

Bioactive Components and Their Functional Properties of Mulberry Fruits as Food Resources

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This study was carried out in order to evaluate the function of mulberry fruit and to search functional compound. First, the study about anthocyanin pigment in mulberry fruit was carried out to investigate the development of pigments and their chemical components. The anthocyanin pigments in the fruits of mulberry were extracted with 1% methanolic hydrochloric acid (V/V). The cyanidin-3-glucoside (C3G) was separated and quantified by HPLC system using Nova-Pack C₁₈ column. 38 varieties were evaluated for the C3G content. Among tested varieties, 35 varieties showed only one peak (C3G) and their contents were 0.57~1.15%. But the C3G pigment was not detected in white-colored fruits of mulberry.

The component and content of free sugar in mulberry fruits were also evaluated. In all accessions, fructose and glucose were identified as the major free sugar. The ratio of two components appeared in the same level. But CV (coefficient of variation) of fructose and glucose were 23.6%, 23.4%, respectively. It might suggest that varietal variation exists in free sugar contents. The mean of total free sugars was 9.11±2.14%. Among the tested 49 accessions, 'Geunanosang' showed the highest total free sugars in 14.67%, whereas 'Cheongsipyung' showed the lowest total free sugars in 5.57%. Also fruity characteristics as well as total free sugars to select the desirable mulberry varieties for the production of fruit were researched and analyzed. From that results, four suitable varieties such as 'Kaeryangchosaengsipmunja', 'Hwansipchosaeng', 'Junggojo' and 'Geunanosang' were selected.

Furthermore, fatty acids analysis was carried out with mulberry seed. Palmitic acid, stearic acid, oleic acid and linoleic acid were detected as a major fatty acid. Their rates of composition were 8.8±3.3, 4.2±1.6, 5.8±2.3, and 81.2±6.9 (%), respectively. The unsaturated fatty acids such as oleic

acid and linoleic acid were abundant in mulberry seed. Particularly, five accessions including 'Gukkwang', 'Jaelaenosang', 'Sangbansibmunja (Jeonnam)', 'Neunggeum' and 'Suwonnosang' were observed only with linoleic acid.

The effect of methanol extract from mulberry fruit on the lipid metabolism and the liver function in cholesterol-induced hyperlipidemia rats was investigated with 5 mulberry fruit varieties, including Daeryukppong, Kuksang 20, Subongppong, wild variety, and Cataneo. Animal treated with wild variety from mulberry fruit showed the decrease in body weight, food efficiency ratio, serum triglyceride (85%), and GOT value (86%).

Biological effect of subfraction of MeOH extracts with Chongilppong mulberry fruit was tested. In the cholesterol-induced hyperlipidemia rats administered with subfraction of mulberry fruit extract, the level of serum triglyceride, GPT, and GOT in serum were generally decreased. Therefore, the above results suggested that the water-soluble fraction of mulberry fruit has a possibility to maintain normal liver functions and to protect hyperlipidemia.

Also, physiological effect with wild varieties of fruit was tested. The yield of 85% MeOH extract from freezing and dried Mulberry fruits was 60.2% and Hexane, BuOH and H₂O fraction from MeOH extract were 2.8%, 4.6%, 92.3%, respectively.

In the cholesterol-induced hyperlipidemia rats administered with subfraction of mulberry fruit extract, total cholesterol and serum triglyceride were decreased in the MeOH extract group and in the water-soluble fraction group. Also, water-soluble fraction group decreased GPT, GOT, and LDH level. Therefore, the above results suggested that wild varieties of mulberry fruit also have a possibility to maintain normal liver functions and to protect hyperlipidemia.

From above results, it was supposed that these functions were derived from anthocyanin pigment and linoleic acids in mulberry fruit.

Lastly, sensory characteristics of mulberry fruit jam and wine were investigated by according to mulberry fruit varieties, including Daeryukppong, Kuksang 20, Chongilppong, and a wild mulberry variety.

Palatability ranks of mulberry fruit jam in according to mulberry fruit varieties were Kuksang 20 (34.5%), Chongilppong (32.8%), Daeryukppong (17.2%), and Wild variety (15.5%).

In the sensory characteristics, mulberry fruit jam was obtained 6.32 points as total mean point.

In case of mulberry fruit wine, panels liked the Chongilppong best. But, the sensory characteristics of mulberry fruit wine was obtained low points

(=5.47) as total mean point. From these results, it seems that alcohol content was very important factor.

Chongilppong and Kuksang 20 were selected in the desirable mulberry fruit varieties for manufacturing materials.

In sensory characteristics of Chongilppong mulberry fruit wine investigated, color and taste showed a good overall preference.

The above results indicate that mulberry fruits containing bioactive components have many physiological effects and are desirable anthocyanin pigment resource as well as food resources.