Effects of Temperature and Pressure on the Antioxidanting Activities in Aqueous Extract of Angelicae Sinensis

林明丘、游銅錫 ; 陳齊聖

E-mail: 9601091@mail.dyu.edu.tw

ABSTRACT

In this study, Angelicae Sinensis was used the sample the herb for extraction, and the sample was treated at various temperatures and pressures . The antioxidative components of these samples were extracted using water as the solvent, and the antioxidative properties of the aqueous exacts were studied. In the analysis of ferrous ion chelating power, it showed that the aqueous exacts at high temperature and pressure had higher values than those extrated at room temperature and atmosphenic pressure. In the analysis of free radical scavenging acvtivity, both of Angelicae Sinensis samples exhibited high free radical scavenging activity at high solid to liquid ratio(16 mg/mL). In the quantitative analysis of the content of antioxidative components, both of flavonoids and polyphenols content, in the extracts were low. However, increase the extration temperature and pressure improved the extraction of both antioxidants.

Keywords : Angelicae Sinensis ; antioxidant ; temperature and pressure

Table of Contents

REFERENCES

1. 吳淳美。1979。食品中之氧化-還原系統及食品抗氧化劑。食品工業11:42-49。 2. 林天送。1998。生老病死的秘密pp.92-94。健康世界雜誌社。 3. 孫朝棟。1990。食品工程學。藝軒圖書出版社p.p. 345-364。 4. 高馥君、李敏雄。1998。食品保存與抗氧化劑。食品工業30（12）:17-24。 5. 陳如茵。1993。台灣蔬菜的儲存。食品工業發展研究所。新竹市，台灣省，中華民國。 6. 陳如茵、吳家駒、蔡美珠、錢明賽。2000。儲藏及熱加工對蕃茄抗氧化性之影響。台灣農業化學與食品科學38(4):353-360。 7. 傅偉光、陳秀瑩、仇志強、陳景川。1997。台灣地區食品營養成分資料庫。行政院衛生署委辦，食品工業發展研究所編印。新竹市，台灣省，中華民國。 8. 劉伯康。1997。數種傳統食用植物抗氧化性之研究。國立中興大學食品科學系碩士論文。 9. 劉伯康、陳惠英、顏國欽。1999。數種傳統食用植物甲醇萃取物抗氧化性之研究。中國農業化學會誌37（1）:105-116。 10. 鄭玉磬。1981。淺談食品色素。科學月刊12（12）:19-22。 11.晏文潔、李家璞、杜平。2000。類黃酮抗氧化力與其結構之關係。台灣農業化學與食品科學38（1）:80-88。 12.郭悅雄。1995。自由基、活性氧與抗氧化劑。台灣科學48(2): 164-177。 13. Arouma, O. I. 1994. Nutrition and health aspects of free radicals and antioxidants. Food Chem. Toxic. 32(7): 671-683. 14. Astorg, P. 1997. Food carotenoids and cancer prevention : An overview of current research. Trends Food Sci. Technol. 8(12): 406-413. 15. Waseem, A. V. Rao Z. and Agarwal. S. 1998. Lycopene content of tomatoes and tomato products and their contribution to dietary lycopene. Food Research International 31:737-741 16. Abushita, A. A. Hebshi,E.A. Daood H.G. and Biacs,P.A. 1997. Determination of antioxidant vitamins in tomatoes. Food Chem. 60:207-212 17. Bell, G. A. and Mellor, J. D. 1990. Further developments in adsorption freeze-drying. Food Research Quarterly. 50(2):48-53. 18. Blosi, M. S. 1958. Antioxidant determination by the use of a stable free radical. Nature. 26: 1199-1200. 19.Bonorden, W. R. and Pariza, M. W. 1994. Antioxidant nutrients and protection from free radicals, In: Nutr. Toxicol, Kostsonis FN, Mackey M and Hjelle J ed. Raven press. New York. p. 19-48. 20. Byers, T. and Guerrero, N. 1995. Epidemilogic evidence for vitamin C and vitamin E in cancer prevention. American J. Clinical Nutrition. 62(6S):1385-1392. 21. Crozier, A., Lean, M. E. J., McDonald, M. S. and Black, C. 1997. Quantitative analysis of the flavonoid content of commercial tomatoes, onions, lettuce, and celery. J. Agric. Food Chem. 45:590-595. 22. Decker, E. A. and Welch, B. 1990. Role of ferritin as a lipid oxidation catalyst in muscle food. J. Agric. Food Chem. 38:674. 23. Dzlezak, J. D. 1986. Antioxidants: the ultimate answer to oxidation. Food Technol. 40(9): 94-102. 24. Freed, M. 1966. L-Ascorbic acid. In

“ Methods of Vitamin Assay, ” 3rd. Edited by the Association of Vitamin Chemists, pp.287-344. Inc., Interscience Publishers, New York. 25. Ferrers, M. I., Gil, M. I., Castaner, M., and F. A. 1997. A Tomas - Barberan :phenolic metabolites in red pigmented lettuce changes with minimal processing and cold storage. J. Agric. Food Chem. 45:4249-4254. 26. Gerster, H. 1997. The potential role of lycopene for human health. J. Amer. Coll. Of Nut.16:109-126. 27. Halliwell, B. and Gutteridge, J. M. C. 1989. Free radicals, ageing and disease. In: Free Radicals in Biology and Medicine, ed. by B. Halliwell, and J. C. Gutteridge, p. 484-487. Clarendon Press,Oxford. Halliwell, B., M. A. Murcia, S. Chirico and O. I. Aruoma (1995) Free radicals and antioxidants in food and in vivo : what they do and how they work. Crit. Rev. Food Sci. Nutr. 35: 7-20. 28. Johnson, A. R. and Hewgill, F. R. 1961. The effect of the antioxidnts, BHA, BHT, and PG on growth, liver and serum lipids and serum sodium level of the rat. Aust. J. Exp. Biol. Med. Sci. 39: 353. 29. Khachik, F., Goli M. B., Beecher, G. R., Holden, W. R., Lusby M. D., Tenorio, M. D., Berrera M. R. 1992. Effect of food preparation on qualitative and quantitative distribution of major carotenoid constituents of tomatoes and several green vegetables. J. Agric. Food Chem. 40:390-398. 30. Khachik, F., Beecher, G. R., and Smith, J. C. 1995. Lutein, lycopene, and their oxidative metabolites in chemoprevention of cancer. J. Celllar Biochem. Supplement. 22:236-246. 31. King, V. A. -E., Zall, R. R., and Ludington, D. C. 1989. Controlled low-temperature vacuum dehydration – a new approach for low-temperature and low-pressure food drying. J. Food. Sci. 54(6):1573-1579. 32. Kitts, D. 1997. An evaluation of the multiple effects of the antioxidant vitamins. Trends Food Sci. Technol. 8(6): 198-203. 33. Klein, B. P. and Perry, A. K. 1982. Ascorbic acid and vitamin A activity in selected vegetables from different geographical areas of the united states. J. Food Sci. 47: 941-945. 34. Krinsky, M. I. 1990. Antioxidant functions of beta-carotene. Food Nutrition and Health 13(12):1-5. 35. Larson, R. A. 1988. The antioxidants of higher plants. Phytochemistry. 27: 969-978. 36. Lee, Y., Howard, L. R. and Villalon, B. 1995. Flavonoids and antioxidant activity of fresh pepper (Capscicum annuum) cultivars. J. Food Sci. 60:473-477. 37. Levy, J. Danilenko, M. and Sharoni, Y. 1997. The tomato carotenoid lycopene and cancer. In Food Factors for cancer prevention, pp.209-212. 38. Litchfield, R. J. and Liapis, A. I. 1979. An adsorption-sublimation model for a freeze-dryer. Chemical Engineering Science. 34:1085-1090. 39. Masrizal, M. A., Giraus, D. W., Driskell, J. A. 1997. Retention of vitamin C, iron, and β -carotene in vegetables prepared using different cooking methods. J. Food Quality. 20:403-418. 40. Meyskens, F. L. and Manetta, A. 1995. Prevention of cervical intraepithelial neoplasia and cervical cancer. American J. Clinical Nutrition. 62(6S):1417S-1419S. Meir, S., kanner, J., Akiri, B. and Philosoph-Hadas, S. 1995. Determination and involvement of aqueous reducing compounds in oxidative defense systems of various sencescing leaves. J. Agric. Food Chem. 43(7): 1813-1819. 41. Mistry, B. S. and Min, D. B. 1992. Oxidized flavor compounds in edible oils, in “ Off-Flavors in Foods and Beverages. ” Charalambous, G. (Ed). Elsevier, Amsterdam, The Netherlands. p.171-209. 42. Namiki, M. 1990. Antioxidants . antimutagens in food. Crit. Rev. Food Sci. Nutr. 29: 281-300. 43. Oyaizu, M. 1986. Studies on products of browning reaction: Antioxidative activities of products of browning reaction prepared from glucosamine. Jpn. J. Nutr. 44:307. 44. Porter, A. F. 1984. The use of citric acid in the seafood industry. Biotech. Pro. Div., Miles Labs., Inc., Elkhart, Ind. 45. Rao, A. V., Waseem, Z., Agarwal, S. 1998. Lycopene content of tomatoes and tomato products and their contribution to dietary lycopene. Food research International. 31:737-741. 46. Rouseff, R. and Nagy, S. 1994. Health and nutritional benefits of citrus fruit components. Food Technol. 48(11): 125-139. 47. Shimada, K., Fujikawa, K., Yahara, K. and Nakamura, T. 1992.Antioxidative properties of xanthane on the autoxidation of soybean oil in cyclodextrin emulsion. J. Agric. Food Chem. 40: 945. 48. Sies, H. and Krinsky, N. I. 1995. The present status of antioxidant vitamins and beta-carotene. American J. Clinical Nutrition. 62(1):1299S-1300S. 49. Thamas, J. 1995. The role of free radicals and antioxidants : How do we know that are working. Crit. Rev. Food Sci. Nutr. 35(1&2): 21-39. 50. Tonucci, L. H., Holden, J. M., Beecher, G. R., Khachik, F., Davis, C. S., Mulokozi, G. 1995. Carotenoid content of thermally processed tomato-based food products. J. Agric. Food Chem. 43:579-586. 51. Wang, H., Cao, G. and Prior, R. 1997. Oxygen radical absorbing capacity of anthocyanins. J. Agric. Food Chem. 45: 304-309. 52. Windholz, M. 1983. The Merck Index, 10th ed.Published by Merck & Co., Inc. Rahway, N. J., USA. Williams, W. B., Cuvelier, M. E. and Berset, C. 1995. Use of a free radical method to evaluate antioxidant activity. Lebensm-Wiss. Technol. 28(1): 25-30. 53. Zhang, Y., Talalay, P., Cho, C. and Posner, G. H. 1995. A major inducer of anticarcinogenic protective enzymes from broccoli:Isolation and elucidation of structure. Proc. Natl. Acad. Sci. 89:2399-2403.