Study on Botanical Characteristics of Single Plant of Prunus Mongolica

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Abstract: Prunus mongolica is a kind of deciduous shrub mainly growing in plateau desert and desert steppe of Mongolia. It plays a positive role in maintaining the water resources and grassland desertification in desert areas. From the botanical characteristics, it has rich amino acids and proteins needed by human body, and has strong medicinal value. As an ancient Mongolian Plateau relic, it is a very precious woody oil plant, listed as an endangered and class III protected plant by the state. From the perspective of research, it has high value of research, development and utilization.

1. Introduction

In recent years, the research and development of prunus mongolica has become more and more popular, and more and more enterprises have begun to explore its “edible” and “medicinal” value. However, there is no systematic elaboration on the botanical characteristics of prunus mongolica. From the perspective of botanical characteristics of single plant of prunus mongolica, it plays a positive role as a desert species in desert areas, however, disordered development and utilization will also destroy the soil for its survival. From the perspective of protection, it is necessary to have a clearer understanding of its characteristics.

2. Overview of Prunus Mongolica

Prunus mongolica is a woody plant of Rosaceae and Prunus, and it is also a species belonging to flora. According to the geographical location of their growth, prunus mongolica are mainly distributed in the Alashan Gobi Desert steppe area in Inner Mongolia, the Hexi Corridor of Gansu Province, Helan Mountain area in Ningxia Autonomous Region and Altay region of Xinjiang. As an unique species of gobi desert, prunus mongolica has drought tolerance and water system maintenance. It can be used as an important plant for soil and water conservation in arid areas. Both its medicinal characteristics and the importance of desert protection and improvement reflect its ecological and economic value as an economic plant. Prunus mongolica is one of the important woody oil tree species.

In recent years, due to the destruction of human commercial activities, the number of natural populations of prunus mongolica in many areas has been sharply reduced, which is extremely unfavorable for the development of single plant growth of prunus mongolica. Therefore, in 1991, prunus mongolica was classified as vulnerable (VU) and listed in the China Plant Red Data Book (Vol I). In 2004, it was listed in the Red List of Chinese Species (Plant Part), and was recognized as a class III protected plant by the state.

3. Analysis of Botanical Characteristics

Prunus mongolica is light loving and drought tolerant, can be said to be very light tolerant. It can tolerate ground temperature of 55 ℃ and 42 ℃ in summer. It grows poorly in the shade and bears no fruit. Prunus mongolica has strong drought resistance and has physiological function of shrinking leaf surface, which can reduce leaf transpiration, so it is very suitable for growth in arid

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areas. The experimental results showed that when the water content of sand layer was 1% - 2% and the depth was less than 6 m, the prunus mongolica could grow normally, and it could grow normally on sandy brown soil with annual precipitation less than 100 mm and annual evaporation more than 3 000 mm. In addition, prunus mongolica has strong low-temperature resistance. In Inner Mongolia, the average annual temperature is 3 ℃ and the minimum temperature can reach -33 ℃ to -45 ℃, it can still grow well. Meanwhile, it has outstanding ability to resist strong wind. According to statistics, it can resist 7-9 days and 80-100 days for many years. Even under the condition of wind speed exceeding 5m / s, prunus mongolica can still grow well. Similarly, prunus mongolica has resistance to poor conditions. In the area where prunus mongolica grows, it is found that its root system is particularly developed, which can easily absorb groundwater and nutrients. Its living and breeding environment is very poor, including barren loess hilly areas, sandy loess and gravel, and even granite, limestone mountains and so on. In addition, the growth and development of prunus mongolica is inhibited to a certain extent under the condition of high temperature and high humidity, and it is easy to be infected with diseases. In particular, it should be noted that prunus mongolica has salt and alkalinity tolerance, can normally grow in the soil with salt content of 0.11% - 0.13%, and can normally grow in the soil with pH value greater than 9, and blossom and reproduce [1].

3.1 Biological Characteristics

It was found that the crude protein content of prunus mongolica seeds is 26.77 ‰ and there are 18 kinds of amino acids in prunus mongolica seeds. The proportion of essential amino acids in these amino acids is suitable, and the degree of closeness to human protein is 0.876, so it has high nutritional value. At the same time, the seed vigor of prunus mongolica decreased under drought stress, which is one of the reasons for its endangerment. This is because the seedlings of prunus mongolica under drought stress have obvious osmotic adjustment ability, and the main osmotic adjustment substances are proline and soluble sugar, while some potassium and sodium ions are not obvious. In addition, the free radical scavenging ability and oxygen tolerance of prunus mongolica seedlings are improved, and membrane lipid peroxidation and membrane damage are also observed. Drought stress is one of the main environmental factors causing the endangered prunus mongolica.

3.2 Botanical Value

Prunus mongolica is a forage plant for sheep in desert grassland, mountain and sandy land. Goats and sheep feed on its shoots, leaves and flowers. In the absence of herbaceous plants, its advantage lies in meeting the poor palatability years of goats. Wula Mountain, Langshan Mountain, Qianli Mountain, Helan Mountain and Yabulai Mountain in Inner Mongolia are the concentrated distribution areas of prunus mongolica and also are the production bases of famous white cashmere goats such as Albas white goat, Erlangshan white goat and Alashan white goat. The breeding of these goats may be related to the composition of local forage. Prunus mongolica is rich in nitrogen-free extract, with high ash content, medium protein content and low content of nine essential amino acids. Compared with the middle and low-grade forage grass, it is found that after drought stress, the activities of SOD and AA of prunus mongolica were better than those of middle and low grade forages.

3.3 Medicinal Value

Prunus mongolica usually ripens in summer every year, then the flesh and kernel shell are cleaned, and the kernel is removed and dried. It is found in relevant literature research that the dried seed kernel contains fatty oil and a small amount of amygdalin. From the perspective of traditional Chinese medicine, its taste is pungent, dry and bitter, can be used as medicine and has a certain effect on chronic constipation, ascites, beriberi, edema and other diseases. At the same time, the oil

content of prunus mongolica kernel is high, reaching 40%, which can not only be used for food, but also for industry [2].

4. Analysis of Chemical Constituents in Seeds of Prunus Mongolica

4.1 Content Analysis of Crude Protein and Amino Acid in Prunus Mongolica Seeds

Protein is essential to living beings, and it is also one of the three major molecules of living beings. It also plays an active role and has important value in the process of seed ripening and germination of prunus mongolica. The seeds of prunus mongolica were determined by micro Kjeldahl method according to relevant literature. The result showed that the crude protein content of prunus mongolica seeds was 25.55%. The total protein content of prunus mongolica seeds determined by amino acid automatic analyzer was 26%, and the coefficient of variation was 1.22%. 18 kinds of amino acids were also detected. The total amount of amino acids accounted for 96% of the total crude protein. Among them, essential amino acids accounted for 31.55% of the total amino acids, and non-essential amino acids accounted for 68.59% of the total amino acids, while the ratio of the two was 0.448. The ratio of essential amino acids to total amino acids was 0.315. Aspartic acid, glutamic acid and arginine were the most abundant amino acids in prunus mongolica, however, tryptophan was relatively low [3].

4.2 Analysis of Fatty Acid Composition of Prunus Mongolica Kernel

For plants, the carbon chain length and saturation of fatty acids in plant oil determine one of the key indicators for its quality. According to the fatty acid composition of prunus mongolica seed oil, there are not many kinds of fatty acids, which basically contain even number of carbon atoms, and the content of unsaturated fatty acids is as high as 97%. The content of oleic fatty acids accounts for 65.55% of the total fatty acids, followed by linoleic acid, accounting for 31.44%. The content of saturated fatty acids is low, accounting for 3.01% of the total oil, of which palmitic acid content was 2.39% and stearic acid content was 0.64% (Table 1).

Table 1 Composition of Fatty Acids in Prunus Mongolica Seeds

Composition of Fatty Acids	Fatty Acid Labeling	Melting Point/℃	Content/g·100g $^{-1}$
Palmitic Acid	16∶0	63.1	2.39 ±0.2
Stearic Acid	18∶0	69.6	0.64 ±0.2
Oleic Acid	18∶1(9)	14.0 ~16.0	65.55 ±3.1
Linoleic Acid	18∶2(9,12)	-5.0	31.44 ±1.7

5. Research Value of Prunus Mongolica

Under the situation of China's western development and ecological construction of returning farmland to forest and grassland, prunus mongolica, as a native tree species in arid and sandy areas, is one of the earliest afforestation species for sand control and prevention in China. In recent years, a 3.0103hm2 prunus mongolica shrub forest has been found in the Tengger Desert of Wugesu County, Alxa Left Banner, Inner Mongolia. It is estimated that there are more than 300000 species of prunus mongolica. This fully shows that if the protection measures are appropriate, prunus mongolica can be used as a plant to control the desert and prevent soil erosion. Prunus mongolica is an ancient relic plant of Mongolian Plateau, which has important academic research value for Flora of Central Asia arid region. Mature prunus mongolica is an excellent biological fence plant, can be used to establish grazing prohibition areas and fence protection projects in desert and grassland areas with bad ecological environment. It has a good application prospect. Due to the deterioration of ecological environment, heavy sandstorm in flowering period, difficulty in natural reproduction, low seedling emergence rate, high mortality rate, difficulty in natural regeneration, serious feeding of livestock and felling of firewood, the annual population of prunus mongolica decreased sharply,

and the distribution range in Mongolia became narrower and narrower. It is listed as an endangered plant in both the China Plant Red Data Book and the Mongolian Plant Red Book, and is determined as a national class III protected plant by the State Environmental Protection Agency [4].

From the current situation and development prospects of prunus mongolica, it has a high research value. If it is better protected, it is related to the stability of its botanical value.

6. Conclusion

From the botanical characteristics of single plant of prunus mongolica, it has better cold resistance and drought resistance with rich protein amino acids, especially the content of essential amino acids is higher. It has good edible and medicinal value, but with the destruction and influence of human activities, prunus mongolica also has a more complex growth environment, which needs to be paid attention to and better protected by effective measures.

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