Ⅱ-62

# 재배지가 쑥갓의 항산화능과 항산화 물질에 미치는 영향

구강모[1], 김지영[1], 임채성[1], 김정상[2], 윤정한[3], 이충환[1]*
[1]건국대학교 생명공학과, [2]경북대학교 생명식품공학과, [3]한림대학교 식품영양학과

# Effect of Different Cultivated Areas on Antioxidant Activity of *Chrysanthemum coronarium* L. and Its Antioxidant Compounds

[1]Department of Bioscience and Biotechnology, Kon-Kuk University, Seoul,
[2]Department of Life and Food Science and Animal Science and Biotechnology, Kyungpook National University, Daegu,
[3]Department of Food Science and Nutrition, Hallym University, Chuncheon

Kang Mo Ku[1], Jiyoung Kim[1], Chae Sung Lim[1], Jong Sang Kim[2], Jung Han Yoon[3], and Choong Hwan Lee[1]*

## Objectives

The objectives of this study were to study the antioxidant activities of *Chrysanthemum coronarium* L. from grown different regions *in vitro* systems and to study the correlation between antioxidant activity and antioxidant compounds such as phenolics and flavonoids.

## Materials and Methods

○ Materials

The collected samples were cultivated in Pocheon, Youngin (two samples), Seoul, and Yeoju in Korea. The samples were boiled for 10 min and freeze-dried. The dried samples were extracted with ten times 80% methanol and evaporated *in vacuo*. The methanolic extracts were suspended in water and then, partitioned successively with ethyl acetate. The ethyl acetate fractions of *Chrysanthemum coronarium* samples were used for evaluating antioxidant activity and determing antioxidant compounds.

○ Methods

*In vitro* anitoxidant methods such as ABTS, DPPH, and FRAP were performed based on spectrophotometric assays. Inhibitory activity of linoleic acid peroxydation were determined using ferric thiocyanate (FTC) method and thiobarbituric acid (TBA) method. Total phenol content (TPC) and total flavonoid content (TFC) were determined using gallic acid and naringin standard curve, respectively. All the statistical analyses were carried out using SAS.

Corresponding author: Choong Hwan Lee E-mail: chlee123@konkuk.ac.kr Phone:82-2-2049-6177

## Results

*Chrysanthemum coronarium* fromYoungin1 showed the highest antioxidant activity among various cultivated area samples in three antioxidant assays and inhibition of linoleic acid peroxydation assays. We found a higher correlation between antioxidant compounds and various antioxidant assay systems. Further study should be carried out to identify antioxidant compounds in *Chrysanthemum coronarium* L. by metabolomics approch.

Table 1. Antioxidant activity and its antioxidant compounds of *Chrysanthemum coronarium* L. from different cultivated areas.

| Sample | DPPH[a] | ABTS[b] | FRAP[c] | TPC[d] | TFC[e] | FTC[f] | TBA[g] |
|---|---|---|---|---|---|---|---|
| BHT[h] | | | | | | 78.5±0.5[i]a | 98.5±0.1a |
| Vitamin C | 6.4± 0.1a | | | | | | |
| Pocheon | 155.1± 5.8d | 75.3± 2.8c | 515±74c | 25.1±1.6b | 46.5±1.1c | 67.0±0.6d | 78.1±0.2e |
| Youngin1 | 66.8± 3.1b | 189.7±12.8a | 1252±56a | 58.7±3.4a | 88.8±4.1a | 72.8±0.4b | 89.6±0.0b |
| Youngin2 | 127.1± 7.9c | 99.3± 1.3b | 778±40b | 25.3±1.3b | 56.0±5.9b | 68.9±0.5c | 69.8±0.1f |
| Seoul | 181.0±11.3e | 74.7± 4.6c | 552±45c | 19.2±0.9c | 35.3±0.2d | 65.8±0.7e | 80.4±0.1d |
| Yeoju | 200.8±21.8f | 71.5± 7.9c | 503±41c | 18.1±1.9c | 30.3±0.4d | 53.2±0.8f | 82.1±0.1c |

[a]$IC_{50}$ value of DPPH. [b]expressed as mg of vitamin C equivalents/g of EtOAc. [c]mM/L of $FeSO_4 \cdot 7H_2O$/g of EtOAc. [d]expressed as mg of gallic acid equivalents/g of EtOAc. [e]expressed as mg of naringin equivalents/g of EtOAc. [f,g]values (%) are expressed as means±deviation. [h]butylated bydroxytoluene. [i]the final concentration of samples in FTC and TBA system were 39.6 μg/mL. Results are the mean±SD (n=3). Means with different letters with a column are significantly different ($p < 0.05$).

Table 2. Correlation coefficients between antioxidant compounds and antioxidant activity[a].

| | ABTS | FRAP | FTC | TBA | TPC | TFC |
|---|---|---|---|---|---|---|
| DPPH | - 0.914*** | - 0.929*** | - 0.815*** | - 0.300[NS] | - 0.915*** | - 0.966*** |
| ABTS | | 0.975*** | 0.638** | 0.584* | 0.976*** | 0.946*** |
| FRAP | | | 0.671** | 0.478[NS] | 0.941*** | 0.945*** |
| FTC | | | | 0.037[NS] | 0.655** | 0.773*** |
| TBA | | | | | 0.630* | 0.410[NS] |
| TPC | | | | | | 0.957*** |

[a]DPPH=$IC_{50}$ value of DPPH; ABTS = ABTS radical scavenging activity; FRAP = Ferric Reducing/Antioxidant power; FTC = lipid peroxidation by ferric thiocyanate; TBA = MDA production inhibition activity; TPC = total phenol contents; TFC = total flavonoid contents. ***, **, and * indicate $p < 0.001$, $p < 0.01$, and $p < 0.05$, respectively. [NS] indicates non siginificant at $p < 0.05$.