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Distribution Characteristics and Industrialization Development of Mulberry in Mu Us Desert

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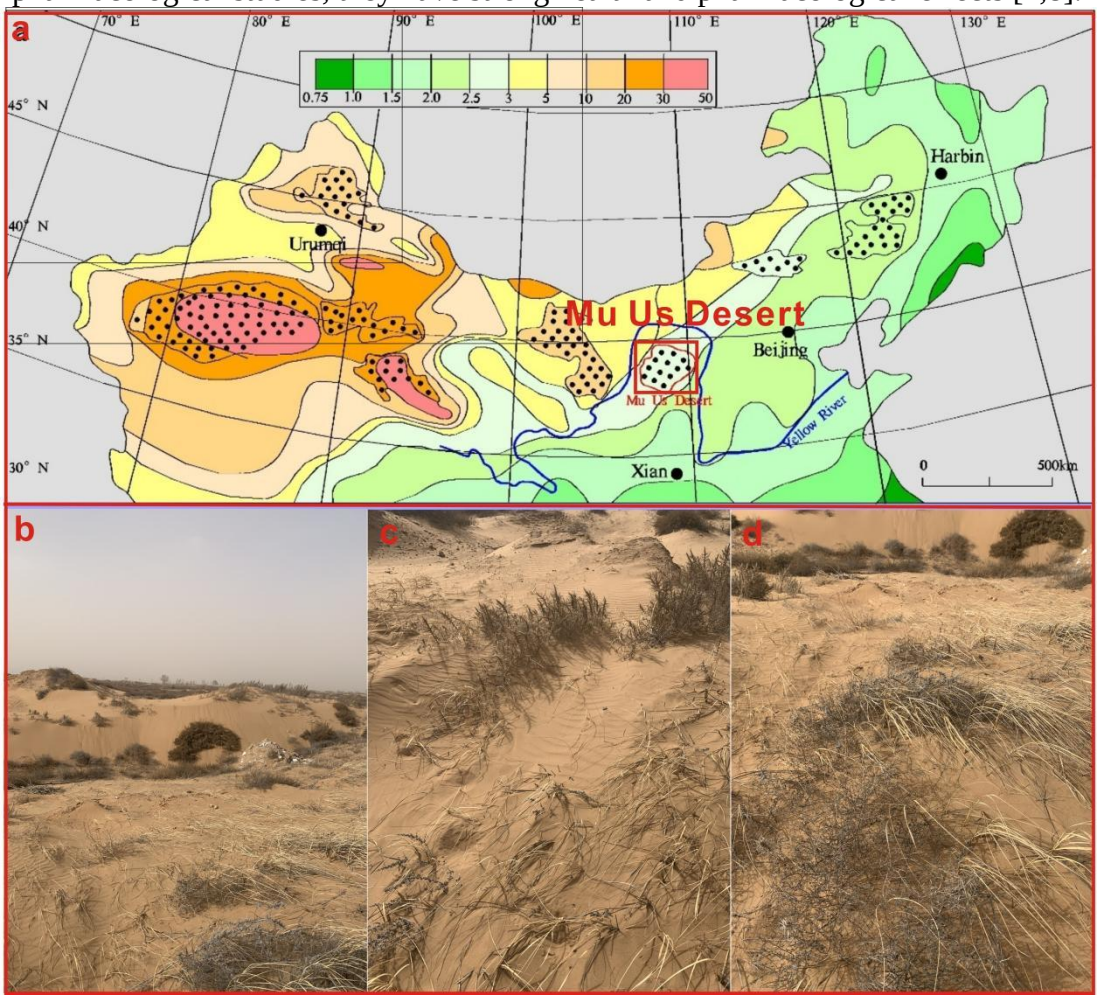
Abstract: Mulberry has rich nutritional value and medicinal value.In recent years, the mulberry industry in Mu Us Desert has made great progress, and the chain of green mulberry industrialization has basically formed. Based On the comprehensive observation and analysis of the characteristics of the introduced mulberry variety resources in Mu Us Desert under the local environmental conditions, the following results were obtained:In order to provide technical support for the scale, standardization and intensive development of mulberry base, the cultivation techniques of main mulberry varieties were studied.The existing problems of Mu Us Desert mulberry industry were also analyzed, and the direction of industrialization development was discussed,suggestions on diversified development ideas and large-scale development are put forward.

1. Introduction

As shown in Figure 1, mulberry has rich nutritional value and medicinal value.Since ancient times, mulberry has been used as fruit and traditional Chinese medicine [1]. It has a long history of medicinal use, and its health care and medicinal value are recorded in many ancient books.Mulberry fruit has the reputation of fruit emperor in China, and is a treasure of the third generation of fruit.Mulberry fruit juice beverage is a natural health drink.Mulberry is a kind of polyflower fruit, the fruit is generally 1-3cm long, the fruit period is from May to July, and the color is red purple or white.Mulberry is rich in various nutrients, and the juice extraction rate can reach 70% [2]. Juice is date red, rich in anthocyanins, with mulberry aroma, taste mellow, sweet and sour palatability, and the appearance is translucent.According to the determination, fresh fruit contains 16 kinds of oxyacids, vitamins, zinc, Mn, Ca and other minerals and trace elements that human body lacks [3,4], it also contains carotene, pectin and cellulose, especially vitamin content.The research on the chemical composition of mulberry is based on the general nutritional components, such as total sugar, total acid, protein, fat, amino acid, vitamins, minerals and so on.To further explore the health

and pharmacological effects of mulberry, these studies are necessary and imminent [5,6]. Natural products and general methods can be used to study the chemical constituents of mulberry by chemical or physical means.The mulberry is divided into different polar parts or monomers, and that the effective parts or effective components of the mulberry are determined by a chemical or biological method.Mulberry is rich in anthocyanins and polysaccharides, according to the results of modern pharmacological studies, they have strong health and pharmacological effects [7,8].



a: Red box indicates the location of the Wu Us Desert in northern China [12]
bd:field Photo of Mu Us Desert

Figure 1: Location map of Mu Us Desert

2. Physical Geography of Mu Us Desert

Mu Us sandy land is located in the northwest of the Loess Plateau. For a long time, it has become one of the most serious areas of land desertification and desertification in China [13,14]. due to the strong interference of natural drought and human factors[9]. In recent years, with the large-scale afforestation activities, the area of artificial vegetation in Mu Us Desert Area has increased year by year, it has increased from less than 10% to 20% -50%, and the vegetation coverage in some areas has even exceeded 50%. However, with large-scale vegetation restoration and ecological reconstruction, the contradiction between the supply and demand of soil moisture in Mu Us Desert area is increasing, and some plantations even appear degradation.The basin is located in the water-wind erosion crisscross zone and belongs to the temperate semi-arid continental

monsoon climate [11]. It is located in the northwest of Shenmu City, Shaanxi Province, with an altitude of 1250~1280m, an average annual temperature of 9.1℃, and a frost-free period of 134~153 d.The annual change rate of precipitation is large, the average annual precipitation is 420mm, mainly concentrated in July to September, accounting for more than 70% of the annual precipitation.The topography of the basin is small, and the dunes are widely distributed and mostly semi-fixed dunes.

3. Geographical Distribution of Mulberry

There are species of Morus in China, accounting for 53.7% of the genus, and 12 species of Morus originated from China. There are 11 species in Yunnan, 9 species in Guizhou, 8 species in Sichuan, and 8 species in Xizang. Yunnan, Guizhou, and Sichuan are the three provinces with the most abundant species, which are the genetic diversity centers of Morus.Morus elongata, also known as Guizhou and Hubei, mulberry, originated in southwestern China, distributed in Yunnan, Guizhou, Guangxi, Guangdong, Hubei, Hunan and other regions at altitudes of 500-1400 m.In northern India, Nepal and Myanmar, there are Himalayan mulberry (southern phoenix tail mulberry) and geographical alternative species.Mulberry is distributed in the southwest of China and the Himalayas at an altitude of 150-2400m, almost coextensive with Morus elongata, but the distribution center is 1-2 °south of Morus elongata, which is the southernmost mulberry species in Asia.It is often found in tropical forests in valleys where the soil is rich and wet.Milk mulberry and long spike mulberry, all with long spike, is a tropical rain forest tree species.It has the same phylogenetic experience as Morus elongata.White mulberry, originating in China, Korea and Japan, is the most widely distributed species in Morus.White mulberry is one of the largest stems and branches in the early systematic evolution, and its number is the largest.The early evolution centered on North China, Central China and East China (Wu,2003). Huasang, mainly distributed in central China, the Yangtze River Basin, north to Liaoning, Shandong, south to Fujian, Guangxi, Yunnan, Laos, Korea, Japan, 500-2700 m above sea level.It often grows in ravines, limestone parent soils and around villages.Fast growth, large leaves, thick leaves, leaves with many soft hairs, silkworms do not like to eat.M. mongolica Schneid, a tree or shrub, is cold-resistant and drought-resistant, native to Mongolia, China and northern Korea, born in hanging rock, limestone parent soil, steep wall shrub forest, with strong drought resistance and tough wood.

4. Processing Technology and Industry of Mulberry

Fruit mulberry varieties are rich and varied, some varieties are suitable for fresh food, some varieties are suitable for processing mulberry drinks, and some varieties can be used as both leaves and fruits [10]. Due to the successful breeding and popularization of mulberry varieties, the deep processing industry of mulberry has also developed rapidly.At present, fruit mulberry planting is mainly concentrated in Guangdong, Zhejiang, Shanghai, Shaanxi, Xinjiang, Beijing and other places, the main processing products are mulberry juice, mulberry juice beverage, mulberry wine, mulberry seeds, mulberries paste, mulberries anthocyanins and so on.The edible period of mulberry is three days at room temperature, while the edible period of mulberry can be prolonged to 12 days at low temperature of 0-5 °, and the mulberry has obvious effect on quality maintenance.Because mulberry is a climacteric fruit, there is a significant difference in respiratory intensity under different temperatures, low temperature storage not only reduces the respiratory intensity in the early stage of storage, but also delays the arrival of respiratory climacteric, thus delaying the success process of fruit ripening and senescence.The results showed that the peroxidase activity of mulberry fruits stored at room temperature reached the peak at 3 days after harvest, while the peroxidase activity of mulberry fruits stored at 0 °and 5 °maintained at a relatively low level until

12 days after harvest. Therefore, there was a close relationship between the respiratory climacteric and the activity of peroxidase.It can be concluded that the increase of fermentation activity of peroxides is one of the reasons for the respiratory climacteric of mulberry fruits.Polyethylene bag packaging has a good effect on the storage of many fruits, but it is used for mulberry storage, but the late physiological fruit rot is serious, the reason may be that the water is not easy to lose with polyethylene bag packaging, water droplets gathered in the bag wall, so that some fruits in the bag local humidity is too large, and poor ventilation is also one of the reasons.Therefore, it is better not to use polyethylene bags for mulberry storage.However, there are still quite a lot of rotten, so only the fresh mulberry processed into quick-frozen products (divided into monomer quick-frozen and block quick-frozen) and concentrated mulberry juice can reduce the physiological losses such as mildew and rot.

5. Development of Fruit Mulberry Industry in Mu Us Desert

In the past, mulberry cultivation research focused on sericulture, and improving the yield and quality of mulberry leaves became the focus of research. Now, the development of fruit mulberry production requires that the focus of mulberry cultivation research should be shifted to improving the yield and quality of mulberry, strengthening the prevention and control of diseases and pests in special mulberry garden for fruit mulberry, and cultivating and cutting technology of high yield and high quality tree type[15, 16]. At the same time, the preservation and processing of mulberry fruit is also a weak link in the research of mulberry fruit, which needs to be strengthened urgently. Establish the development idea of mulberry planting is not only for sericulture, carry out diversified comprehensive utilization of fruit mulberry resources, and develop new organic fruit mulberry garden construction. On the one hand, the advanced experience of fruit tree production is used with reference to carry out orchard grass growing, organic fertilization, kiwifruit and grape single trunk on shelves, double main vine extending, and feather arranged tree shape cultivation to achieve the purpose of high yield and bumper harvest of fruit mulberry.And on that other hand, a plant growth regulator is adopt to promote the fruit mulberry to produce fruits for a plurality of time in one year, so that the yield and the quality of the mulberry are improved[17].

In recent years, the land consolidation project in Yulin City has built 67 000 hm2 wide terraced fields, if the development of terraced fields ridge mulberry, whether for ecological environment construction or promoting income will have an inestimable role[18].The local excellent variety of Wubasang, Tiansang and other foreign varieties of good mulberry, such as Xuan 792, Husang 32 and Huanggru, were selected (the introduced mulberry must be strong grafted seedlings). Only one row of mulberry trees is planted on the edge of the terrace, either in autumn or in spring. The plant spacing is 3 m, the distance from the terrace edge is 1 m, the planting pit is 40 cm square, and 5 kg of organic fertilizer is applied.Watering root fixing water in time after planting.Medium stem tree form is cultivated.harvested by cutting mulberry shoots in early summer and late autumn.Mulberry, like mulberry leaves, can be used as food and medicine, is a favorite fruit, can develop a variety of products, and is suitable for terrace ridge planting.The varieties are Hongguo No.1, Hongguo No.2, Black Pearl, Baiyuwang, White Pearl and so on.

As shown in Figure 2, develop the mulberry industry, effectively extend the development of traditional silkworm industry and the new mulberry industry in Yulin, and realize an industrial cluster. According to the local actual situation and development needs, we should use the favorable conditions brought by silkworm, give full play to the characteristics of mulberry as a treasure, carry out all-round technical and material services, strengthen the cooperation of industry and trade among processing enterprises, and form a close interest community with silkworm farmers, to bring economic benefits to enterprises, but also bring large economic benefits to local mulberry farmers.

a-b: Sprout of mulberry leaves , March 2022
c-f: Mulberry leaves in summer, June 2022
g-i: Red clippings indicate mulberries of different ripeness

Figure 2: Mulberry in Mu Us Desert

6. Analysis on the Management Techniques of Mulberry

6.1 Shaping and Trimming

The principle of shaping and pruning of grafted fruit mulberry is to promote the growth of small trees, cultivate branch trunks, expand the crown, less sparse, more reserved, and light pruning.Choose strong branches and remove weak ones.Winter pruning. Aft that the tree shape is bred, the numb of the branches of each tree is about 25.Because of the characteristics of drought and little rain in northern Shaanxi, the growth of mulberry trees in the same year is small, so special cutting methods can only be adopted.We are testing the method of alternate rotation cutting, that is, no cutting after fruiting in June, cutting shoots in autumn to raise silkworms, cutting in spring the next year, culturing one-year branches and fruiting in the third year;Another row of mulberry trees were cut in spring, cultured for one year and fruited in the next year.The method is easier to operate than the method of cutting in rotation or cutting in rotation at intervals, and can ensure the normal growth of mulberry trees and the requirement of producing 450 kg fresh mulberry per 650 m2. Spring felling adopts non-fist cutting[19].

6.2 Mulberry Garden Fertilization Ecological Mulberry Garden soil is Poor, Mulberry Must Pay Attention to Fertilization

The fertilization period is divided into spring fertilizer and summer fertilizer. The amount of

spring fertilizer accounted for 2/3, organic fertilizer and compound fertilizer.The amount of summer fertilizer was 1/3, and the special compound fertilizer for mulberry or other quick-acting fertilizers with balanced nutrient elements were applied.The ratio of N, P and K was 10:6:8.The amount of N, P and K fertilizer applied in the mulberry field with 500 kg fresh fruit per 667 m 2 was 7.5 kg, 4.5 kg and 6 kg per year respectively.Because the growth of mulberry trees in northern Shaanxi stopped at the beginning of September, to ensure the full use of fertilizer and not to cause excessive branch growth and reduce cold resistance, summer fertilization must be carried out before mid-July[17, 20].

6.3 Pest Control

The climate in northern Shaanxi is arid, especially in spring and summer, the air is dry, and the mulberry disease is relatively light.At present, no mulberry Sclerotinia disease has been found, while mulberry pests are more serious. Sprout eating pests such as mulberry weevil, mulberry looper, Mongolian soil, nose, and scarab beetle generally occur in mulberry fields in spring.In summer, mulberry psyllid, red spider, wild silkworm and mulberry longicorn are more harmful [10].Therefore, the focus of prevention and control is on sprout eating pests in spring and mulberry psyllid and red spider in summer.Considering the damage characteristics of omnivorous pests such as Mongolian soil nose and scarab beetle, joint control with adjacent agricultural and forestry crops should be paid attention to.

6.4 Scientific Cultivation, in-Depth Research and Development of Processed Products

Breeding and popularization should select suitable mulberry varieties according to the geographical environment and climatic environment, and popularize mulberry grafting, seedling raising, and other technologies to form high-quality planting.From mulberry fruit picking and processing, logistics transportation to storage, standards and technologies should be upgraded to ensure the quality of mulberry fruit.Mulberry industry market has a large space for development[7], and the silk market developed by relying on mulberry leaves needs to maintain a strong momentum and develop steadily;With the help of mulberry branches, edible fungi can be cultivated, the development of deep processing enterprises can be strengthened, and the technology and management should be more in line with national standards, so that more mulberry processed products can enter the international market.Yulin mulberry products will be vigorously promoted to all parts of the country and even abroad[12].

7. Conclusion

Strengthen policy guidance and enhance the level of industrialization development. Mulberry industry in Mu Us Desert should be positioned as an efficient industry, ecological industry, and rich people industry, taking the development of ecological mulberry industry as an opportunity, and promoting the healthy and rapid development of mulberry industry with policy guidance.

Reasonable planning, strengthening base construction, and expanding industrial scale. Through the centralized and large-scale development of mulberry orchards, scale benefits can be formed, and the ability of mulberry production to resist market risks and natural environment pollution risks can be enhanced.Strengthen base construction, expand the industrial scale by doing a good job in the construction of high-standard new mulberry garden, low-yield mulberry garden transformation, fruit mulberry garden construction and modern agricultural demonstration park construction.

Strengthen scientific and technological innovation and enhance production capacity. According to the natural conditions, excellent fruit mulberry varieties suitable for local development were

selected. Achieve the matching of early, middle, and late varieties and prolong the harvest period. According to the requirements of producing green products, the standardized production technology of fruit mulberry was formulated and implemented.

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