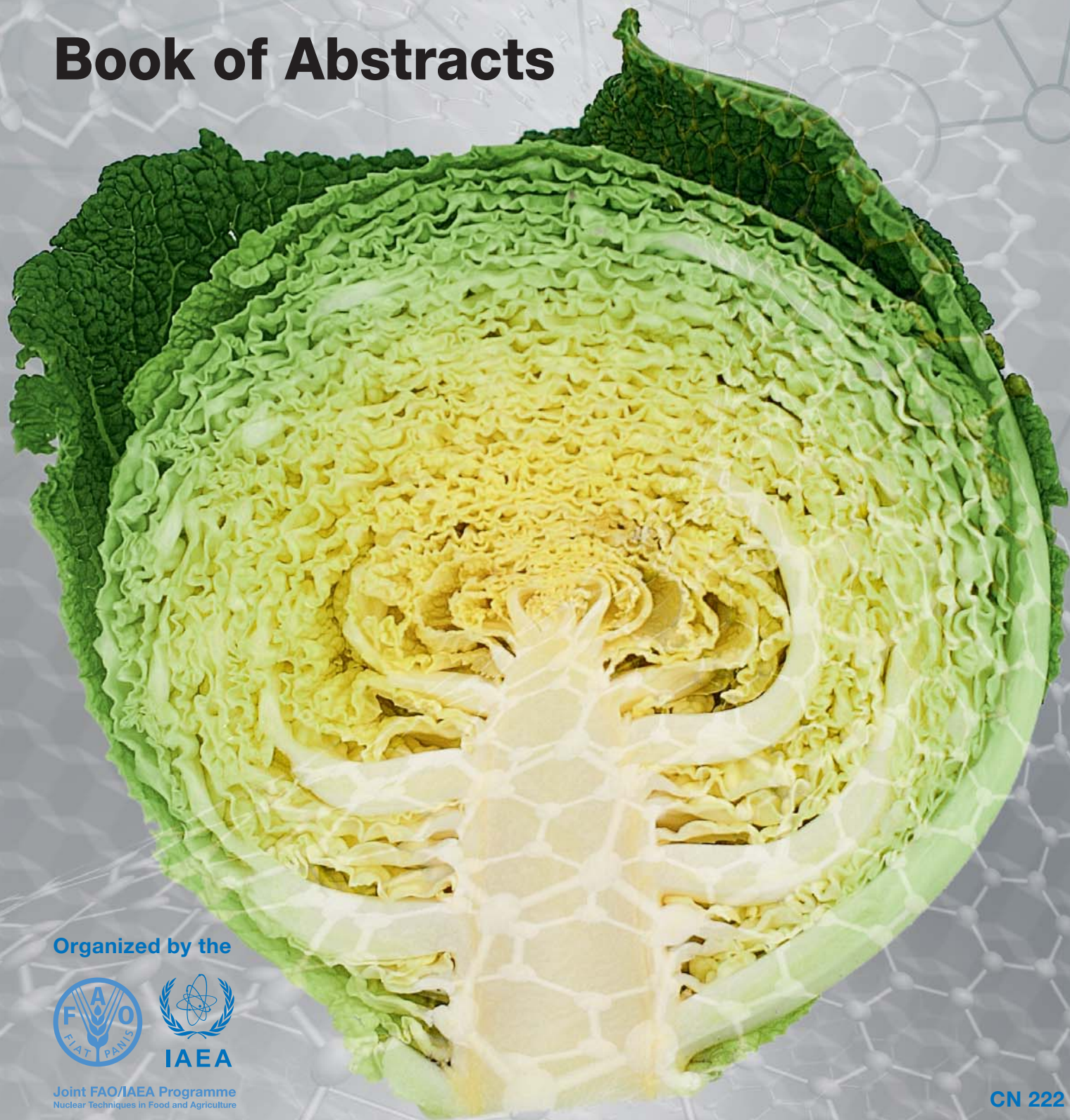


# International Symposium on Food Safety and Quality: Applications of Nuclear and Related Techniques

10–13 November 2014, Vienna, Austria

## Book of Abstracts



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Nuclear Techniques in Food and Agriculture

CN 222

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## Effects of gamma irradiation on antioxidant potential and chemical composition of *Ginkgo biloba* L.: a comparative study of 1 and 10 kGy doses

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*Ginkgo biloba* L. is a very old tree widely used in pharmaceutical industry to combat some diseases; in particular, it has been experimentally used as a natural therapeutic agent in the treatment of Alzheimer's disease [1,2]. Irradiation is a methodology accredited for dry ingredients, being increasingly recognized, and represents almost 50% of the world market for post-harvest preserved foods (~186 000 ton). Furthermore, irradiation might also represent a suitable solution for medicinal plants postharvest treatment in order to guarantee their decontamination [3,4,5]. In this study, the effects of gamma irradiation (1 and 10 kGy) in the antioxidant properties and chemical composition of *G. biloba* were evaluated. Radical scavenging activity, reducing power and inhibition of lipid peroxidation in brain homogenates were used to evaluate antioxidant potential. Macronutrients (protein, fat, carbohydrates and ash) were determined following official procedures of analysis; hydrophilic (sugars and organic acids) and lipophilic (fatty acids and tocopherols) compounds were determined by chromatographic techniques coupled to different detectors. In general, the methanolic extract gave higher antioxidant activity (lower EC50 values) than the corresponding infusions. For both infusion and methanolic extract, gamma irradiation at both doses increased 2,2-diphenyl-1-picrylhydrazil (DPPH) scavenging activity, reducing power,  $\beta$ -carotene bleaching and lipid peroxidation inhibition of *Ginkgo* samples. In chemical composition this process preserved macronutrients (ash, fat and energy were not changed), fatty acids,  $\gamma$ - and  $\delta$ -tocopherols, fructose, trehalose, quinic and shikimic acids. In particular, 1 kGy protected  $\alpha$ -tocopherol, oxalic and malic acids contents, while 10 kGy decreased proteins,  $\alpha$ -tocopherol, glucose, sucrose, oxalic and malic acids level. Overall, irradiation at 10 kGy potentiated more the antioxidant activity of methanolic extract and infusion obtained from leaves and 1 kGy would be the recommended dose to maintain nutritional profile of *G. biloba*, protecting specific molecules.

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[1] Kato-Noguchi, H., Takeshita, S., Kimura, F., Ohno, O., Suenaga, K., 2013. A novel substance with allelopathic activity in *Ginkgo biloba*. *J. Plant Physiol.* 170, 1595-1599.

[2] Diamond, B.J., Shiflett, S.C., Feiweil, N., Matheis, R.J., Noskin, O., Richards, J.A., Schoenberger, N.E. 2000. *Ginkgo biloba* extract: mechanisms and clinical indications. *Arch. Phys. Med. Rehabilitation* 81, 668-678.

[3] Byun, M.W., Yook, H.S., Kim, K.S., Chung, C.K. 1999. Effects of gamma irradiation on physiological effectiveness of Korean medicinal herbs. *Rad. Phys. Chem.* 54, 291-300.

[4] Nagy, T.O., Solar, S., Sontag, G., Koenig, J. 2011. Identification of phenolic components in dried spices and influence of irradiation. *Food Chem.* 128, 530-534.

[5] Kume, T., Furuta, M., Todoriki, S., Uenoyama, N., Kobayashi, Y. 2009. Status of food irradiation in the world. *Rad. Phys. Chem.* 78, 222-226.