Phytochemical profiles and antioxidant potential of Arctic plants

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Environmental stress in the Arctic region leads to damage in plant membranes as a result of oxidation processes. To withstand these stress conditions, plants are expected to produce antioxidants that differ from phenolics. Here, we investigated the chemical composition and antioxidative activities of four Arctic plant species (*Dryas octopetala*, *Carex rupestris*, *Silene uralensis* and *Deschampsia alpina*) through in vitro measurements of the free radical scavenging activities (FRS), inhibition of lipid peroxidation (ILP) and trolox equivalent antioxidant capacities (TEAC). *D. octopetala* exhibited the highest ILP and FRS activities. The TEAC values were higher than those of the Trolox vitamin E standard in all four species. Overall, the antioxidative activity was highest in *D. octopetala*, followed by *C. rupestris*, *S. uralensis* and *D. alpina*. Electrospray ionization tandem mass spectrometric (ESI–MS/MS) analysis of methanolic extracts of these plants revealed the presence of organoselenides, linear alkylbenzenesulfonates (LAS) and oligosaccharides. Our findings suggest that these plants can be used as nutraceutical sources of selenium and as biomarkers for environmental pollution.

The antioxidant potential of eight Arctic lichen species was evaluated in vitro using free radical scavenging activity (FRS), inhibition of lipid peroxidation (ILP), and Trolox equivalent antioxidant capacity assay (TEAC). FRS activities of lichen species in various organic solvents such as methanol, ethanol, acetone, and dimethyl sulphoxide (DMSO) were in the range 9.6–51.77%, while ILP activities in these solvents ranged from 32.5 to 82.43%. *Pseudophebe pubescens* showed the highest ILP and FRS activities as compared to other lichen species and the standard antioxidants butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT). The TEAC value was also found to be higher in all species compared to the standard water soluble vitamin E analog Trolox. The order of antioxidative activities in lichen species was *Pseudophebe pubescens Cladonia amaurocraea*,*Cladonia mediterranea*, *Physcia caesia*, *Flavocetraria nivalis*, *Cetraria fastigata*, *Xanthoria elegans Umbilicaria hyperborea*.

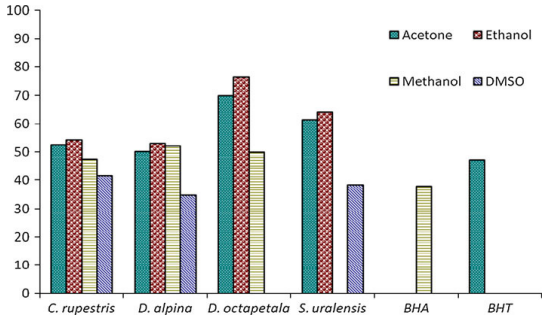

Fig1 Free radical scavenging activity of plant species in solvents. *C. rupestris* = *Carex rupestris*, *D. alpina* = *Deschampsia alpina*, *D. octopetala* = *Dryas octopetala*, *S. uralensis* = *Silene uralensis*. BHA = butylated hydroxyanisole, BHT = butylated hydroxytoluene, DMSO = dimethylsulfoxide

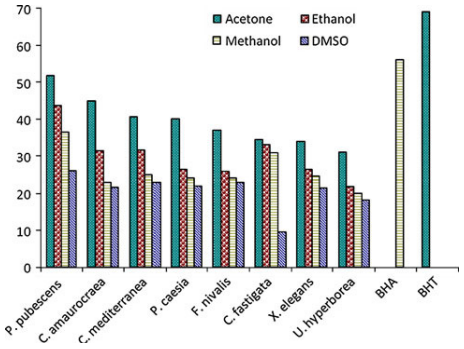

Fig.2 Free radical scavenging activity of lichen species in various solvents

Reference:

Singh P., Singh S.M., D`Souza L.M., Wahidullah S. (2012). Phytochemical profiles and antioxidant potential of four Arctic vascular plants from Svalbard. *Polar Biology*, DOI 10.1007/s00300-012-1225-0 .

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