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# **Czech J. Food Sci.**

**Horváthová J., Suhaj  
M., Polovka M.,**

**Drežova V., Šimková I. .**  
**The influence of  
gamma-irradiation on  
the formation of free  
radicals and  
antioxidant status of  
oregano (*Origanum  
vulgare* L.)**

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The influence of various gamma-radiation dose absorptions on oregano (*Origanum vulgare* L.) solid samples was monitored by means of electron paramagnetic resonance (EPR) spectroscopy. Further, the antioxidant activity of oregano methanol/water extracts was characterised using DPPH (1,1-diphenyl-2-picrylhydrazyl free radical); thiobarbituric acid reactive substances (TBARS); ferric reducing power (FRP); and total content of phenolic compounds (TPC) assays. EPR spectroscopy was used for the investigation of the influence of the absorbed dose on the character of

the paramagnetic structures formed, as well as for their thermal stability and lifetime characterisation. EPR spectrum of the reference (non-irradiated) sample represents a broad singlet line with unresolved hyperfine splitting, attributable to Mn(II) ions, upon which the additional sharp EPR signal ( $g = 2.0022$ ,  $\Delta B_{pp} \approx 1$  mT) is superimposed, assigned to stable semiquinone radicals produced by the oxidation of polyphenolic compounds present in plants. The additional paramagnetic structures of different origin (mostly of cellulose and carbohydrate), possessing diverse thermal stability and life-time, were identified in the gamma-irradiated samples. Immediately after irradiation, a statistically significant increase was observed of the TBARS values and the total content of phenolic compounds in methanol/water oregano extract. The alterations of the antioxidant properties of oregano extracts with the time after the radiation treatment were also monitored. A substantial time-dependent decrease of antioxidant activity was observed, probably as a result of storage, with both irradiated and non-irradiated oregano samples, as obvious from the ferric reducing power test and

the content of total phenolic substances. The influence of irradiation and subsequent storage of oregano samples on the DPPH radical-scavenging ability was only negligible.

**Keywords:**

oregano; irradiation; EPR spectroscopy; free radicals; thermal stability; life-time; antioxidant activity

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