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Effective Extract Conditions from Fronds of Ostrich Fern for Increase of Antioxidant Compounds and Activity

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This study was performed to investigate the effective extract condition from fronds of Ostrich fern (*Matteuccia struthiopteris*) to increase antioxidant compound contents and antioxidant capacity. Powder (1g) of lyophilized fronds were mixed with 3 kinds of solvents (MeOH, 80% EtOH and water). Extraction was carried out using not only by immersion (room temp.), heating (60°C) and stirring (200 rpm) for 6 h, but also by sonication in 42 kHz ultrasonic bath for 15, 30 and 45 min. Extracts were filtrated, and the final volumes of all treatments were adjusted up to 50mL to determine contents of soluble solids (SS), total polyphenols (TP; tannic acid as a standard) and total flavonoids (TF; Naringin as a standard). Antioxidant capacity was measured according to radical scavenging activity of 0.15mM DPPH. Both MeOH and 80% EtOH were used as effective solvents for all extract methods. RC_{50} (0.104mg·mL⁻¹SS) of extract obtained from stirring in 80% EtOH was lower than that of BHT (0.121mg·g⁻¹). However, 30 min. of sonication in 80% EtOH was the optimum extract condition with high contents of SS (317.15mg·g⁻¹DW), TP (70.902mg·g⁻¹DW), TF (41.530mg·g⁻¹DW) and strong antioxidant capacity (RC_{50} : 0.136mg·mL⁻¹SS). From present investigation, fronds of Ostrich fern can be used as natural material for antioxidant, and sonication (30 min.) with 80% EtOH was the ideal extraction method for saving labors and time for extraction.

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Effect of Media on *In vitro* Bud Induction of Pleurocarpous and Acrocarpous Mosses

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In vitro bud induction of two pleurocarpous mosses (*Hypnum plumaeforme*, *Amblystegium serpens*) and one acrocarpous moss (*Bartramia pomiformis*) were successfully established from spores on hormone free Knop and three strengths ($\times 1/8$, $\times 1/4$, $\times 1/2$) of MS media. Nutritional components and their concentration influenced on spore germination, transition to caulonema and bud induction of both types of mosses. Spore germination, caulonema formation, bud induction and bud quality were better on 1/4MS and 1/8MS medium than other media. Comparatively late germination and poor bud development were found at higher concentrations (1/2MS) and without micronutrient (Knop media). However, the percentage of caulonema cells increased on high concentration of media (1/2MS). Therefore, intermediate strength (1/4MS) of the nutrient solution was ideal for optimal bud induction as well as for vegetative growth of all three species.

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