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Antioxidaive Activity of Lotus Root (*Nelumbo nucifera* G.) Extracts

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This study was investigated on the antioxidant capacity of 80% ethanol extract of lotus root *in vitro*. The extraction yields of 80 % ethanol extract was 9.14%. Lotus root ethanol extract was fractionated by the following: n-hexane, chloroform, ethylacetate and n-butanol. n-Butanol fraction showed the highest extraction yield of all fractions. Antioxidative activities of different fractions were examined by 1.1-diphenyl-2-picrylhydrazyl(DPPH) radical generation, the Rancimat test, the nitrite scavenging activity and the thiobarbituric acid(TBA) method, and compared with the properties of the commercial antioxidant butylated hydroxytoluene(BHT). The antioxidative capacity of the ethylacetate fraction was the highest among fractions and its fraction showed higher contents of total polyphenol. Furthermore, the antioxidative capacity of the ethylacetate fraction was similar to that of BHT. In conclusion, these results suggest that lotus root may be a good candidate as a natural antioxidant source.

Key words: Antioxidative activity, lotus root, polyphenol

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AtCYS6, a Phytocystatin, Regulates Seed Germination in *Arabidopsis*

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Phytocystatins, cysteine peptidase inhibitors from plants, are implicated in the endogenous regulation of protein turnover, programmed cell death, and in defense mechanisms against insects and pathogens. A cDNA encoding a phytocystatin, *AtCYS6* (*Arabidopsis thaliana* phytocystatin 6), has been isolated. AtCYS6 was highly expressed during seed germination. *AtCYS6* protein expression in seeds was dramatically decreased by GA_{4+7} and strongly increased by ABA, both of which are seed germination regulatory phytohormones. This was confirmed in transgenic plants bearing an *AtCYS6* promoter-β-glucuronidase (*GUS*) reporter construct, where we found that expression from the *AtCYS6* promoter was strongly induced during seed germination and post germination periods. The GUS staining patterns in transgenic *Arabidopsis* seedlings reflected the expression patterns of the AtCYS6 protein. In addition, constitutive over-expression of the *AtCYS6* gene retarded seed germination and seedling growth. In contrast, an *AtCYS6* knock out mutant (*atcys6*) exhibited enhanced seed germination and seedling growth. The retarded seed germination induced by over-expression of the *AtCYS6* gene caused a general retardation in over all plant growth and development that was reversed in the *atcys6* mutant. Additionally, stored cysteine peptidase activities were inhibited by AtCYS6 in transgenic *Arabidopsis*. From these data, we propose that *AtCYS6* participates in the control of seed germination by regulating stored cysteine peptidases activities.