Title	Effect of gamma-irradiation on antioxidant activity of black pepper (*Piper nigrum* L.)
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Abstract

Antioxidant activity and EPR investigations of irradiated ground black pepper (*Piper nigrum* L.) were evaluated. The black pepper was exposed to γ-irradiation at doses from 5 to 30 kGy. The effect of irradiation on antioxidant properties of black pepper extracts was investigated by radical-scavenging effect on 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals, by determination of reducing power and content of thiobarbituric acid-reactive substances. Some significant changes were observed in creation of thiobarbituric acid-reactive substances (TBARS). Difference between non-irradiated and irradiated samples at the legal European limit dose of 10 kGy reached, on average, 23% and, at the Food and Drug Administration (FDA) 30 kGy limit, 33%. Irradiation affected significantly the DPPH radical-scavenging activity and reducing power of ground black pepper extracts. The γ-radiation treatment of ground black pepper samples observed by EPR, resulted in the production of three paramagnetic species (**GI–GIII**) characterized by different origin, thermal behaviour and stability. The axially symmetric EPR resonances, **GI** and **GII**, were assigned to the carbohydrate radical structures. The spin Hamiltonian parameters of **GIII** possessed the characteristic features of "cellulosic" radical species. The EPR measurements, performed 20 weeks after the radiation process, confirmed that temperature increase from 298 to 353 K, caused significant decrease of integral EPR signal intensity for γ-irradiated samples (~40%), compared to the reference (non-irradiated) ground black pepper, where only 13% drop was found. Significant correlation between EPR and thiobarbituric acid methods was assessed by study of antioxidant activity changes in relation to irradiation doses and also in the case of spice storage, between EPR and reducing power methods.