人工溼地處理含鹽廢水時水生植物耐受性的研究

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摘要：本研究選擇台灣常見的四種濱海挺水性水生植物及兩種紅樹林：培地茅(*Vetiveria zizanioides*)、單葉鹹草(*Cyperus malaccensis*)、蘆葦(*Phragmites communis*)、香蒲(*Typha angustifolia*)、欖李(*Lumnitzera racemosa*)、海茄苳(*Avicennia marina*)等，評估其在含鹽分環境中的耐受性，並探討種植此 6 種不同水生植物的人工溼地，進流廢水中的鹽度對溼地水質淨化功能的影響。首先，在不同含鹽分的小規模溼地生態系統(microcosms)中，以批次更換營養液的方式進行單一種植物的培養，結果顯示培地茅及香蒲在 0 及 5 g/L 的含鹽環境中能持續生長，在 15 g/L 以上的水中則陸續出現葉片枯死及光合作用活性停止的結果。單葉鹹草及蘆葦在 0~15 g/L 的鹽分環境中均可持續生長，但是植物生長速率及光合作用活性均隨鹽分的增加而顯著降低，且無法生長於 25 g/L 的含鹽環境。欖李及海茄苳在 0~25 g/L 的含鹽環境中雖然也觀察到鹽分濃度的提高顯著降低了植物生長速率及光合作用活性，不過此兩種植物均能持續生長，在高鹽分逆境中表現最好的耐受性。另外，在試驗規模人工溼地水質淨化實驗中發現，進流廢水之含鹽量顯著影響溼地植物的光合作用活性及生長，進而影響人工溼地對氨氮的去除，在本研究最高試驗鹽分下(18.5 g/L)，上述六種水生植物中只有紅樹林種的欖李及海茄苳光合作用活性最高且能持續生長，並維持最高的氨氮去除效能。本研究結論人工溼地處理含鹽分廢水時，將可依據所處理廢水的實際鹽分範圍選擇適合的挺水性水生植物。

關鍵詞：人工溼地、水生植物、鹽分、耐鹽性、廢水處理、紅樹林

Abstracts: In this study, four species of common emergent macrophytes (*Vetiveria zizanioides*, *Cyperus malaccensis*, *Phragmites communis*, *Typha angustifolia*) and two native species of mangrove (*Lumnitzera racemosa*, *Avicennia marina*) were evaluated their salt tolerance when being planted in microcosms containing various levels of salinity (0, 5, 15 and 25 g/L). Also, several pilot-scale subsurface flow constructed (SSF) wetlands unplanted and planted with the six species of macrophytes above mentioned were installed to investigate the effects of salinity on ammonium removal performance of the wetlands as receiving a synthetic aquaculture wastewater with different salinity levels (5.3, 11.5, and 18.5 g/L). Results of the microcosm study show that *Vetiveria* and *Typha* grew well in microcosms with salinity up to 5 g/L, whereas they exhibited significant decreases in both relative growth rate and photosynthetic activity and could not survive eventually in salinity of 15 and 25 g/L. *Phragmites* and *Cyperus* grew properly in salinity ranging from 0 to 15 g/L, but they died off gradually in microcosm with salinity of 25 g/L. *Lumnitzera* and *Avicennia* remained healthy in all microcosms trials, still salinity had some negative effects on relative growth rate and photosynthetic activity of the macrophytes. In wastewater treatment study, salinity of influent also affected the relative growth rate and photosynthetic activity of the macrophytes, and thus ammonia removal performance of the constructed