

## Nutritional Health Function of Pomegranate and Its Food Processing Technology

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**Abstract:** Pomegranate is a pomegranate of the pomegranate family. It is distributed throughout China and has a wide range of therapeutic effects. Based on this, the article analyzes the nutritional health function of pomegranate and its food processing technology. Based on a brief summary of the development and utilization of pomegranate, the article analyzes the nutritional health function of pomegranate. Taking pomegranate wine processing as an example, the food processing technology was analyzed to provide reference for pomegranate food processing.

### 1. Introduction

The route that pomegranate was introduced into China was probably from Central Asia, first to Xinjiang, Han Dynasty to Shaanxi, and then from Shaanxi to all parts of the country [1]. Others believe that pomegranates are transmitted from Iran to India, and then from India to Tibet, and then to the northwest, and then to the whole country. At present, it is distributed in all parts of the north and south of China except the extremely cold regions [2]. The national pomegranate planting ranks first in the world, mainly in Shaanxi, Anhui, Shandong, Sichuan, Xinjiang, Henan, Yunnan and other places. There are many varieties available, which are divided into two categories: ornamental and edible. The edible pomegranate is divided into sour pomegranate and sweet pomegranate. Among them, Shaanxi has hit the sky red egg pomegranate, Anhui Huaiyuan powdered pomegranate and jade seed pomegranate, Sichuan Huili soft seed pomegranate, Yunnan Mengzi large pomegranate and Xinjiang Yecheng big pomegranate. . Pomegranate has been cultivated in China for more than 2,000 years. With the change of history, pomegranate resources have been destroyed many times, but the cultivation and utilization technology of pomegranate has been in constant development in China, in Shaanxi, Shandong, Yunnan, Sichuan, Anhui. In other places, many excellent varieties were selected and many ecological varieties were formed.

### 2. Pomegranate Nutrition and Health Function

Pomegranate is known as “the world's fruit, Kyushu fruit”, its fruit is rich in carbohydrates, protein, various amino acids and trace elements and various vitamins necessary for the human body [3]. The edible part of pomegranate accounts for about 15% to 40%, and the water content is about 78.2%. When it is immature, the amount of sucrose is more [4]. When it matures, the amount of invert sugar increases, and the total sugar content is 11% to 16.8%. Pomegranate contains malic acid and tannic acid. The sour taste varies with the variety and fruit maturity [5]. The general content is 0.4% to 1.0%, with an average of 0.77%. Pomegranate is rich in vitamins and minerals. Each 100g of juice contains 0.01mg of carotene, VB 10.04mg, VB 20.09mg, Vpp1.7mg, VC4.6~11mg, calcium 11~13mg, phosphorus 11~16mg, iron 0.4. ~1.6mg, and rich in potassium, copper, manganese, zinc and so on. It also contains 0.6% to 1.5% protein and 0.6% to 1.6% fat, and 2.7% crude fiber. Pomegranate is a treasure, the chemical composition of which is different in different parts. The distribution of flavonoids, tannins, alkaloids, organic acids and special structures of polyphenols in juice, peel, leaves and bark are different; Pomegranate seeds and other parts contain quinones, phospholipids, triglycerides and other ingredients.

Pomegranate and its products contain high levels of antioxidants that delay aging, prevent heart disease and slow the progression of cancer [6]. The roots, leaves, flowers, fruits, peels and seeds of pomegranate can be used as medicine. Recent studies have also found that pomegranate leaf water infusion has a strong lipid-lowering and antioxidant capacity. Pomegranate peel and pomegranate slag have certain anti-oxidation effects in addition to their medicinal functions. They contain various chemical components, and flavonoids are one of the more important compounds [7]. In recent years, it has been found that flavonoids have anti-cancer and anti-cancer effects; they have strong anti-oxidation effects, can prevent or delay the oxidation reaction of foods, cause rancidity and deterioration of feed, etc., can prevent lipid peroxidation in the body [8]; It treats cardiovascular and vascular diseases, blood lipids and other medicinal health functions [9]. The latest research shows that pomegranate contains estrogen and is effective for diseases such as female climacteric syndrome and osteoporosis [10].

### **3. Pomegranate Food Processing Technology**

#### **3.1. Materials and instruments**

Test materials: sweet pomegranate, acid pomegranate.

Test species: *Saccharomyces cerevisiae* B184, brewer's yeast, wine yeast Y3324 and BM45, brewing active dry yeast.

Wort agar medium: Baume 5-6 wort, pH about 6.4, 2% agar was added, and sterilized at 121 degrees for 20 minutes.

#### **3.2. Processing technology**

Determination of the basic nutrients of pomegranate juice: peeling the sweet pomegranate and acid pomegranate, pressing with a press, and then measuring the soluble solids, total sugar, reducing sugar, total acid and tannin content in sweet pomegranate juice and acid pomegranate juice .

Selection of Pomegranate Fermented Wine Yeast: *Saccharomyces cerevisiae* B184, *Saccharomyces Cerevisiae*, Wine Yeast Y3324 and BM45, Brewing Active Dry Yeast, activated by 25°C wort agar medium, and expanded for 48 hours in pomegranate juice at 25°C. The blood cell count plate counted the yeast concentration to be 108 cells/min. Then, the expanded culture solution of the yeast was added to the pomegranate juice by the addition amount of 3% by volume, and placed in a 25 ° C constant temperature incubator for main fermentation. The change in the alcohol content and soluble solid content of the pomegranate fermented wine was measured daily. After the end of the fermentation, the five kinds of yeast-fermented pomegranate wines were subjected to sensory evaluation.

The selected pomegranate fermented wine yeast was activated at 25 ° C in a wort agar medium, and then expanded in pomegranate juice. After the sweet pomegranate is peeled and pressed, it is divided into three equal parts, and 40% of the SO<sub>2</sub> is added to the fermented wine yeast culture solution, and placed in a 25 ° C constant temperature incubator for main fermentation. The change of alcohol content, soluble solids and reducing sugar content in pomegranate fermented wine was measured daily.

After peeling the sweet pomegranate, it is pressed into 4 parts of equal amount, and 40 mg/L of sulfur dioxide is added. According to the above analysis results, the same amount of yeast culture solution is added, and the conditions are respectively performed at room temperature, 25 ° C and 30 ° C. Main fermentation, daily determination of soluble solids, reducing sugar content and alcohol content in pomegranate fermented wine. After the fermentation, the alcohol content, soluble solids, reducing sugar, methanol and fusel oil content of the pomegranate wine were determined.

Both the sweet pomegranate and the acid pomegranate are peeled and pressed with a press. According to the results of the above test, an appropriate amount of sulfur dioxide was added to the sweet and sour pomegranate juice, and then the same amount of yeast culture solution was added, and the mixture was placed in a 25 ° C constant temperature incubator for fermentation. Changes in soluble solids content and alcohol content were measured daily. After the fermentation, the content

of the wine, color, soluble solids, methanol, fusel oil and acetic acid of the pomegranate wine were determined.

The sweet pomegranate raw wine after the main fermentation is placed at 10 °C, 15 °C and 20 °C, and then fermented in the dark. The alcohol content and soluble solid content are measured every 5 days to obtain the soluble solid content. No longer falling and the alcohol no longer rises to the end of post-fermentation. After the post-fermentation, the light transmittance, color and total acid content of the pomegranate wine were determined, and the sensory evaluation was carried out to select the optimum post-fermentation temperature and time.

### 3.3. Process results analysis

The basic nutrient composition of pomegranate juice. After extracting sweet pomegranate and sour pomegranate, the basic nutrients were measured as shown in Table 1.

Table 1 Pomegranate nutrients

Raw material	SSC(%)	Total sugar	Reducing sugar	Acid value	Tannic acid
Pomegranate	15	14.49	12.71	0.51	0.24
Sour pomegranate	14	13.47	11.24	4.23	0.23

The brewing process of fruit wine is the process in which the sugar in the juice is converted into alcohol by the use of microorganisms, that is, as the content of soluble solids decreases, the degree of alcohol gradually increases. This experiment uses *Saccharomyces cerevisiae* B184, brewer's yeast, wine yeast Y3324 and BM45, brewing active dry yeast, activated by wort agar medium and expanded culture of pomegranate juice, then fermented into pressed pomegranate juice, and its alcohol content is measured daily. And changes in soluble solids content. The sensory scores of pomegranate wine fermented by different yeasts are shown in Fig.1. Pomegranate wine brewed with wine yeast BM45 is very sensory, so wine yeast BM45 is selected as the yeast for fermenting pomegranate wine. When the amount of wine yeast added is 3%, the degree of alcohol produced is the highest. When the amount added is increased to 5%, the degree of alcohol produced is decreased. This is because during the fermentation process of fruit wine, as the amount of yeast added increases, the fermentation speed increases accordingly, and the amount of alcohol produced also increases, mainly due to the increased reproduction of yeast, and the ability to convert sugar in juice into alcohol. However, when the amount of yeast added is increased to a certain extent, the amount of yeast added is further increased, and although the fermentation speed is increased, the produced alcohol is not high.

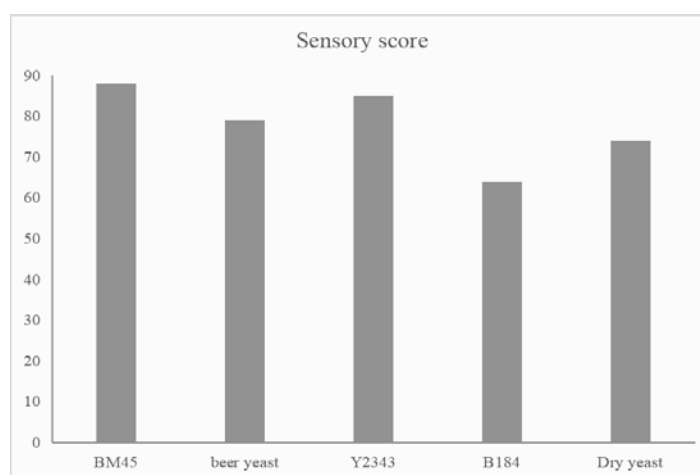


Fig.1. Sensory score

In the first 3 days of fermentation, the temperature rises at 30 °C, the alcoholicity rises the fastest at 20 °C, the fermentation stops at 30 °C on the 4th day, and the fermentation stops at 5 °C on the 5th day. The fermentation was stopped substantially until the 7th day at °C, as shown in Figure 2.

Finally, the temperature produced at 30 ° C is the lowest, and the alcohol produced at 20 ° C and 25 ° C is 7 degrees. This is because temperature is an important condition for the growth and reproduction of yeast. The optimum breeding temperature is 20 °C. The maximum number of cells can be obtained at this temperature. The temperature rises above 20 °C, and the germination speed increases, but the cells gradually appear aging. The number of yeasts decreases. In the range of 20~30 °C, for every 1 °C increase in temperature, the rate of conversion of sugar into alcohol per unit time is increased by 10%. However, the higher the temperature, the faster the fermentation speed, the stronger the respiration of the yeast, the earlier the fatigue phenomenon occurs and the fermentation is stopped, so the final wine is produced at a lower temperature and the fermentation speed is slow, but the yeast is not aging, and the fermentation duration is long. Long, fermented thoroughly, and the resulting wine is high.

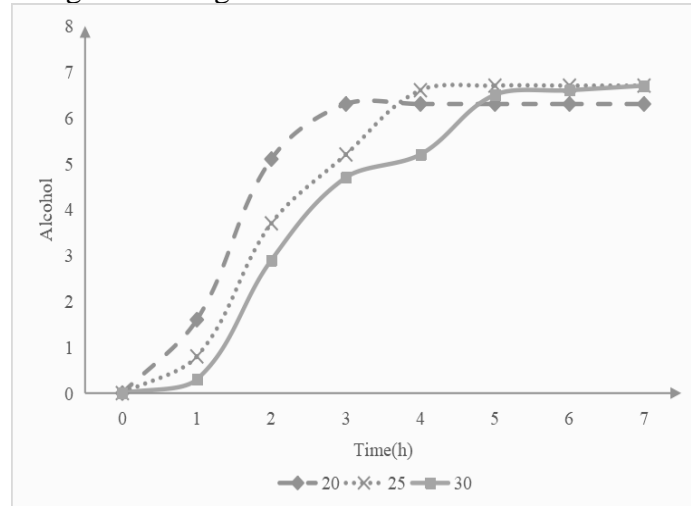


Fig.2. Changes in alcohol consumption at different temperatures

At the same temperature, the soluble solids are decomposed during the fermentation of sweet pomegranate, and the resulting fermented wine is also relatively high. The soluble solids cannot be completely decomposed into alcohol when the pomegranate is fermented, as shown in Figure 3. This is because the yeast has the strongest fermentation ability under neutral or slightly acidic conditions. For example, under the condition of pH=4, the fermentation ability is stronger than that at pH 3.0, and under the condition of low pH, the yeast activity generates volatile acid or stops activity. Therefore, high acidity is not conducive to the activity of yeast. The sweet pomegranate juice is 4.08, the fermentation ability of the yeast is strong, and the acid pomegranate juice is 2.70, which is not conducive to the fermentation of pomegranate wine.

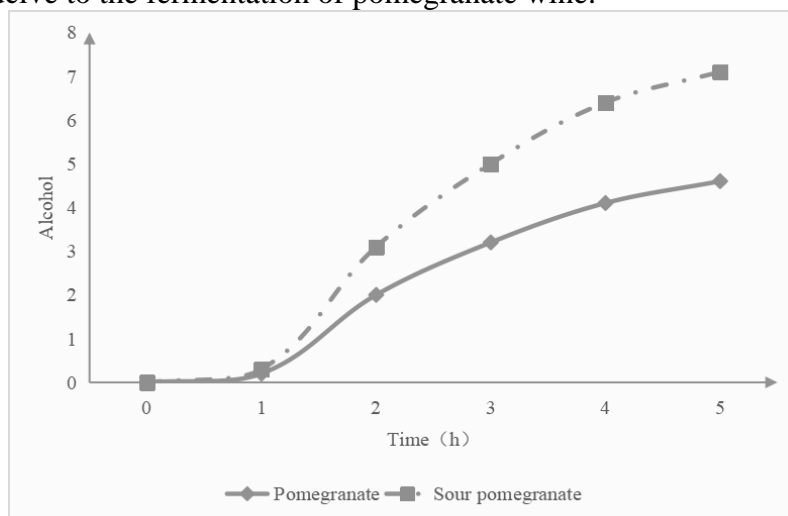


Fig.3. Changes in alcohol content of different pomegranate fermentation

As the post-fermentation time is extended, the alcohol content will increase and the soluble solid

content will still decrease. Moreover, the lower the post-fermentation temperature, the more favorable it is to promote the reduction of the soluble solid content in the wine, and the higher the alcohol content. The purpose of the post-fermentation process is to make the wine after the main fermentation continue to ferment at low temperature, the conversion of malic acid to lactic acid, the acidity of the wine is reduced, the taste is softer and more harmonious, and the yeast, solids and tartar in the wine are at low temperature. Slowly precipitated and the wine gradually cleared.,see Table 2. It can be seen from the table that the lower the post-fermentation temperature, the longer the time, the better the clarity of the pomegranate wine, the lower the acidity, the better the taste, and the less the effect on the color. Therefore, the post-fermentation temperature of pomegranate wine was 10 ° C for 25 days.

Table 2 Fermentation results at different temperatures

Fermentation Temperature	Alcohol	SSC	Time	Transmittance	Chroma	Acid value
10	8	4	25	72.3	0.38	0.61
15	8	4	20	71.4	0.38	0.62
20	7.8	4.3	15	70.4	0.40	0.64

#### 4. Conclusion

The nutritional health function of pomegranate and its food processing technology have received wide attention. The article analyzes the nutritional value and processing technology of pomegranate, and believes that wine yeast is more suitable for fermenting pomegranate wine. The wine yeast fermented pomegranate wine has high wine quality, good quality, yeast dosage is 3%, fermentation is 5 days, post-fermentation process research It shows that the lower the temperature, the more favorable the alcoholicity and the decrease of acidity, the clearer the pomegranate wine, the better the color and taste. The nutritional health function of pomegranate and the status of its food processing technology in food enterprises have gradually gained widespread attention. However, it should be recognized that at present, the nutritional health care function of our pomegranate and its food processing business are still in their infancy, and its development process has a long way to go.

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