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Effects of Cropping Season on Vitamin C and Total Phenolic Contents and Antioxidant Activity in Potatoes (*Solanum tuberosum* L.)

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[Introduction]

Potato is a starchy tuber crop and an excellent source of vitamin C and phenolic compounds known as antioxidants. These nutrients' levels may be affected by the growing seasons. This study was carried out to investigate the effects of cropping seasons on total phenolic contents (TPC), vitamin C (Vc), and antioxidant activity (AA) in potatoes (*Solanum tuberosum* L.).

[Materials and Methods]

Seven potato genotypes (cv.Summi, cv.Daeseo, cv.Chuback, cv.Arirang 1ho, cv.Arirang 2ho, cv.Sante, and cv.Gala) were cultivated at Gangneung (average sea level 5m) in Spring season and at Daegwallyeong (asl 750m) in Summer season. Their tubers harvested at 90 days after sowing were used for the analysis of TPC and Vc and AA.

[Results and Discussion]

As the agronomic characteristics of potato genotypes, shoot length and tuber yield were significantly affected by genotype and location×genotype interaction while there were no significant differences by the location between Spring season and Summer season. Dry matter rate (DMR), TPC, and Vc contents showed very significant differences by location, genotype, and location×genotype interaction. DMR was higher in Spring cultivation (20.1%) than in Summer cultivation (18.0%), while TPC and Vc contents were higher in Summer cultivation (98.4 mg·100g⁻¹ dry weight and 59.2 mg·100g⁻¹ DW, respectively) than in Spring cultivation (73.0 mg·100g⁻¹ DW and 38.5 mg·100g⁻¹ DW, respectively). TPC varied from 41.4 (cv.Daeseo) to 104.7 mg·100g⁻¹ DW (cv.Gala) in Spring season and from 58.6 (cv.Daeseo) to 156.3 mg·100g⁻¹ DW (cv.Sante) in Summer season. Vc content was shown from 23.1 (cv.Arirang-1ho) to 58.9 mg·100g⁻¹ DW (cv.Chuback) in Spring season and from 32.9 (cv.Sante) to 76.0 mg·100g⁻¹ DW (cv.Gala) in Summer cultivation. AA expressed as electron donating ability was also very significantly influenced by location, genotype, and location×genotype interaction. AA correlated positively with TPC (Pearson's $r=0.335$, $P\leq 0.05$) and Vc (Pearson's $r=0.421$, $P\leq 0.01$), however there was not any correlation with shoot length, yield, and DMR. In conclusion, potatoes cultivated at Daegwallyeong in Summer showed higher TPC, Vc content and AA than those at Gangneung in Spring. In particular, among Korean potatoes, cv.Chuback and cv.Summi were shown to contain higher Vc and TPC in two cropping seasons.

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