

Optimum Extraction of *Aplinia oxyphylla* Miquel Seed Oil by Supercritical Carbon Dioxide

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ABSTRACT

Aplinia oxyphylla Miquel is a Chinese herbal medicine that has clear-headed, resist a cold and kidney protected in the south mainland China. In the recently, some reports indicated the elements of *Aplinia oxyphylla* Miquel have terpenes (for example: eucalyptol, Zingiberene and zingiberol) and large of Taurine. The elements can to inhibit agglutination of platelet, reduced probability of cardiovascular diseases and apoplexy occurred, postponed to maturity, raised the faculty of memory and sex therapy. The *Aplinia oxyphylla* Miquel extract have raise contractibility of left atrial in guinea pig by methanol. The aqueous extracts have inhibition of sarcoma grow of ascites in a rat. In this study focus on the extraction of *Aplinia oxyphylla* Miquel seed oil by supercritical carbon dioxide. First, used one-factor-at a-time method to know the extract yield is affected with pressure. Second, response surface methodology (RSM) and 3-level-3-factor fractional factorial design were adopted to evaluate the effects of extraction variables, such as extraction time, reaction temperature and pressure on extraction yield. The optimum extraction conditions were: extraction time 3 h, reaction temperature 65 °C, pressure 300 bar and the highest extraction yield 2.80%. The results showed the pressure was important effect of extraction variables in the extraction of *Aplinia oxyphylla* Miquel seed oil by supercritical carbon dioxide.

Keywords : *Aplinia oxyphylla* Miquel ; supercritical carbon dioxide ; extraction ; RSM

Table of Contents

封面內頁 簽名頁 授權書iii 中文摘要iv 英文摘要v 誌謝vi 目錄vii 圖目錄x 表目錄xi 1.緒論1 2.文獻回顧4 2.1益智仁簡介4 2.1.1 益智仁內含成分及其功能簡介8 2.1.2目前益智仁取得方式介紹9 2.1.3益智仁相關文獻探討9 2.1.4益智仁走勢分析10 2.2 超臨界流體(Supercritical fluid, SCF)原理簡介12 2.2.1超臨界流體發展史13 2.2.2超臨界二氧化碳(Supercritical Carbon Dioxide)萃取優點15 2.2.3超臨界流體反應萃取技術簡介16 2.2.4超臨界二氧化碳於工業及食品上之應用16 2.3反應曲面法簡介17 2.3.1反應曲面法之應用22 2.3.2反應曲面法之原理22 3.材料與方法25 3.1實驗材料25 3.1.1實驗設備25 3.2實驗設計與方法25 3.2.1一對一實驗設計25 3.2.2三階層三變數的部份因子實驗設計(fractionalfactorial experimental design)26 3.2.3超臨界二氧化碳萃取益智仁方法29 3.2.4不同變因下萃取益智仁油質地及其顏色變化29 3.2.5萃取物回收率之計算32 4.結果與討論33 4.1一對一實驗結果33 4.1.1不同壓力對超臨界二氧化碳萃取益智仁含油量的影響33 4.1.2不同溫度對超臨界二氧化碳萃取益智仁含油量的影響33 4.1.3不同時間對超臨界二氧化碳萃取益智仁含油量的影響34 4.1.4超臨界二氧化碳萃取益智仁含油量之數據分析34 4.1.5統計分析之結果34 4.1.6超臨界二氧化碳萃取中草藥益智仁含油量之最優化探討35 5.結論42 參考文獻43

REFERENCES

- 1.王智民。2000。全球天然藥物之應用與發展。現代中藥研究與實踐。14:79-83。
- 2.李昌憲、洪哲穎及熊光濱。1992。利用反應曲面法進行以Streptococcus faecalis生產酪胺酸脫羧酶之培養基最適化研究。中國農業化學會誌。30:264-272。
- 3.余哲仁，王璧娟。2000。以超臨界二氧化碳萃取紫草中色素與紫草成份之研究。台灣農業化學與食品科學。2:194-198。
- 4.呂俠卿 編著。2002。中藥鑑別大全。第72-73頁。中華人民共和國湖南科學技術出版社。中國大陸。
- 5.林亮全，藍珮菁。1999。利用超臨界CO₂ 萃取日糧中添加不同油脂鵝肉膽固醇及磷脂質之研究。食品科學。26:350-360。
- 6.林語堂 編著。2004。蘇東坡傳。第94-167 頁。遠景出版社。台北，台灣。
- 7.邱郁雯，廖怡禎、孫璐西。1999。水分含量對於連續式超臨界二氧化碳下之酵素性酯化反應的影響。食品科學。37:87-94。
- 8.侯金才，李樹，李公戶。2005。複方地黃對衰老大鼠學習記憶及腦內AchE, SOD 活性影響的實驗研究。四川中醫。3:1002-1239。
- 9.孫璐西，廖怡禎。1998。超臨界流體技術應用在食品工業中之應用。化工技術。6:166-182。
- 10.高馥君。1992。反應曲面法在食品開發上的應用。食品工業月刊。24:32-41。
- 11.曹俊嶺。2004。火麻仁油對D-半乳糖治療急性衰老模型小鼠腦組織NO, SOD, GSH-PX, MDA 的影響。四川中醫。23:29-30。
- 12.張曉利，于新宇，驥志紅。2005。益智仁提取物對東良岩?所致記憶獲得障礙大鼠的干預效應。中國臨床康復。9:120-122。
- 13.張景岳。2006。中藥材之研究與發展。中醫藥研究中心。6:342-367。
- 14.馮淑香，劉耀明，董俊興。2003。中藥益智仁化學成分與藥理研究進展。現代中藥研究與實踐。17:58-61。
- 15.董志宏，楊宗熙，朱燕華。1999。超臨界二氧化碳萃取條件對烏龍茶粉咖啡因、多元酚及揮發性成份之影響。食品科學。26:395-403。
- 16.廖怡禎。1997。超臨界流體技術在台灣食品工業之發展與未來應用的展望。科學與技術。食品工業發展研究所。新竹，台灣。
- 17.劉紅，郭祀遠，肖凱軍，蔡妙顏，韓長日。2006。超臨界CO₂萃取益智油及益智油的抗氧化活性。華南理工大學學報。34:3。
- 18.Bowman, L. and Geiger, E. 1984. Optimization of fermentation nditions of alcohol

production. *Biotechnol. Bioeng.* 26:1492-1497. 19.Box, G.E.P. and Wilson, K.B. 1951. On the experimental attainment optimum conditions. *J. Roy. Statist. Soc.*, 13:1-45. 20. Chen, S.L. 1981. Optimization of batch alcoholic fermentation of glucose syrup substrate. *Biotechnol. Bioeng.* 23:1827-1836. 21. Cheynier, V., Feinberg, M., Chararas, C. and Ducauze, C. 1983. Application of response surface methodology to evaluation of bioconversion experimental conditions. *Appl. Environ. Microbiol.* 45:634-639. 22.Forster, M.J., Dubey, A., Dawson, K.M., Stutts, W.A., Lal, H. and Sohal, R.S. 1996. Age-related losses of cognitive function and motor skills in mice are associated with oxidative protein damage in the brain[J]. *Neurobiol.*93:4765-4769. 23.Galas, E., Bielecki, S., Antezak, T. and Weiczorek, A.B. 1981. Optimization of cultivation medium composition for lytic enzyme biosynthesis. In Moo-Young, M., Vezina, C. and Singh, K. (Eds) *Advances in Biotechnology-Proceedings 6th International Fermentation Symposium*, Pergamon Press, Canada. 3:301-306. 24.Jogiekar A.M. and May A.T. 1987. Product excellence through design of experiments. *Cereal Food World.* 32:857-868. 25.Leutner, S., Eckert, A. and Muller, W.E. 2001. ROS generation, lipid peroxidation and antioxidant enzyme activities in the aging brain. *J. Neural. Transm.* 108:955-967. 26.Liu, J., Atamna, H., Kurastsune, H. and Ames, B.N. 2002. Delaying brain mitochondrial decay and aging with mitochondrial antioxidants and metabolites. *J. Ann. NY. Acad. Sci.* 959:133-166. 27.Maddox, I.S. and Richert, S.H. 1977. Use of response surface methodology for the rapid optimization of microbiological media. *J. Appl. Bacteriol.* 43:17-204. 28.Moresi, M., Colicchio, A. and Sansovini, F. 1980. Optimization of whey fermentation in a jar fermenter. *Eur. J. Appl. Microbiol. Biotechnol.* 9:173-183. 29.Squier, T.C. 2001. Oxidative stress and protein aggregation during biological aging *J. Exp. Gerontol.* 36:1539-1550. 30.Shu-Feng Zhou.2007. Chinese Herbal Medicines for Toxicity Reduction in Cancer Chemotherapy. *Australian Journal of Acupuncture and Chinese Medicine.*2:30-34. 31.Zertuche, L. and Zall, R.R. 1985. Optimizing alcohol production from whey using computer technology. *Biotechnol. Bioeng.* 27:547-554. 32. www.100md.com.