

Antioxidant activity of ultrasonic extracts of leek *Allium porrum* L.

Jelena D. Mladenović¹, Pavle Z. Mašković¹, Radoš M. Pavlović¹, Blaga C. Radovanović², Gordana Aćamović-Đoković¹, Milica S. Cvijović¹

¹Faculty of Agronomy, University of Kragujevac, Čačak, Serbia

²Faculty of Science, University of Niš, Niš, Serbia

Abstract

This study was aimed at evaluating the antioxidant activity and efficacy of the ethanolic extract of the ultrasonic extracts of leek *Allium porrum* L. Ethanolic (50 vol.%) extracts of edible leek parts (stem and leaf) were prepared by ultrasound-assisted extraction, which was followed by evaluation of total phenols, flavonoids and antioxidant activity. Total phenols were determined using the modified Folin–Ciocalteu method. Antioxidant activity was assessed by scavenging the stable free radical 2,2-diphenyl-1-picrylhydrazyl (DPPH). The results of antioxidant activity were compared with control antioxidants: vitamin C and BHT. The higher content of phenols (69.46 mg GAE/g dry extract) and flavonoids (33.53 mg CE/g dry extract) was found in the ethanolic extract of leek stem. The measured values of IC_{50} were 98.90 and 61.05 μ g/mL for the ethanolic extract of leek leaf and stem, respectively.

Keywords: ultrasonic extracts; leek; stem; leaf; antioxidant.

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Phenolic compounds exhibiting antioxidant properties are an important component contributing to the beneficial effect of fruits and vegetables on human health [1]. Their ability to affect diseases resulting from oxidative stress has not been sufficiently elucidated. Flavonoids include a large number of compounds present in plants that have been used in both traditional and Eastern medicine for more than a thousand years. Pharmacologically speaking, these compounds show a broad spectrum of biochemical and pharmacological activities [2]. Different flavonoids have diverse antioxidant, antibacterial, anti-inflammatory, antiallergic, anti-mutagenic, antiviral, antithrombotic and vasodilative actions, with antioxidant and anti-inflammatory effects being the most pronounced [3]. These compounds are active in chronic inflammatory and allergic diseases, breast cancer and cardiovascular diseases [4]. Particular attention has been focused on their capacity to protect against and prevent cardiovascular diseases, in light of the fact that epidemiological studies have shown that flavonoids provide protection against the development of these diseases.

Most natural antioxidants are phenolic compounds [5]. In food, cosmetic and pharmaceutical industries, the most commonly used antioxidants include synthetic ones such as BHA (a mixture of 2-tert-butyl-4-hydroxyanisole and 3-tert-butyl-4-hydroxyanisole isomers) and BHT (2,6-di-tert-butyl-4-methylphenol). The use of syn-

thetic antioxidants is prohibited in some countries due to their long-term undesirable toxicological effects, including mutagenic, carcinogenic and teratogenic ones [6]. Moreover, the use of synthetic antioxidants is limited due to increasing consumer demand for additive-free food. Therefore, numerous studies conducted over the last few decades have been focused on identifying new antioxidants from natural sources. A major tendency in the food industry today is to obtain natural antioxidants from the plant material [7]. Extracts from the plant biomass are an important source of nutritional supplements, functional food components or antioxidants in the food industry. The tendency to replace synthetic compounds by active natural components has aimed research towards studies on different plant materials and identification of new extractable compounds having antioxidant effects. Huge efforts have therefore been made towards both the identification of cheap sources of natural antioxidants and the development of effective selective extraction techniques.

EXPERIMENTAL

Plant material

The Dutch leek (*Allium porum* L.) cultivar Varna characterized by medium early maturation, long white stem of uniform length and short green leaves that can be preserved for a long period of time was used as the plant material in this study. The plant was cultivated under open field conditions during the autumn growing cycle in 2010 on an experimental field at Trbušani, near Čačak. During the stage of leek harvest maturity, samples of edible parts, *i.e.*, stem and leaf were collected for extraction, and cut longitudinally into thin strips.

Correspondence: J. Mladenović, Department of Chemistry and Chemical Engineering, Faculty of Agronomy, University of Kragujevac, Cara Dušana 34, 32 000 Čačak, Serbia.

E-mail: jelenaml@tfc.kg.ac.rs

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