

## PC-37

Antioxidant activities of germinated Ginseng (*Panax ginseng* C.A. Meyer) SeedMi-Ok Chae<sup>1</sup>, So-Hyun Kim<sup>1</sup>, Yong-Sung Park<sup>1</sup>, Il-Doo Kim<sup>2</sup>, Dong-Hyun Shin<sup>1\*</sup><sup>1</sup>School of Applied Biosciences, Kyungpook National University, Daegu, Korea<sup>2</sup>International Institute of Research and Development, Kyungpook National University, Daegu, Korea**[Abstract]**

Ginseng has been traditionally used in Asia including Korea, for health care and to treat verities of different diseases such as immune disease, liver disease, and cancer. The current study was aim to unveil the most efficient method such heating, prethanol-A and ultrasound, for cured extraction of ginseng with higher antioxidant activity. The current results shows a significant improvement in the inhibition of H<sub>2</sub>O<sub>2</sub> by the ultrasound method than the HT and Pre-A method. Thus this inhibition in free redical is possible through the increase in the antioxidant activity. Therefore in this study the CAT, APX and phenolic and flavonoid content was increased in ginseng seed and germinated ginseng sprouts by the US method, while the POD, SOD and GSH activity was increased in HT method. This suggest that the different extraction method in different stage of ginseng growth show a different biochemical and metabolites activation. Thereby the Ultrasound and Heat extraction was a feasible alternative method for extracting interested ingredients from biological materials.

**[Materials and Methods]**

## 1. Sprout growing and sample preparation

A 100 grams of dehiscid intact seeds, were washed 3 times with tap water. The container containing seeds or sprouts were sprinkled with tap water using a spray for 2 min every day. The sprouts were grown at 4-5°C in a refrigerator for 14 days. The sprouts were kept into deep freeze (-70°C) before subjected to freeze-drying. 100 grams of intact seeds were also freeze-dried.

## 2. Preparation of sample extracts

For hot water extractions, the ginseng powder (30g) was dissolved in 300mL distilled water and heated for 3h at 80°C in a water bath. For prethanol-A (ethanol) extractions, the powder (30g) was mixed with 300mL of 70% (v/v) prethanol-A (ethanol) and heated for 3h at 60°C in a water bath. For ultrasound-assisted extractions, the powder (30g) and the predetermined volume of extracting solvent were put in an Erlenmayer flask (500mL): the ratio of powder and solvent was 1:10g/mL. The sonication were performed in 40 min using an ultrasonic cleaning bath (BRANSONIC, 8510E-DTH, Mexico; in ternal dimensions: 47×29×15 cm) operating at 44KHz frequency.

3. Determination of H<sub>2</sub>O<sub>2</sub>, total polyphenol(TP) and total flavonoid content

Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) content was estimated using the method of Velikova, V. *et al*, Total phenolic content (TPC) and total flavonoid content (TFC) were quantified using the method of Liang *et al*.

## 4. Determination of catalase, SOD(superoxide dismutase), and APX(ascorbate peroxidase) activity

The catalase activity was measured using the method of Halo, B. A. *et al*.

Superoxide dismutase activity was estimated using the method of Giannopolitis, C. N. *et al*. The ascorate peroxidase (APX) activity was estimated using the method of Khan, A. L. *et al*.

## 5. Quantification of Reduced glutathione

The raduction in GSH content was estimated using the method of Ellman, M. A.

## 6. Statistical analysis

All the data are presented as a mean±standard error (SE). Analysis of variance test was conducted using PROC GLM in SAS 9.4 (SAS Institute Inc., Cary, NC, USA). The significant differences among treatment means were identified by Student's t-test at 0.05 probability level.

**[Results and Discussion]**

In this study, we carried out to investigate the inhibition of H<sub>2</sub>O<sub>2</sub> and antioxidant activity of ginseng seed and germinated ginseng spruts through heat extraction, Pre-A extraction and ultrasound extraction. Compared with the heat and Pre-A extraction methods, the US treatment provided high extraction efficiency. Moreover, the US treatment contained more total polyphenol and flavonoid content, higher SOD, POD, CAT and GSH activity, along with significant inhibition of H<sub>2</sub>O<sub>2</sub> radical activity compared with heat and Pre-A extraction methods. When choosing an extraction method, one should consider both extraction efficiency and the maximum antioxidant activity. Ultrasound extraction was a feasible alternative method for extracting interested ingredients from biological materials.

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