Determinations of Antioxidative Activity And Total Phenolic Compounds in Red Dragon Fruit (*Hylocereus polyhizus*) Wine

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Abstract

Red dragon fruit is rich in micronutrients which has recently generated a great deal of consumer interest. The fruit itself is betalain-rich which may have high antioxidant potential. This study aimed to produce red dragon fruit wine with different kind of yeast strains and to study the relationship with their antioxidative activity and total phenolic compound. Antioxidative activity was estimated by DPPH free radical scavenging assay. The inhibition of free radical by *saccharomyces* yeast is almost 97.16 % compared with non-*saccharomyces* yeast. which is only 90%. Additionally, their total phenolic contents were analyzed by Folin-ciocalteau method. The result showed that *saccharomyces* yeast wine was better extracts of antioxidant compounds than non-*saccharomyces* yeast.

Keyword : Red dragon fruit, antioxidant activity and total phenolic compound

Introduction

Red Dragon fruit (*Hylocereus polyhizus*) or pitaya or pitahaya in South America is a member of the cactus family and is known to be rich in nutritional value, high in economical value and medicinal uses. The red flesh variety is in particular richer in betalains which meet the increasing trade interest for antioxidant products and natural food colorant. The red dragon fruit helps the digestive process, prevent colon cancer and diabetes, neutralize toxic substances such as heavy metal, reduce cholesterol levels and high blood pressure and consumed regularly the dragon fruit can help against asthma and cough.

Recently, natural foods and food-derived antioxidants such as vitamins and phenolic phytochemicals have received growing attention, because they are known to function as chemopreventive agents against oxidative damage. Red wine consumption for 2 weeks resulted in a 20% reduction in the propensity of plasma to undergo lipid peroxidation. (Fuhrman and Lavy et al. 1995) Betalain at very low concentrations was found to inhibit lipid peroxidation and heme decomposition. The IC₅₀ inhibition concentrations for low-density lipoprotein (LDL) oxidation of betalain was better than that of catechin. (Kanner, Harel et al. 2001)

The main objectives of this study was to produce red dragon fruit wine by different kind of yeast strains and to study the relationship with their antioxidative activity and total phenolic compound.

Material and Method

Organisms

*Saccharomyces cerevisiae* 4019 (SC) was obtained from the culture collection of Thailand Institute of Scientific and Technological Research (TISTR), *Saccharomyces ludwigii* (SL) and *Hanseniaspora uvarum* (HU) were isolated from pineapple provided by Dr. Cheunjit Prakitchaiwattana.

Fermentation

In single-culture fermentations, red dragon fruit must (RDFM) was inoculated with 8×10⁶ cells ml⁻¹ of either *S. cerevisiae* 4019 or *S. ludwigii* or *H. uvarum*. The fermentations were carried out without agitation at 20 °C for 10 days in 300 ml of RDFM in 500 ml flasks. The wines produced were centrifuged and stored at -20 °C for analysis within one month.
DPPH radical scavenging activity.

The DPPH radical scavenging activity was measured according to the method of Wu et al. (2006) with a slightly modification.

Total Phenolic Content

The Total Phenolic content was measured according to the method of Lee et al. (2003) with a slightly modification.

Result and discussion

Table 1. Proximate composition of red pitaya fruit and wine.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Red dragon fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Must</td>
</tr>
<tr>
<td>Total soluble solid (Brix)</td>
<td>24.0</td>
</tr>
<tr>
<td>Reducing sugar (g/100 ml.)</td>
<td>6.45</td>
</tr>
<tr>
<td>Titratable acidity</td>
<td>0.18</td>
</tr>
<tr>
<td>pH</td>
<td>4.63</td>
</tr>
<tr>
<td>Ethanol (% w/v)</td>
<td>0.0</td>
</tr>
</tbody>
</table>

SC= Saccharomyces cerevisiae 4019, SL = Saccharomycodes ludwigii and HU = Hanseniaspora uvarum

Table 2. DPPH• radical scavenging activity in red dragon fruit wine.

<table>
<thead>
<tr>
<th>Day</th>
<th>DPPH• radical scavenging activity (EC50) (mM vitamin C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saccharomyces cerevisiae 4019</td>
</tr>
<tr>
<td>0</td>
<td>74.06 ± 0.029g</td>
</tr>
<tr>
<td>2</td>
<td>67.67± 0.52g</td>
</tr>
<tr>
<td>4</td>
<td>73.55± 0.71g</td>
</tr>
<tr>
<td>6</td>
<td>74.05± 0.27g</td>
</tr>
<tr>
<td>8</td>
<td>73.81± 0.83g</td>
</tr>
<tr>
<td>10</td>
<td>71.96± 0.14g</td>
</tr>
</tbody>
</table>

* Abc Variation in the following letters between samples indicates significance of difference by Scheffe’s test at 5% level (p<0.05).

Table 3. Total phenolic content in red dragon fruit wine.

<table>
<thead>
<tr>
<th>Day</th>
<th>Total phenolic content (mg gallic acid equivalent/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saccharomyces cerevisiae 4019</td>
</tr>
<tr>
<td>0</td>
<td>150.81 ± 0.55g</td>
</tr>
<tr>
<td>2</td>
<td>147.53± 0.42g</td>
</tr>
<tr>
<td>4</td>
<td>235.89± 0.95g</td>
</tr>
<tr>
<td>6</td>
<td>265.92± 0.65g</td>
</tr>
<tr>
<td>8</td>
<td>239.17± 0.28g</td>
</tr>
<tr>
<td>10</td>
<td>215.89± 0.95g</td>
</tr>
</tbody>
</table>

* Abc Variation in the following letters between samples indicates significance of difference by Scheffe’s test at 5% level (p<0.05).

Conclusion

In summary, considerable amounts of phenolic compounds were found in red dragon fruit wine. Red dragon fruit wine might be another good source of antioxidants and phenolic compounds. Red dragon fruit wine fermented by Saccharomyces cerevisiae has higher total phenolic content than in non-saccharomyces yeast wine.

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Reference


