**In vitro** antioxidant properties and total phenolic contents of wetland medicinal plants in Taiwan

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**ABSTRACT.** The aim of this study was to examine the possible antioxidant activities of the methanol and water extracts of 31 medicinal wetland plants in Taiwan. We assayed for such properties such as: TEAC, DPPH radical scavenging, total polyphenol content, total flavonoid and total flavonol contents using the reducing power method. Our results showed that *Rotala rotundifolia*, *Juncus effusus* var. *decipiens*, *Cyperus iria*, *Salix warburgii*, *Lindernia antipoda*, *Kyllinga brevifolia*, and *Typha orientalis* possessed both high antioxidant activities and high total polyphenol contents. There was a low correlation between TEAC and total polyphenol content (water extracts, $R^2=0.14$; methanol extracts, $R^2=0.23$) thus eliminating high phenolic content as an important factor in determining the wetland plants’ antioxidant capacities. Our results demonstrated that although phytochemicals in the wetland medicinal plants may contribute significantly to their antioxidant activities, these antioxidant activities were not directly related to the polyphenol quantity. Phytochemicals may play key roles in the potent antioxidant activity of wetland medicinal plants. The potential of these easily accessible sources of natural antioxidants should be explored by the pharmaceutical, medical, and health food industries.

**Keywords:** Antioxidant; Flavonoid; Flavonol; Polyphenol; Wetland medicinal plant.

**INTRODUCTION**

It is commonly accepted that reactive oxygen species, such as superoxide (O$_2^-$), hydroxyl (OH$^-$), and peroxyl (‘OOH, ROO•) radicals, are produced under oxidative stress. Reactive oxygen species play important roles in degenerative or pathological processes, such as aging (Burns et al., 2001), cancer, coronary heart disease, Alzheimer’s disease (Diaz et al., 1997), neurodegenerative disorders, atherosclerosis, diabetes, and inflammation (Chen et al., 2006). Several anti-inflammatory, digestive, anti-necrotic, neuroprotective, and hepatoprotective drugs have recently been shown to have antioxidant and/or radical scavenging mechanisms as well (Lin and Huang, 2002). Some natural antioxidants and compounds with radical scavenging activity have been identified over the last few years, including echinacoside in *Echinacea* root (Hu and Kitts, 2000), anthocyanin (Espin et al., 2000), phenolic compounds (Rice-Evans et al., 1997), and the extracts of water spinach and sweet potato tuberous roots (Huang et al., 2004; Huang et al., 2005).

Medicinal plant parts are commonly rich in phenolic compounds, such as flavonoids, phenolic acids, stilbenes, tannins, coumarins, lignans and lignins. These compounds have multiple biological effects including antioxidant activity (Packer et al., 1999). *In vitro* experiments on antioxidant compounds in higher plants show how they protect against oxidation damage by inhibiting or quenching free radicals and reactive oxygen species (Ali et al., 2008). The role of these compounds as potential antioxidants can be inferred by their similarity to synthetic antioxidants of related structures.

The multifarious natural environment of Taiwan harbors abundant plant resources. Many of these plants, including those with therapeutic potential, face endangerment. Therefore, we investigated wetland medicinal plants and analyzed their antioxidant activities. In the present study, we collected 31 medicinal wetland plant species that are widely consumed in Taiwan, prepared their water and methanolic extracts, and analyzed their antioxidant activities and polyphenol contents.