

Research Status of Seabuckthorn Fermented Beverage

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Abstract

Hippophae rhamnoides is a kind of plant with rich nutrition and high medicinal value. It is mainly produced in Xinjiang province of China and has a large market. At present, many kinds of seabuckthorn fermented drinks have been developed, such as light fermented seabuckthorn juice, seabuckthorn fermented yoghurt, seabuckthorn fermented compound beverage, seabuckthorn fruit tea, green food Seabuckthorn soy sauce, seabuckthorn acetic acid beverage and other drinks. In this paper, the current situation of seabuckthorn fermented drinks in China market is briefly summarized and analyzed.

Keywords

Seabuckthorn, fermentation, development status, beverage.

1. INTRODUCTION

Hippophae rhamnoides is a kind of deciduous shrub in Elaeagnus family, which is also known as vinegar willow and acid thorn {1}. Seabuckthorn fruit is rich in nutrition, with vitamin C content of (800-1000) mg / 100g, which is three times of kiwifruit, 20 times of tomato and 200 times of grape. Therefore, it is called the king of vitamin C. In addition, seabuckthorn also has a unique medicinal value. Its roots, stems, leaves, flowers, fruits and seeds can be used as medicine, which can be used to treat burns, scalds, heart diseases, cardiovascular diseases, etc. Seabuckthorn was listed in Pharmacopoeia of the people's Republic of China in 1977 as a traditional Chinese medicine by the Ministry of health, and was listed as one of the homologous plants of medicine and food in 1987. Seabuckthorn is known as the third generation fruit in the world {2}. It is rich in nutrition and can be processed into various high-level drinks and nutritious health food. In recent years, the research and development of seabuckthorn products are becoming more and more hot at home and abroad, and its nutritional value and nutritional value are more and more recognized and accepted by the public.

China is the country with the most seabuckthorn resources in the world, mainly distributed in North China, northeast and Northwest China, among which Inner Mongolia and Shanxi are the most {3}. Because of the sour taste and poor taste of seabuckthorn, it is difficult for people to accept the direct consumption of seabuckthorn, so the economic benefits of seabuckthorn farmers are not very good, and a large number of seabuckthorn are wasted every year, and the development of seabuckthorn fermented drinks can promote the development of local economic, ecological, industrial and other benefits, and conform to the current consumption trend of healthy diet.

2. METHODOLOGY

2.1. Low Temperature Fermentation Technology to Produce Seabuckthorn Juice Yoghurt

Liu Chen {4} explored the best conditions for producing low temperature and long-term fermentation of seabuckthorn yoghurt by mixed fermentation of two kinds of fermentation bacteria, *Streptococcus lactis* and *Lactobacillus bulgaricus*, with fermentation temperature of 33 °C and fermentation time of 8h. Through the fermentation of seabuckthorn yoghurt at high temperature and short time and fermentation at low temperature and long time, the fermentation process, post ripening stage and 4 °C cold storage process were carried out. By comparing the quality of Chinese yogurt with various active ingredients, it can be determined that the quality of low-temperature and long-term fermentation of seabuckthorn yogurt is better, and the active ingredients of seabuckthorn can be well preserved.

The nutritional value of *Hippophae rhamnoides* juice is high and it contains many kinds of active components. The total phenol content is 7.51mg/ml. Through the low temperature fermentation process, the total phenol content of *Hippophae rhamnoides* yogurt increased to 8.52mg/ml, and the total phenol content of low temperature *Hippophae rhamnoides* yogurt decreased from 9.48mg/ml at the end of fermentation to 8.31mg/ml, 12% less. High temperature Seabuckthorn yoghurt decreased from 7.88mg/ml at the end of fermentation to 6.22mg/ml, decreased by 21%, indicating that low temperature Seabuckthorn yoghurt can better retain the active ingredients of seabuckthorn juice under the same storage conditions. Therefore, the effect of fermentation conditions on the active components of seabuckthorn yoghurt is greater, and the low temperature is significantly higher than the high temperature fermentation. At the same time, it also provides a new guidance method for low temperature technology in the production of seabuckthorn yoghurt.

2.2. Production of Seabuckthorn Juice by Light Fermentation

Sun Qiankun {5} and others explored a new type of light fermented beverage based on Seabuckthorn. They determined the fermentation time by measuring the alcohol content, and determined the best mixing combination and stabilizer combination by orthogonal test and sensory evaluation. The results showed that the fermentation time of seabuckthorn juice was 24 hours at 28 °C;

Mildly fermented fruit juice beverage, with an alcohol content of 0.5% ~ 1% vol, has a softer and refreshing taste, richer nutrition, bright color, rich fruit flavor and unique flavor. In foreign countries, mildly fermented fruit juice is gradually replacing the traditional pressed fruit juice, which is the general trend of the future development of the beverage industry. The selection of raw materials and the creation of technology for mildly fermented seabuckthorn fruit juice. In addition, *Hippophae rhamnoides* has good ecological benefits in soil and water conservation, wind and sand fixation, soil improvement and other aspects, and has a broad market prospect. Low alcohol juice fermented beverage has the advantages of very low alcohol accuracy, high nutritional value and unique style, which is in line with the current concept of people's pursuit of health and green. At present, in the domestic market, this kind of beverage is still in its infancy, but it will become a trend of the future development of the beverage industry.

2.3. Preparation of New Seabuckthorn Wine by Compound Microorganism Fermentation

Xu Min {6} used the method of biological acid reduction and the fermentation method of lactic acid bacteria combined with yeast to overcome the shortcomings of traditional fruit wine, such as long fermentation time, difficult to control fermentation and poor flavor, and prepared a new type of seabuckthorn wine suitable for public drinking. Single factor and orthogonal experiments were used to study the effects of the amount of bacteria (*Lactobacillus* / yeast), fermentation temperature and fermentation time on the quality of seabuckthorn wine. In the

process of fruit wine brewing, the adjustment of acidity is very important. Proper organic acid can balance the bitterness of the wine and make the wine mellow and refreshing. However, if the content of organic acid is too high, the wine will be sour and rough. How to reduce the acidity of fruit wine and improve the flavor of fruit wine is a key research content in fruit wine brewing. Therefore, they optimized and improved the production process of traditional Seabuckthorn wine from the aspects of the proportion of inoculated bacteria, fermentation temperature and fermentation time, and developed a new Seabuckthorn wine which is mellow and delicious, uniform in organization, suitable for industrial production and public drinking.

In this study, the method of biological acid reduction and the fermentation method of lactic acid bacteria combined with yeast were used to overcome the shortcomings of traditional fruit wine, such as long fermentation time, difficult to control fermentation and poor flavor. When the proportion of inoculated bacteria (*Lactobacillus* / yeast) is 3%: 5%, the fermentation temperature is 30 °C, the fermentation time is 96h, the sensory score of seabuckthorn wine is the highest, the alcohol degree is 11.90% vol, the acidity is 59 °T, the color is milky yellow, the organization is uniform, the taste is mellow and the smell is fragrant.

2.4. Study on the Production of Fruit Acid by Seabuckthorn Fermentation

Zhang yuepeng {7} used mature seabuckthorn fruit as raw material, which was produced by enzymatic hydrolysis reaction, biological fermentation reaction, flocculation technology, membrane filtration technology, etc. Among them, biological fermentation is a process of making full use of the sugars in the fruit mud to produce organic acids by *Aspergillus niger* and other microorganisms. Through the experiment of the effect of biological fermentation on the production of acid, the suitable strains and the best combination of technological conditions were determined, and a kind of product with wide application prospect was developed.

Seabuckthorn fruit acid is extracted from natural wild seabuckthorn fruit by advanced production technology. The content of natural organic acids in seabuckthorn fruit can reach 3.2% ~ 4.5%, the most important of which are malic acid, citric acid, ascorbic acid and tartaric acid, and malic acid content accounts for more than 60% of the organic acid content. Seabuckthorn fruit acid is characterized by rich nutrients needed by human body, good water solubility, easy to be absorbed by human body, making full use of sugar substances in seabuckthorn fruit mud to produce organic acids. It can be widely used in the production of fruit juice candy and snacks, as well as the preservation and storage of canned meat food. It has a broad application prospect in the fields of food, medicine, health products and cosmetics.

Their research results show that the effects of strain dosage, fermentation temperature and fermentation time on acid production are significantly higher than those of empty column, indicating that these three factors have significant effects on acid production, which can not be ignored. The amount of organic acid in the fermentation broth reached 6.21% when the amount of bacteria was 0.05%, the fermentation temperature was 45 °C, and the fermentation time was 120 min. These provide valuable data for future research.

2.5. Study on the Compound Fruit Vinegar of Seabuckthorn and Tomato

Fruit vinegar is a kind of sour condiment with rich nutrition and good flavor, which is brewed with fruits and vegetables or the leftovers of fruits and vegetables processing as the main raw materials and modern biotechnology. It has the function of nutrition and health care of fruit and vinegar. It is a new type of drink that integrates nutrition, health care, dietotherapy and other functions. Research shows that fruit vinegar has many functions, and drinking fruit vinegar is good for human health. If we can make use of many kinds of fruits and vegetables and make them into compound fruit vinegar, we can make the nutrition of fruit vinegar more abundant. Compound fruit vinegar also has a broader market prospect.

Li Qiu {8}and others from Jiangnan University studied the solid-liquid fermentation of seabuckthorn vinegar. The technological parameters of solid-liquid fermentation of seabuckthorn fruit vinegar were determined, and its components were analyzed. Yang Ying and others have done some research on the strain selection of Acetobacter. The fruit vinegar beverage is rich in nutrition, and the compound fruit vinegar beverage of seabuckthorn and tomato will integrate the advantages of both, which is more nutritious than the fruit vinegar brewed from one kind of fruit. If Seabuckthorn and tomato are made into compound fruit vinegar, the new fruit vinegar can have new flavor, rich nutrition and higher market value. The functions of tomato and seabuckthorn can be complementary and enhanced, which can significantly promote human metabolism, improve blood circulation, antioxidant, enhance human immunity and prevent diseases. Among them, the beneficial ingredients have the protective effect on human organs, as well as the effect of anti-aging, beauty and skin care. The method of liquid fermentation was used to produce compound fruit vinegar. The process of alcohol fermentation and acetic acid fermentation was optimized by single factor experiment and orthogonal experiment, and the optimal fermentation conditions were determined. That is to say, the fermentation temperature is 30 °C, the initial pH is 3.9, and the initial sugar degree is 19 ° BX. The initial alcohol fermentation accuracy was 6%, the inoculation amount of Acetobacter was 9%, and the initial pH was 5.5.

3. RESULTS AND DISCUSSION

In recent years, the consumption of seabuckthorn drinks in China has increased dramatically. More and more people are willing to serve Seabuckthorn drinks with mellow taste on the table, and their health preservation value is more and more valued by consumers. Hippophae rhamnoides drinks are constantly rich in variety, which can meet more nutritional and health needs, but also give consumers more choices. The research technology of seabuckthorn fruit wine is maturing day by day, and seabuckthorn fruit vinegar is also being developed step by step. However, the research on Seabuckthorn fermented milk drinks, seabuckthorn tea and other Seabuckthorn drinks needs to be further deepened, so as to make Seabuckthorn give full play to the health care effect, eating effect, and meet people's leisure and health needs.

ACKNOWLEDGMENTS

Special name: Special project on key generic technologies of agricultural high-quality development

Project name: Development and application of high-value processing technology of seabuckthorn resources and functional food

Project number:19223002D

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