

Isolation and Structural Elucidation of Anti-Oxidant Compounds from Immature Berries of *Ampelopsis grandulosa*

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1. Introduction

Antioxidants play pivotal role in preventing diseases driven by free radical stress. The search of natural antioxidant having benefit of being nontoxic has been done by a lot of researchers (Lanigan et al., 2002). Dietary food such as fruits and vegetables are particularly rich in antioxidants which is well known as functional food or super-food containing flavonoids, and antioxidative vitamins such as ascorbic acid and tocopherol (Hanasaki et al., 1994). Numerous epidemiological studies have reported that the higher intake of fresh fruits, vegetables, and tea is associated to give lower risk of cancer and coronary heart disease (Hertog et al., 1993; Doriane et al., 2008).

In Japan, the extract of immature berries of *Ampelopsis grandulosa* (Vitaceae) is utilized as a folk medicine which has beneficial effects to human health. However, the studies for biological active compounds of *A. grandulosa* such as antioxidant have not been done. Therefore, this study is aimed to isolate and characterize the antioxidant compounds from immature berries of *A. grandulosa*.

2. Material and Methods

Immature dried-berries of *A. grandulosa* were harvested from experimental field of Fruit Time System Company in Mikage, Japan. The antioxidant activities were monitored using 2,2-diphenyl-1-picrylhydrazyl (DPPH) method. DPPH assay is one of the most frequently utilized method to test the ability of compounds to act as hydrogen donors or free radical scavengers (Amorati et.al., 2013). Determination of chemical structures of active compounds were done using spectroscopic techniques such as ¹H NMR, ¹³C/DEPT NMR, COSY, HMQC, and HMBC. GC-MS analysis was completed on a Varian CP-3800 gas chromatography with a Varian 1200L quadropole MS/MS in electron ionization mode. Optical rotation was also measured with a Jasco DIP-370 digital polarimeter.

3. Results and Discussion

A mixture of fatty acid containing palmitic acid (1), stearic acid (2), oleic acid (3), *cis*-hexadec-7-enoic acid (4), *trans*-oleic acid (5), and linoleic acid (6) was isolated and exhibited the radical scavenging activity. *cis*-Hexadec-7-enoic acid (4) was synthesized using 7-octyn-1-ol (7) as starting compound. During the synthesis stage for the target compound, dihydrogenation using Lindlar's catalyst which was performed in MeOH containing 2-methyl-2-buten (8). In addition, other two compounds were also isolated, namely (+)-catechin (9) and ethyl gallate (10) which have antioxidant activities.

4. Conclusions

Overall, this study revealed that the immature berries of *A. grandulosa* contain a mixture of fatty acids, (+)-catechin, and ethyl gallate. These compounds have antioxidant activities, which suggested that the immature berries should be promising material as a functional food.