Microbiological Diversity Analysis of Mildew Liubao Tea

Rui Ma

Guangxi Vocational & Technical College, Nanning, Guangxi, 530226, China

313444924@qq.com

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Abstract: Liubao tea has a long history and is one of 24 famous teas in China because of its unique betel nut flavor. With the upsurge of black tea consumption, the output and export volume of Liubao tea are increasing rapidly, and the quality is also paid more attention to. Aluminum mainly exists in nature in the form of alumina or insoluble silicate, which is a rich metal element in the crust, which is generally harmless to plants, but under acidic conditions, the output and export of Liubao tea are increasing rapidly, and the quality of Liubao tea is also paid more attention to. Aluminum mainly exists in nature in the form of alumina or insoluble silicate, and some fixed forms of aluminum will be activated to soluble aluminum into the soil, which will be toxic to some plants. Tea is a typical polyaluminum plant. Tea originated in the warm and humid area of southwest China, because of the long adaptation choice in the origin, so that it likes warm and humid environment and not very cold, so it faces the problem of safe overwintering in the process of tea cultivation and promotion. Most of the raw materials of Liubao tea are processed by Liubao tea processing technology, but there are few studies on the original species of Liubao tea (Liubao group), which originated from Liubao Town and its vicinity in Cangwu County, Guangxi. In this study, the quality of Liubao tea group was studied under aluminum and low temperature stress, which provided scientific basis for the breeding of good seedlings and the production of pure Liubao tea..

1. Materials and Methods

1.1. Plant Materials

From the state-owned Tianhongling Forest Farm in Cangwu County, Guangxi, Liubao tea seedlings were planted in Liubao town and nearby area.

1.2. Hydroponic Treatment

The root soil of the tested tea seedlings was washed with clean water and placed in a bucket ,11 plants per barrel, and 1 L 1/2Hoagland nutrient solution was added to the bucket, and the nutrient solution was replaced every 7 d. After 1 month of hydroponics, the tea seedlings grew new leaves, that is, aluminum and low temperature stress treatment, as shown in Fig .1.

Figure 1 Six fort tea

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The tea seedlings were cultured in aluminum-containing nutrient solution with different aluminum concentrations. Al2(so4)3 was added to the 1/2 Hoagland nutrient solution to regulate aluminum concentrations of 0(control),50,100,200,400 mg/L,3 replicates (barrels) per treatment. room temperature, aluminum stress treatment for 1 month, every 7 d to replace the nutrient solution.

Under low temperature stress in a full photo incubator, temperatures were set to 5,15,25℃ (control), Hydroponics, 3 replicates (drums) per treatment. During the duress, From 7:00 to 19:00, Illuminance level 7(7) 500 lx or more), Processing time is 1 month, Change the nutrient solution once every 7 d.

1.3. Sample Determination

Two ~ and three new leaves and buds from the top of tea shoots were collected and stored in 4℃ refrigerators after 1 month of treatment.

determination of dry matter content with reference to GB/T 8303-2013, drying method, determination of tea polyphenol content by forlin phenol method; determination of free amino acid content with reference to GB/T 8314-2013, ketamine colorimetric method; extraction of tea polysaccharide with reference to literature, determination of tea polysaccharide content by anthrone sulfuric acid method; determination of water extract content with reference to GB/T 8305-2013, sample boiling, decompression filtration, drying.

1.4. Statistics

Using Excel and SPSS 22.0 statistical software for data analysis and mapping.

2. Results and Analysis

2.1. Effect of Aluminum on Tea Quality of Liubao Tea

The effect of aluminum concentration on the dry matter content of liubao tea was small, and there was no significant difference between the treatments (P=0.833). however, it can be seen from different aluminum concentrations that the dry matter content of tea (0.97%) was slightly higher than other treatments when the aluminum concentration was 100 mg/L (figure 1), while the lowest (0.96%) when the aluminum concentration was 200 mg/L.

The effect of aluminum concentration on the content of free amino acids in Liubao tea is small. and there was no significant difference between the treatments (P=0.184). It can be seen from the content of free amino acids in tea treated with different aluminum concentration, At 1.70%~2.05%, the content of free amino acids was changed in Liubao tea. the content increases first and then decreases with the increase of aluminum concentration. Compared with the control (1.70%), the content of free amino acids in each aluminum treated tea seedling increased by 5.29%(50 mg/L, respectively 1.79%,20.59%(100 mg/L,) 2.05%,15.88%(200 mg/L,) 1.97%,5.88%(400 mg/L,) 1.80%), and the content of free amino acids treated with 100 mg/L was the highest. The proper aluminum treatment can promote the free amino acid content of tea seedling, concentration of 100 mg/L is more obvious.

Figure 2 Six fort tea

Aluminum concentration can significantly affect the content of tea polyphenols (P<0.01), At 17.20%~20.31%, the content increased first and then decreased with the increase of aluminum concentration (figure 3). When the aluminum concentration increased from mg/L 0 to 200, There was a significant increase in tea polyphenols, 8.12%(50 mg/L,) higher than control (18.60%) 20.11%,9.19%(100 mg/L,) 20.31 per cent and 7.90 per cent (200 mg/L,) 20.07%), at 100 mg/L tea polyphenols content is the highest. The content mg/L tea polyphenols (17.20%) was 7.53% lower than that of P<(0.05). also significantly lower than other aluminum treatments (P<0.01). The results showed that adding proper amount of aluminum could promote the increase of tea polyphenols in Liubao tea. at a concentration of 100 mg/L is more obvious.

The content of polysaccharide in Liubao tea was significantly affected by the concentration of aluminum (P<0.01). The content of polysaccharide changed at 0.98%~1.27%. The tea polysaccharide content of 100 mg/L aluminum treatment was significantly higher than that of other treatment (P<0.01), the content reached the highest (1.27%),29.59% higher than that of control (0.98%). All the results showed that adding proper amount of aluminum could increase the content of tea polysaccharide in Liubao tea, and the concentration was 100 mg/L.

Al concentration had no significant difference on the content of Liubao tea extract (P=0.129). The content of water extract increased first and then decreased with the increase of aluminum concentration. a variation of 15.52%~26.40%(Figure 5). (0 mg/L,) 18.13 per cent) 20.41%(50 mg/L,, respectively, was increased in water immersion 21.83%,45.62%(100 mg/L,) 26.40%,29.78%(200 mg/L,) 23.53%), However, when the concentration of aluminum was 400 mg/L, the content of water extract (15.52%) was 14.40% lower than that of the control. Although there are no significant differences between treatments, But figure 5 shows, Adding proper amount of aluminum can promote the content of water extract of Liubao tea, at a concentration of 100 mg/L is more obvious.

2.2. Effect of Low Temperature on Tea Quality of Liubao Tea

the effect of temperature on the dry matter content of liubao tea was small, and there was no significant difference in each treatment (P=0.729). however, it can be seen from different temperature treatment that the dry matter content of tea (0.96%) was slightly lower than that of other treatments at 5℃(figure 6).

However, there was no significant difference in the content of free amino acids between temperature treatments (P=0.189), But the content of free amino acids increased first and then decreased with the increase of temperature. a variation of 1.70%~1.93%(Figure 7). The content of free amino acids in tea treated with 5℃(1.76%) and 15℃(1.93%) was 25℃(control). 1.70%) increased by 3.53% and 13.53% respectively. The content of free amino acids in the tea of Liubao tea increased at low temperature. 15℃ Treatment is more pronounced.

Temperature can obviously affect the content of tea polyphenols in tea seedlings (P<0.05), and the content of tea polyphenols in Liubao tea was 16.71%~18.78%(Fig .8). 15℃ Treatment of tea polyphenols (18.78%) than control (25℃, 18.60%) increased by 0.97%, The content ℃ tea polyphenols (16.71%) was 10.16% lower than that of control (P<0.01). but the content of tea polyphenols treated with control and 15℃ was not different. At 5℃, the tea seedlings of Liubao grow, tea polyphenols content will decrease.

Although the temperature did not significantly affect the tea polysaccharide content of tea seedlings (P=0.263), the tea polysaccharide content of Liubao tea treated at different temperatures can be seen, and the tea polysaccharide content of tea increased slightly with the decrease of temperature. the content of tea polysaccharide increased by 16.33% and 12.24% over the control (25℃,0.98%) at 5℃(1.14%) and 15℃(1.10%), respectively. the lower temperature can increase the polysaccharide content of liubao tea tea to some extent.

A low temperature had a significant effect on the content of water extract (P<0.01), flooding content was 18.13%~35.11%. And control (25℃, 18.13 per cent) The contents of water extract

increased significantly ℃93.66% and 36.73% at 5(35.11%) and 15(24.79%), respectively. The content of water extract ℃ treated was also significantly higher than 15℃($P<0.01$). This indicated that the low temperature promoted the water extract content of Liubao tea, more obvious with 5℃ treatment.

Figure 2 Six fort tea

3. Summary and Discussion

Aluminum is not an essential element of plants, and plant growth and development and physiological and biochemical characteristics are closely related to aluminum [4]. Overall, when the concentration of aluminum treatment was 50~200 mg/L, the free amino acid content, tea polyphenol content, tea polysaccharide content and water extract content of Liubao tea were increased to some extent compared with that of no aluminum (control), indicating that proper amount of aluminum promoted the quality of Liubao tea. The content of free amino acid, tea polyphenol, tea polysaccharide and water extract all reached the maximum when the concentration of aluminum treatment was 100 mg/L, which indicated that aluminum promoted the quality of Liubao tea at 100 mg/L, and further explained the aluminum resistance of Liubao tea. the reason may be that proper amount of aluminum can promote chlorophyll synthesis, enhance the ability to assimilate to CO2, improve the photosynthesis of tea seedlings, accumulate more carbohydrates (including tea polysaccharides), and provide carbon sources and energy that can synthesize amino acids and tea polyphenols, so that the content of free amino acids and tea polyphenols in tea leaves can be increased.

The contents of dry matter, free amino acids, tea polyphenols, tea polysaccharides and water extracts of hydroponic Liubao tea grown at different aluminum concentrations and temperatures were determined in this study. Under different concentration of aluminum or low temperature treatment, the quality of Liubao tea has changed to a certain extent. The results of the study have some reference significance for the quality evaluation, breeding and introduction of Liubao tea.

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