

Improvement of Quality of Grape Wine and Bokbunja Wine

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1. Grape wine

Recently consumption of grape wine is increasing rapidly. However, almost all of the wines are imported. It is very difficult to find the domestic wine even in wine shop. To develop wine industry in Korea, the properties of domestic grape and the wine from the grapes should be analyzed to find what should be improved for betterment of the wine. The various methods of fermentation should be tested to select the adaptable methods for our grapes.

Grape varieties: The essential element of wine quality is the variety of grape. The most popular varieties in Korea are Campbell's Early and the next is Muscat berry A. Since Campbell's Early is derived from American species, *Vitis labrusca* and hybrids thereof, it carries more or less native-grape flavors into wine.

Because, the wine industry has not been developed for a long time in Korea, the grape has not been used for wine, but consumed mostly for fresh fruit. This is the reason why most peoples, even wine specialists, have wrong notion that the grape is not suitable for wine. Actually, it is listed as a wine grape in a wine book.

Analysis of grape juice: The factors for fermentation and quality of red wine such as concentrations of sugar, acidity and organic acids in the fresh fruit extract of Campbell's early were analyzed. The average concentration of sugar in the fruit was 15% which was low for regular red wine which contained 12% alcohol. The total acidity and pH of the fruit were 0.8% and pH 3, 4 respectively. The fruit contained 3,649ppm of tartaric acid, 5,339ppm of malic acid and 948ppm of citric acid. Those were optimum levels for fermentation.

The domestic grape, Campbell's Early, was investigated for suitability for production of red wine by three fermentation methods which were conventional fermentation, carbonic maceration and thermal vinification.

Conventional fermentation:I-wine and Y-wine to M wine. The analytic results indicated that the domestic grape, cultivar Campbell's Early, is suitable source for red wine. However, the American native grape aroma was detected.

The low concentration of malic acid and high concentration of lactic acid in M wine should be noted. This indicates the importance of malolactic fermentation which should be developed for up grade our wine.

Carbonic maceration: The wine fermented by carbonic maceration is called Beaujolais Nouveau style wine. The wine from domestic grape, cultivar Campbell's Early, was produced by the carbonic maceration vinification process (CM) and the properties of the CM wine were compared with conventional wine and B-wine which was imported Beaujolais Nouveau style wine. The process did not require the crushing or destemming, the whole clusters of grape could be used. The inoculation of yeast for fermentation was not necessary. Since the fermentation heat was not generated, the cooling device was not required.

The yield rate of the wine by CM was 77%. The rate was almost as same as that of conventional fermentation which was 76%.

The pH of the CM wine was pH 3.6 the conventional wine was pH 3.3 and B-wine was pH 3.4. The total acidity was 0.82% in CM wine, 0.79% in conventional wine and 0.66 in B-wine.

The amount of tartaric acid was 4,691ppm in CM wine, 1,813ppm in conventional wine and 5,578ppm in B-wine. The amount of malic acid was 2,077ppm in CM wine, 3,446ppm in conventional wine and 1,980ppm in B-wine. It indicated that CM could reduce amount of malic acid as low as 2/3 that of conventional process without malolactic fermentation.

The amount of lactic acid was 1,554ppm in CM wine, 1,973ppm in conventional wine and 4,281ppm in B-wine.

All wines contained equal amounts of citric acid about 1,500ppm.

The CM wines had high grape aroma and deep purple-blue color which was the natural color of the grape.

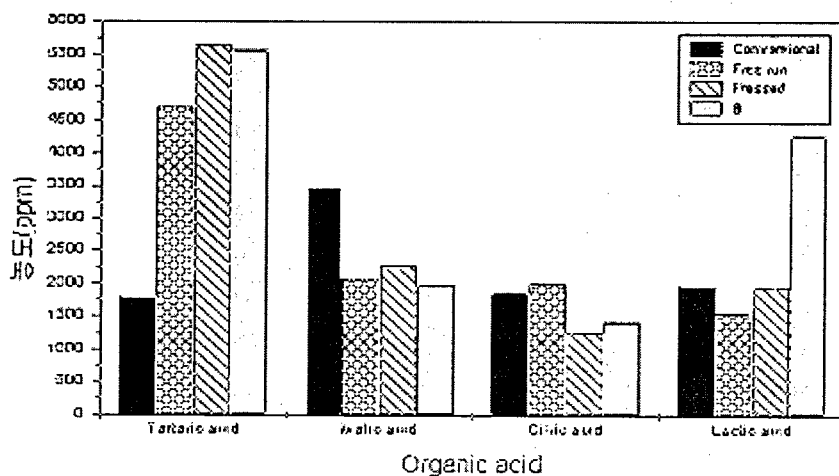


Fig. 1 Concentrations of organic acids in wines

Thermal vinification: The grape was treated with hot water, and crushed and stemmed. This was pressed to yield juice. The sugar concentration in the juice was adjusted, It was fermented to wine. The wine was

excellent. Especially, the American native grape aroma could hardly detected.

2. Bokbunja wine

Bokbunja wine is produced from fermentation of fruit juice of Bokbunja(*Rubus coreanus*). The bokbunja fruit juice contained very high concentration of total phenol and antioxidant activity, higher than grape. However, the concentrations in wines are differ from juice; total phenol and antioxidant activity in grape wine This deteriorates the quality of bokbunja. were much higher than those in bokbunja wine(Table 1). The reason is the grape wine is made from undiluted grape juice, however the bokbunja wine is made from the diluted bokbunja juice. Because the bokbunja juice arome is too strong for the wine, it should be diluted: water used to be added about 4 times the amount of the juice. The dilution reduced the amount of concentration is the juice is very important.

The sugar concentration in the undiluted juice of bokbunja fruit is only 7 Brix. That in diluted juice became too low to fermentation. Consequently, the sugar should be added. The addition of sugar in fruit juice for fermentation is regulated by the National Tax Service. In accordance with the law of making fruit wine of National Tax Service, the amount of added sugar should be less that 80% of sum of original sugar and added sugar. The alcohol concentration in bokbunja wine produced by wine. Since the commercial spirit which is made from tapioca or sweet potato, it has the typical unpleasant smell. To hide the smell from the bokbunja wine, the maker would add some sweeteners. This process deteriorates the quality of bokbunja wine. It is the reason why commercial bokbunja wine in market has the unnatural sweet taste and smell. To improve the quality, the law of National Tex Service should be modified. So that the rate of adding sugar should be adjusted by the volume of must, not by the original amount of sugar in bokbunja

Table. 1 Total phenolic compounds and antioxidant activity in fruits and wines.

Materials		Total phenolic compounds(ppm)	Antioxidant activity(%)
Common name	Botanical name		
Fruits			
Apple	<i>Malus pumila</i>	522.43	10.59
Pear	<i>Pyrus pyrifolia</i>	579.40	5.62
Peach	<i>Prunus persica</i>	627.88	10.41
Grape	<i>Vitis labrusca</i>	698.20	32.19
Kiwi	<i>Actinidia arguta</i>	852.12	19.63
Orange	<i>Citrus sinensis</i>	1016.96	66.08
Strawberry	<i>Fragaria x ananassa</i>	1041.20	51.07
Mandarin orange	<i>Citrus unshiu</i>	1044.84	57.18
Bokbunja	<i>Rubus coreanus</i>	1359.09	78.95
Wild grape	<i>Vitis coiqnetiae</i>	2453.32	79.62
Grape wine	Campbell's Early	1200.00	78.67
Bokbunja wine	Bokbunja	671.52	52.02

fruit. Two bokbunja wines; one was made by the law of National Tax Service and the other one was made by modified method, were compared. The amount of polyphenol and antioxidant activity in these two wines were 665.4ppm and 835.2ppm, and 50.2% and 70.5%, respectively, This indicated modified method could produced better quality of bokbunja wine. An foreign buyer preferred modified bokbunja wine.

Another problem is the attitude of makers. Since the increase of demand of bokbuja fruit, the price of the fruit is increasing, To reduce the cost of production, some maker are suspected to mix cheap juice of other fruits or even artificial dye and sweetener. The bokbunja wine from nine makers were analyzed. The result indicated the suspect. This is another reason that may deteriorate the quality and loss the public favor of bokbunja wine.

To protect honest makers and to inform to the consumers, the marker of authentication should notice to good quality bokbunja wine.

Conclusion

1. Improve grape wine

- a. Develop the method of vinification.
- b. Select and breed varieties of grape for high quality wine and blending.
- c. Need research on malolactic fermentation.
- d. Enforce the publicity activities for Korean wines

2. Improve bokbunjaju.

- a. Modify the law of making fruit wine of National Tax Service.
- b. Maker should try to produce reliable quality of bokbunjaju
- c. Issue note of authentication to the maker producing high quality of bokbunjaju.