19	111	WU Zhihui	234	10	7×5	2	Healthy
20	119	WU Wenshou	341	13	6×10	2	Somewhat Healthy
21	120	WU Wenshou	213	13	6×8	2	Hollow, Rotted
22	122	WU Zhanyu	338	12	8×8	3	Hollow
23	127	WEI Yongan	222	12	5×8	2	Healthy
24	129	WEI Yongan	224	13	8×8	4	Healthy
25	132	WU Weisheng	248	13	10×8	4	Cracked
26	137	WU Pingping	282	11	10×9	3	Hollow
27	141	WU Zixiao	260	12	8×9	3	Clefted
28	145	WU Liuze	325	10	8×7	4	Clefted
29	148	WU Renbao	252	9	9×7	4	Hollow
30	149	LI Yaqin	217	9	4×8	2	1/2 Rotted

### **6.2.6 Properly develop tourism in the System**

The County will proactively apply for the demonstration projects of leisure agriculture and rural tourism, organized by the Ministry of Agriculture and the China National Tourism Administration. Eco-tourism and leisure tourism can be developed in the demonstration orchards in Nihegou, and Mutouyu villages. This will not only enable the County to make full use of its unique tourism resources, but will also drive forward the protection and sustainable development of the ancient jujube orchards.

### **6.2.7 Building a base of organic jujube production**

Based on the existing experimental demonstration base, the County will steer the farmers towards standardized production and intensive operation, by promoting unified procedures and practices. Financing channels will be expanded, which will accelerate the work to build production bases on contiguous land, and accelerate scale development. As a result, the jujube industry will be promoted.

A quality inspection center on jujube products will be founded. In addition, a quality inspection station will be put in place at the main production areas, to control product quality during purchase, production and transportation. Processing enterprises will be encouraged to install advanced and suitable food safety testing devices, to enhance quality control of jujube products.

### **6.2.8 Organize festivals and celebrations of jujube culture**

Festivals and celebrations reflect local culture. They present the charms and culture of the host. The County will organize the “Jia County Jujube Festival”, “Sightseeing in the Jujube Hometown” and other activities, which will showcase the history, folk culture, catering culture, landscape and art relating to jujube. These will demonstrate, from different angles and levels, the

rich connotation of jujube culture of the Jia County. The communication and cooperation with domestic peers will also be enhanced. In addition, the organizers will strive to integrate red culture with jujube culture, so as to create a situation in which these two cultures promote each other, and prosper together.

### **6.2.9 Enhance the network of jujube studies and protection**

The County will continue to participate in international and domestic jujube symposiums, in which it will enhance the awareness of protecting ancient jujube orchards, and will form a network with other jujube production areas and researchers on jujube protection and development.

## **6.3 Strategies for Handling Threats and Challenges**

Measures will be adopted to handle the threats and challenges of the Jia County ancient jujube orchards at the local, national and international levels.

### **6.3.1 Most of the orchards are old ones with irrational variety structure**

With a long history of jujube cultivation, over 60% of the jujube trees in the Jia County were planted before the reform and opening-up. Upgrading of the jujube orchards is urgent for most of the jujube trees are old ones, with low and inferior yield, low commodity rate and economy benefit. Less than 1% is new breeds with upgrading significance and strong competitiveness in the market, even though an increasing number of jujube trees are planted every year.

**Strategies:** Through the fine breed campaign, improve quality. In this regard, the Jia County Chang Jujube and other fine breeds will be promoted.

### 6.3.2 Lack for technical training and management skills

In recent years, the County has organized many technology trainings in various forms for the framers, and has aggressively publicized advanced farming technologies. But the farmers are still wanting in science and technology literacy. This is because the farmers are not well educated at the first place. Also, many young people have gone into the cities to work, so the farmers are mostly senior people, who do not learn new technologies as fast. In addition, most farmers focus more on planting new trees, instead of taking care of existing ones. Therefore, the publicity of new technologies is low, which leads to low unit yield and inferior products. It's especially so in the non-conventional jujube production area in the northwest.

**Strategy:** Strengthen the effects of demonstration projects. This can help the farmers to master modern technologies and enhance orchard management. Also, proper planting and management practices will be promoted, which will improve the product quality and yield of jujube orchards.

### 6.3.3 Lack for technical training and management skills

Weak science and technology foundation subjects the jujube industry to great loss. For example, in planting, the jujube trees crack easily. In mature period, the jujubes are vulnerable of mildew and rot in continuously rainy weather. Also, the yield is low and inferior.

**Strategy:** Promote standardized management of pollution-free jujube and organic jujube. To be specific, the *Standards of Organic Jujube Production in Jia County* will be promoted. And the farmers will be required to follow the standards strictly. The standards demand formula fertilization; yearly trim and increasing fruit set, and forbid applying highly-toxic and high residue pesticide. The County will vigorously promote integrated new technologies of cultural, physical and biological controls.

### **6.3.4 Vulnerable to natural disasters**

Natural disasters that hamper jujube production mainly include pest, disease, hail, rainy and cloudy weather, etc. Especially, rainy weather during the mature period is destructive. For example, in 2004 and 2007, rainy weather lingered on for over ten days during the mature period of jujube. In these two years, almost all jujube fruit cracked or rotted, leaving the yield at nearly zero. Every spring, during the shooting period, the trees are subjected to serious pest outbreaks, such as *Sucra jujuba Chu*, *Ancylis sativa Liu* and *Scythropus yasumatsui Koneet Merimoto*. In recent years, the Jia County was hit by several severe outbreaks of pest and disease in Spring. Also, the rainy weather in the autumn made many jujube fruit crack. The loss was aggravated for the farmers had not made adequate preparation.

**Strategy:** The loss can be reduced by the following measures. Set up an alert system during the mature period, to forecast likely harmful weather. Loss can also be reduced by jujube processing and baking. The government can grant subsidies for pilot projects of agriculture insurance. In the areas to the west of jujube origin, farmers can interplant jujube with walnut and apricot, or interplant jujube with herbal medicine. Bio-technologies to prevent cracking of jujube should be promoted. Another measure is changing the schedule of jujube picking from once a year to multiple times per year.

### **6.3.5 Backward infrastructure in the production area restraints the development of jujube industry**

The main production areas of jujube in the Jia County are mostly located at the mountainous area along the Yellow River. The arable areas are small and dispersed. Affected by rough natural conditions and remote location, the main production areas confront many problems, such as inconvenient transportation, backward irrigation systems, and information failure. These severely hampered



the production, transportation, processing and sales of jujube, thus restraining the development of jujube industry.

**Strategy:** The roads from the main production areas to the County will be improved. New irrigation facilities will be installed, while the existing ones will be upgraded to ensure adequate water supply for jujube growth. An information network will be put in place to collect and analyze the market of jujube, the supply and demand, and to provide technology, information, marketing, and transportation services for the jujube industry.

### **6.3.6 Impact of modern agriculture concepts and technologies**

Modern agriculture, driven by economic gain, has continuously impacted traditional agricultural practices, causing conflicts between economic gains and the development of organic agriculture. The Jia County has earnestly promoted the development of eco-agriculture and organic jujube production base. It does so in the background of continuous development of a resource-conservative and environmental-friendly society, and popularization of harmonious development of mankind and the nature. In the twelfth five-year plan of the Jia County, the government further stresses its ambitious goal to “develop circular economy, and circular, pollution-free and organic agriculture”, and to build an “ecological environment protection and sustainable development demonstration zone at the middle and upper reach of the Yellow River”. But in reality, the organic development of the Jia County is mired in difficulties. The County now has a production base of jujube that covers an area of 60,000 mu. But because no chemical fertilizer and pesticide is allowed, the product quality has dropped by a large margin, which has brought down the economic return significantly. This has reduced the interest of farmers on organic jujube.

**Strategy:** The society’s knowledge of agro-cultural heritage and its position can be improved through campaigns on TV, newspaper, and network.

This will let more people recognize the value of agro-cultural heritage. Marketing channels will be expanded through the regulation effect of prices, and exclusive supply of the jujubes of the Jia County as a green product, and an organic product. Protection of agro-cultural heritage will be directly promoted through the country's campaign on eco-agriculture, and modern agriculture development views. In addition, by setting up relevant reserve and demonstration sites, in which jujube cultivation is strictly carried out in accordance with the standards of agro-cultural heritage, the impacts from modern technologies can be reduced.

### **6.3.7 Global Threats**

Global threats include climate change and unfavorable international economy, which exert certain impacts on jujube production. The export of jujube was cut by international financial crisis and other factors. For example, overseas consumers place more importance on the medical effects and nutrition when choosing jujube products. But the jujube exports of China mostly contain high content of sugar, which makes them less popular in the international market.

**Strategy:** The impacts of international threats can be lowered by becoming a GIAHS and by allying with other GIAHSs to learn from them. It's also helpful to follow the international market closely, to learn about the preference of foreign consumers, and to develop and produce low sugar jujube products with health effect and nutrition value. Doing so, we can strengthen the competitiveness of China's jujube products in the international market.

## **6.4 How to Obtain and Utilize the Protection Fund**

### **6.4.1 Expand financing channels**

To obtain adequate monetary support for the protection of the agro-cultural heritage, the regional and county governments of the heritage site should expand the financing channels. A special fund should be set up in this regard. Possible financing channels include the following:

(1) Global Environmental Fund (GEF): FAO will apply for the special fund of GEF to subsidize the protection of agro-cultural heritage across the world.

(2)Eco-compensation: Eco-compensation is of great significance for the development of the Jia County's jujube industry. The compensation mainly comes from fiscal transfer, and from related industries (e.g. organic culture, and tourism) and lower reaches. The prerequisite is scientific evaluation of the eco-values of new jujube woods, and ancient jujube population, and the direct investment and opportunity cost of the farmers in the site to protect the eco-system.

(3) Support from financial institutions: special loans from the banks and credit cooperatives.

(4) Connection with poverty alleviation projects and new countryside development projects: At present, China attaches great importance to issues relating to rural areas, making it a top priority for rural governments to develop new countryside. The Central Government requires local governments to set up special funds for this purpose. These funds can also be used in protecting agro-cultural heritage, so the two tasks can be promoted at one stroke.

(5) National sponsorship: Support can be solicited from related governmental organs, and comprehensive development projects of agriculture. The County can also obtain support from other related special funds.

(6) International aid: Monetary support can be gained from related international organizations.

#### **6.4.2 Use the funds properly**

When using the funds, the County should pay attention to the following. First, the percentage of counterpart funds should be increased in major projects, such as agriculture infrastructure construction and projects aiming to improve agriculture production conditions. Second, fiscal support will be enhanced in eco-compensation work. Third, a proper amount of money should be spent on holding conferences and campaigns. Lastly, science research should receive adequate funding to ensure successful research on the agro-cultural heritage.

#### **6.4.3 Oversee and inspect the utilization of the funds**

Responsible departments should oversee and examine to ensure proper and efficient management and utilization of the funds. First, major projects should be audited in terms of fund management and use. Second, review will be organized to check whether the project plans and project quality responsibility statements have been followed closely, and to check whether related parties have practiced their obligations according to the statements. Third, the implementation of rectification measures will be examined to facilitate correction and handling of severe violations of laws and regulations. Fourth, look into infringement of laws and regulations. Besides, to ensure proper use of the funds, reviews of eco-environment should be enhanced to ensure successful eco-compensation.

## **6.5 Institution Development at Different Levels**

### **6.5.1 National institution development**

The country has provided a favorable policy environment and generous financial support for the protection of agro-cultural heritage. The Ministry of Agriculture and the Ministry of Science and Technology have also given a fair share of attention and supported the Jia County's application to be a GIAHS. It's suggested that the country keeps improving the control and management department of agro-cultural heritage. Also, special support, guidance and campaign of agro-cultural heritage protection can be enhanced to ensure its success.

### **6.5.2 County and town level institution development**

Enhancing the institutional development at the county level is of great significance to the protection of agro-cultural heritage. Therefore, the Jia County should set up a protection committee, led by the county leaders, to ensure successful implementation of the protection project, and to run and manage national and international projects. An executive office should be established under the committee. They will be fully responsible for the executing the work of the committee. The office will be set up in the agricultural committee of the county to facilitate the work. The town government should also set up a corresponding organization and designate special personnel to support the work of the committee.

### **6.5.3 Institutional development at local communities**

Local residents are the main body in agro-cultural heritage protection, the success of which demands a protection organization dominated by local residents. A committee should be set up, which is featured by self-governance

of the villagers, and participation of the village government and companies. This can enhance local residents' knowledge of the protection project, and their enthusiasm to participate. The result is a community governed by all parties, which will ensure that the agro-cultural heritage receive strong protection.

## Annex 1: Maps

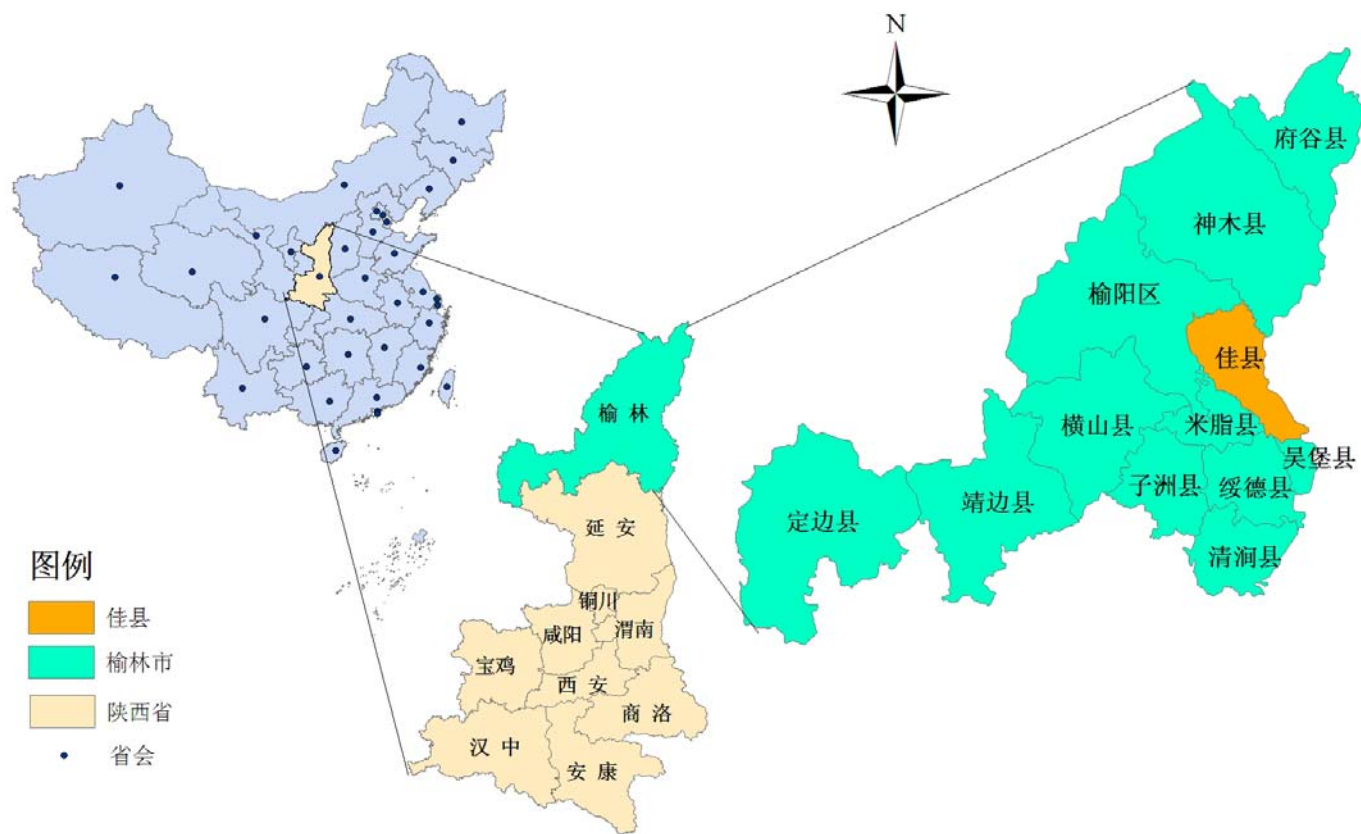


Figure 1 – the Jia County

(In the east of Yulin, Shaanxi, at the west bank of the Jinshaan Canyon along the middle reach of the Yellow River)

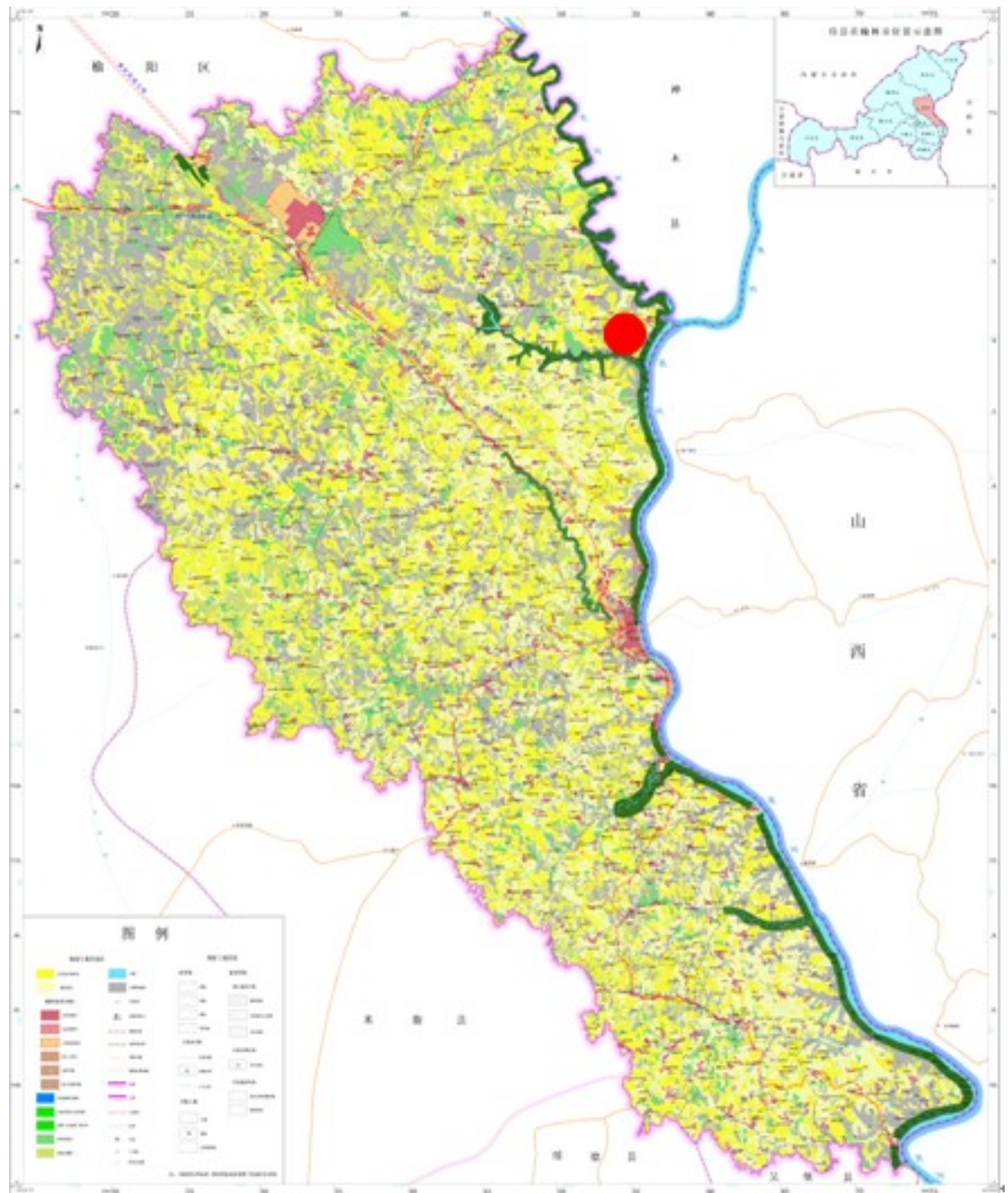


Figure 2 – Nigouhe Village

(20 miles to the north of the Jia County, at the junction of the west bank of the Yellow River and the Chehuigou Village)



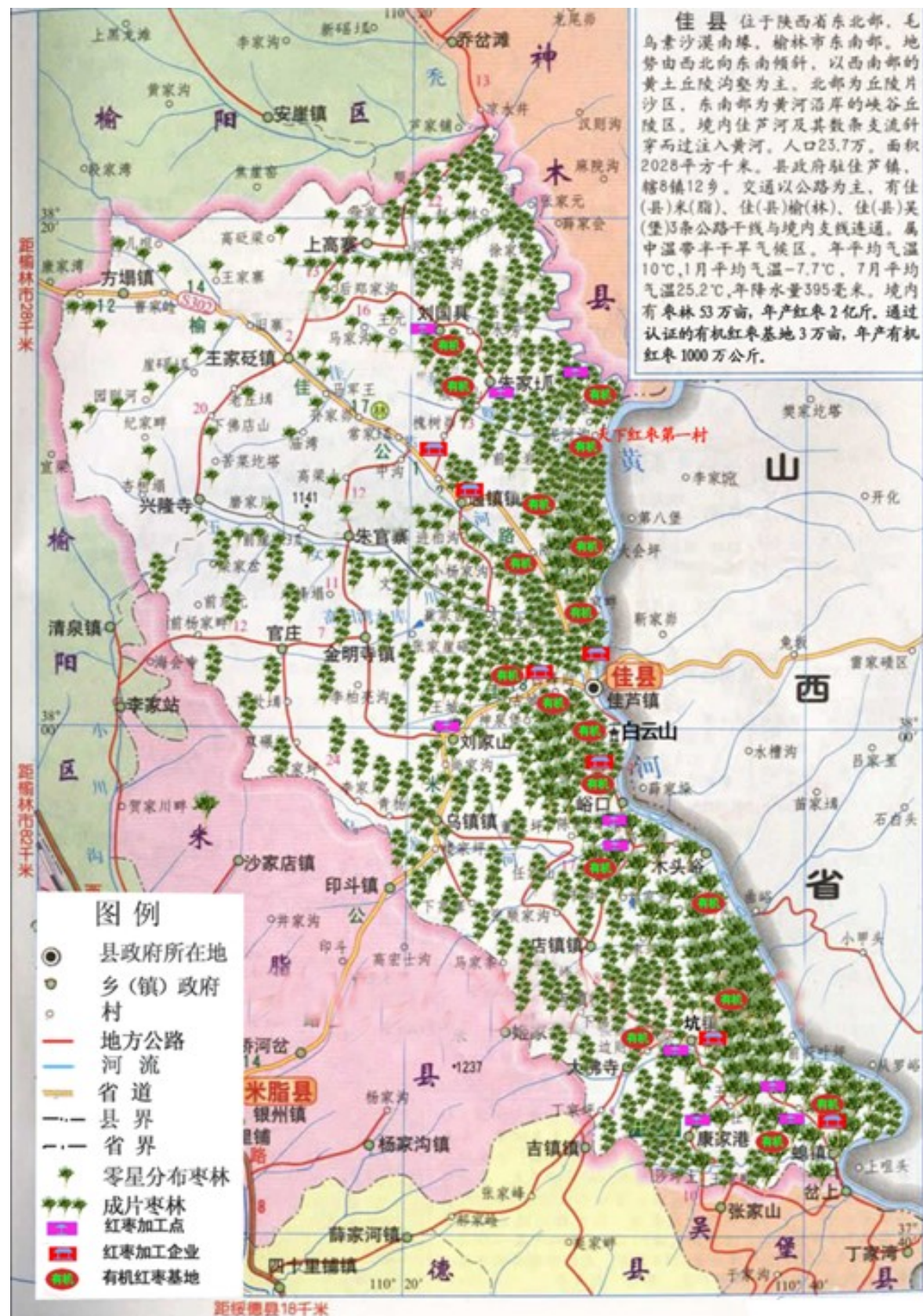


Figure 3 – Distribution of Jujube in the Jia County

## Annex 2: Diversified varieties of jujube in Jia County

Species	Cultivar	Variety	
		Variety Type	Number
Sour Jujube (Zizyphus spinosus Hu)	cultivated sour jujube	Sour-Sweet Jujube, Tuan Sour Jujube	2
	Half- cultivated sour jujube	Tuan Sour Jujube, Tuan Sour Jujube ,Big Tuan Sour Jujube, Tuan Sour Jujube, Small Tuan Sour Jujube, Tuan Sour Jujube ,Sour Jujube, Big Sour Jujube, Tuan Sour Jujube, Obviate Sour Jujube	10
	Wild sour jujube	Round Sour Jujube, Sour Jujube, Extra Sour Jujube, Sour Jujube	4
Jujube (Zizyphus jujube Mill)	Mu Jujube	Fangxing Jujube, Changxing Jujube, Zhuixing Jujube, You Jujube, Heiyou Jujube, Xiyaoyao Jujube, Ruanhu Jujube, Lvnaitou Jujube	8
	Tuan Jujube	Tuan Jujube, Miantuan Jujube, Shatuan Jujube, Bianyuanxing Tuan Jujube, Sour Tuan Jujube, Cu Jujub, Sour Tuan Jujube	7
	Ya Jujube	Daya Jujube, Xiaoya Jujube, Guzixing Jujube, Gouya Jujube, Luanxingya Jujube	5
	Cui Jujube	Cui Jujube	1
	Zanhuang Jujube	Zanhuang Jujube	1
	Huping Jujube	Huping Jujube	1
	Jun Jujube	Jun Jujube	1
	Li Jujube	Li Jujube	1
	Yunaling Jujube	Yuanling Jujube	1
	Bai Jujube	Ruanxingbai Jujube	1
	Short Shoot Jujube	Short Shoot Jujube, Jiuyuehong Jujube, Gougou Jujube, Zhui Jujube	4
	Yihen Jujube	Mojiji Jujube, Momo Jujube, Tanwenwen Jujube	3
	Fenghe Jujube	Fenghe Jujube	1



## Annex 3: Photos



Overview of the Jia County



The ancient jujube orchards of the Jia County





The ancient jujube orchards of the Jia County



Jujube trees in front of cave-dwellings





Jujube fruit



Picking the jujube fruit





Sun-drying the jujube fruit





Jujube trees planted in fish scale pits



Jujube trees green up the deserted mountains



Jujube Products