

Thematic course: Influence of infrared radiation on antioxidant activity of plant raw material and structured water adsorbed inside. Part 2.

Features of structured water in lily samples

© Anatoly A. Lapin,^{1*} Valery N. Zelenkov,² and Vera M. Merzlyakova^{3,4}

¹ Department of Water Biological Resources and Aquaculture. Kazan State Energy University. Krasnoselskaya St., 51. Kazan, 420066. Tatarstan Republic. Russia.

Phone: +7 (843) 519-43-53. E-mail: lapinanatol@mail.ru

² All-Russian Research and Development Institute of Vegetable Growing of the Russian Academy of Sciences. Vereya Village, Build.500. Ramensky District. Moscow Region. Russia.

E-mail: zelenkov-raen@mail.ru

³ Department of Fundamental and Applied Chemistry. Udmurtia State University. Universitetskaya St., 1. Izhevsk, 426034. Udmurtia Republic. Russia.

⁴ Izhevsk State Agricultural Academy. Studencheskaya St., 11. Izhevsk, 426069. Udmurtia Republic. Russia.

Phone: +7 (912) 446-60-30. E-mail: merzlyakova.vera@bk.ru

*Supervising author; ⁺Corresponding author

Keywords: dried samples of lily petals, leaves and bulbs, water extracts, thermal treatment, total antioxidant activity.

Abstract

The total antioxidant activity of water extracts obtained from the samples of dried lily (*Lilium*, ‘Siberia’ variety) petals, leaves and bulbs has been investigated. Both increase and decrease in total antioxidant activity were detected during final drying of studied lily samples using moisture detector MX-50, A&D Company (Japan) at t 105 °C. Using differences in total antioxidant activity of investigated samples of dried lily petals, leaves and bulbs before and after thermal treatment, total antioxidant activity of waters lost during drying were calculated. This water can have antioxidant properties, exceeding the value of distilled water by 4649 times for bulbs, as well as abnormal oxidative negative values, exceeding the value of distilled water in 36579 % rel. – for petals, in 21885 % rel. – for stems, and in 39890 % rel. – for leaves. When water extracts of lily samples were oxidized with 3% medical hydrogen peroxide (in volume ratio of 1:1), synergism effect was detected, it expressed as increase of corrected values of total antioxidant activity. Maximal values were the followings: for petals – 0.82 g rutin per 100 g of a sample, for stems – 0.42 g rutin per 100 g of a sample, and for leaves after thermal treatment – 0.09 g rutin per 100 g of a sample. Simultaneously, antagonism process was present; maximum negative value for thermally treated petals was 2.52 g rutin, for leaves – 0.57 g rutin, for bulbs – 0.27 g rutin, and minimum value for thermally treated bulbs and stems was 0.03 g rutin per 100 g of a sample. Increase in total antioxidant activity during action of hydrogen peroxide can be caused by its oxidative and hydroxylating properties, and oxidative functionalization of antioxidants in the examined samples, as well as by formation of different combinations between hydrogen peroxide, water and antioxidant molecules.