

篩選適合台灣地區生長之海水微藻及其油脂生產之研究

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摘要

從動物脂肪或蔬菜油中得到的長鏈脂肪酸經轉酯化後，所形成的單烷基酯即為生質柴油。許多地區已經開始使用生質柴油，尤其是歐洲和美國。美國每年的生質柴油產量約5.7到6.7 x 10⁷升，而歐洲部分每年可產生5 - 10 x 10⁸升的生質柴油。但是因為油類原料成本過高，所以導致生質柴油成為高成本的產物，但這也是妨礙生質柴油無法大量銷售的原因。因此，此研究之目的為在 台灣分離出能生產高油脂含量之海水微藻以生成生質柴油進而降低油源之成本。所以，我們自台灣沿海的海水中篩選分離出微藻 並根據18S rRNA 基因序列與其型態特徵鑑定。之後挑選出含油量較高的兩株藻Chlorella sp. Y8-1, Chlorella sp. G2-1 進一步探討 碳、氮源種類及濃度、鹽度、光照強度、光照週期、溫度、額外添加物和兩階段培養策略對Chlorella sp. G2-1 和 Chlorella sp. Y8-1 生長及油脂含量的影響。結果顯示，G2-1 微藻細胞培養在碳源: 0.75 g-sucrose/L、氮源: 0.1 g-urea/L、NaCl: 3%、NaHCO₃: 0.2 g/L、light/dark 週期: 24/0 (h/h)、光照強度: 7665 lux 和溫度: 30 條件下，其油脂含量可達細胞乾重的30%。而Y8-1 微藻細胞則培養在碳源: 0.5 g-sucrose/L、氮源: 0.25g-urea/L、NaCl: 3%、NaHCO₃:0.2 g/L、light/dark 週期: 24/0 (h/h)、光照強度: 7665 lux和溫度: 30 條件下，其油脂含量可達細胞乾重的35%。G2-1 及Y8-1 藻株在上述條件下所獲得之最大比生長速率(μ m)分別為1.1 和1.6 day⁻¹。此外，在鹽度影響的試驗中亦發現Chlorella sp. G2-1 和Chlorella sp. Y8-1 的細胞大小會隨著NaCl 濃度的增加而變大。另外，本研究亦探討鐵對海水微藻Chlorella sp. G2-1 和 Chlorella sp. Y8-1 生長及油脂累積之影響。在兩階段培養的試驗結果部份，將進入穩定生長期的微藻細胞經離心收集在重新接入含有Fe³⁺的限制氮源培養基中，結果發現Chlorella sp. G2-1培養在含有1.2 μ M Fe³⁺的培養基中，油脂含量可達40%。由上述結果顯示Chlorella sp. G2-1 在限制氮源條件下額外添加Fe³⁺確實可以增加微藻細胞中之脂質含量。此外實驗研究發現Chlorella sp. G2-1與 Chlorella sp. Y8-1的主要脂肪酸組成為C16:0、C18:1、C18:2和C18:3。結果顯示其所生產的脂質很適合用來生產生質柴油。

關鍵詞：油脂、脂肪酸

目錄

封面內頁 簽名頁 中文摘要.....	iii
英文摘要.....	v
謝辭.....	vii
目錄.....	ix
表目.....	xii
緒論.....	xx
1.1 前言.....	1
1.1.1 研究動機與目的.....	2
2. 文獻回顧.....	2
2.1 微藻生質柴油之優勢與發展潛力.....	4
2.2 微藻介紹.....	7
2.3 光合作用.....	10
2.3.1 葉綠體結構 (Chloroplast Structure).....	11
2.3.2 色素與光吸收 (Pigments and Light Absorption).....	12
2.3.3 光合機構 (Photosynthetic Apparatus).....	14
2.3.4 光合磷酸化循環 (Cyclic Phosphorylation).....	17
2.4 影響微藻生長以及細胞組成之因子.....	18
2.4.1 溫度 (Temperature).....	18
2.4.2 二氧化碳 (CO ₂).....	20
2.4.3 光照 (Light).....	22
2.4.4 氮源 (Nitrogen).....	25
2.4.5 NaCl 之影響.....	29
2.5 藻類的培養 (Cultivation of Microalgae).....	30
2.5.1 開放式培養 (Open Pond Systems).....	30
2.5.2 封閉式反應器 (Closed Bioreactor Designs).....	33
3. 材料與方法.....	39
3.1 實驗器材.....	39
3.1.1 實驗藥品.....	39
3.1.2 儀器設備.....	40
3.2 採樣地點之選擇.....	41
3.3 本土海洋藻類之篩選.....	41
3.4 微藻鑑定.....	42
3.5 微藻特性分析.....	42
3.6 利用光學級電子顯微鏡，觀察藻體形態及藻體油滴脂.....	44
3.6.1 光學顯微鏡之觀察.....	44
3.7 微藻濃度分析法.....	45
3.8 脂質萃取.....	45
3.9 藻體蛋白質含量之測定.....	46
3.10 酸	

鹼值與光照測量 (pH & light)	46	3.11 多醣含量分析.....	46	3.12
藻體葉綠素(Chlorophyll)分析.....	47	3.13 脂質分析法.....	48	
3.14 兩階段培養策略之探討.....	49	3.15 微藻生長簡易計算.....		
49 4. 結果與討論.....	50	4.1 海水微藻之篩選.....		
50 4.1.1 藻株之初步篩選.....	50	4.1.2 藻株之鑑定與外型.....	53	
4.2 不同碳、氮源對微藻生長及油脂累積的影響.....	55	4.3 氮源濃度對微藻生長及油脂生產之影響.....	72	
4.4 不同碳源濃度對微藻生長及油脂生產之影響.....	82	4.5 NaCl 添加濃度對微藻生長及油脂生產之影響.....	91	
4.6 光照週期對微藻生長及油脂生產之影響.....	104	4.7 光強度對微藻生長及油脂生產之影響.....	114	
4.8 兩階段培養策略.....	125	4.8.1 不同溫度下及其第二階段缺N 培養策略.....	126	
4.8.2 不同額外添加物-硫代硫酸鈉及其第二階段 缺N 培養策略.....	127	4.8.3 不同額外添加物-FeCl ₃ 及其第二階段缺N 培養策略.....	128	
5. 結論與建議.....	149	參考文獻.....	153	
173 附錄一、Chlorella sp. G 2-1 之 18S rRNA 基因序列.....	173	附錄二、Chlorella sp. Y 8-1 之 18S rRNA 基因序列.....	174	
174 附錄三、個人簡歷表.....	175			

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