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IRRADIATION TECHNOLOGY FOR FOOD PRESERVATION: A COST ANALYSIS FROM PRODUCER TO CONSUMER

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The food preservation by irradiation provides many benefits to consumers, including more durability, though there may also be increase in their costs. However, the reduction of losses increases the profits producers' and traders', thus offsetting the cost invested in food treatment. The costs for operating a commercial irradiator basically consist of the initial investment, working facilities, equipment and transport, besides, the operating costs which are the resources needed to adjust the operation, performed before the operation of the irradiator which are strongly linked to safety factors. As soon as the operation starts, begins the initial investment recuperation, and it is important to highlight that the recovery time depends on the proper use according to demand, on the product type and on the time it takes to be irradiated, according to technical specifications that determine the production final amount. Due to the high initial investment, it is fair to say that the irradiator must work at its maximum capacity, preferably processing products that add high value as being irradiated. The return over investment calculation aggregates the food sales price, the quantity produced and the cost reduction by lowering the storage. The methodology of the study consisted of a food irradiation technology deployment and its costs and benefits, in order to analyze the increase in the cost of food from the producer to the consumer, as well as to check if the impact of final price may be lower than the loss of storage of not irradiated products. A research unveils that practicality is a feature already incorporate by the consumer, nevertheless the price may be a limiting factor to the popularity of irradiated products, although some consumers consider that due to the avoidance of, the cost increase, may be justified viable.

Key words: Irradiated Food; Technology Cost; Economical Viability

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ENHANCED FORMATION OF QUERCETIN BY COMBINED USE OF GAMMA RAY AND H_2O_2 FROM CYANIDIN-3-O-XYLOSYLRUTINOSIDE

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The cyanidin-3-*O*-xylosylrutinoside (cya-3-*O*-xylrut), a major pigment in *Schizandra chinensis* Baillon, was effectively removed by gamma irradiation of greater than 2 kGy, whereas quercetin, the most abundant of the flavonoids and has anti-inflammatory and anti-allergic effects, could be generated by degradation of cya-3-*O*-xylrut. In the present study, we investigated the effect of combination treatment of gamma irradiation and hydrogen peroxide (H_2O_2) on the formation of quercetin through the degradation of cya-3-*O*-xylrut. Cya-3-*O*-xylrut was significantly degraded (~93%) by gamma irradiation at 2 kGy and it was completely removed by a combination treatment (gamma ray-H_2O_2) (Figure 1). The formation of quercetin was significantly appeared at 2 kGy of gamma ray, together with disappearance of cya-3-*O*-xylrut. This result implies that quercetin formation would be derived from cya-3-*O*-xylrut pigment. In addition, the combination treatment of H_2O_2 (0.2%)-gamma ray (2 kGy) is more effective to convert cya-3-*O*-xylrut into quercetin than individual gamma irradiation. The quercetin formation by gamma ray is 3.2 μg/ml and combination treatment is 7.7 μg/ml (Figure 2), that is, H_2O_2 would be acted as an accelerator for breaking chemical bond of cya-3-*O*-xylrut. In conclusion, gamma ray combined with H_2O_2 would be a promising tool for bio-conversion of organic compounds.

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