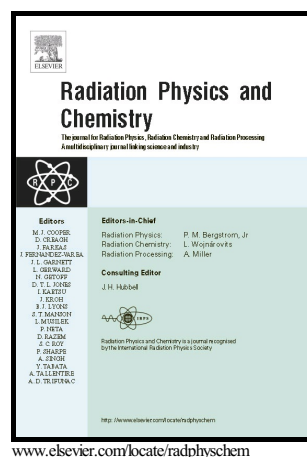


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Effect of electron irradiation and bayberry polyphenols on the quality change of yellowfin tuna fillets during refrigerated storage

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Abstract:

This study evaluated the synergistic effect of bayberry polyphenols and electron irradiation in controlling the chemical, microbiological and sensory changes of raw yellowfin tuna fillets at 4 °C for 7 days. The results indicated that the initial values of each index were dose-dependent. The dose of 5 kGy notably accelerated adenosine triphosphate degradation and lipid oxidation, while the doses of 1 and 3 kGy had acceptable sensory quality and yielded a shelf-life of 5 days. The addition of bayberry polyphenols had evident effect in inhibiting freshness breakdown, bacteria growth, histamine formation, and discoloration of tuna fillets. Bayberry polyphenols, as an antioxidant, could inhibit lipid oxidation and sensory side-effects made by irradiation up to 3 kGy. The dose of 1 ~ 3 kGy coupled with bayberry polyphenols was optimum to preserve tuna fillets which prolonged the shelf-life to 7 days.

Keywords:

Electron irradiation; Chinese bayberry; polyphenols; combination treatment; tuna meat; quality

1. Introduction

Yellowfin tuna (*Thunnus albacares*) meat is one of the most popular sources to make sushi and sashimi. It is usually cut into fillets, aerobically packaged and stored in refrigerators before sale where psychrophilic microorganisms rapidly breed and adenosine triphosphate easily break down, the lipid and hemoglobin oxidation also induce flavor and color changes (Guizani et al., 2005; Thiansilakul et al, 2013).

Electron irradiation is a safe and effective method towards food preservation which has been studied for many years (Roberts, 2014). Although irradiation is useful for eliminating pathogens and inhibiting histamine even at low-dose, it may produce some side-effects like lipid oxidation and characteristic aroma off-odors. Some studies reported that plant extracts with strong antioxidant activities are effective against irradiation-induced oxidation on poultry meat (Ahn et al., 2013; Badr, 2011; Lee and Ahn, 2005; Lee et al., 2003), however, there are less reports assessed the effect of natural antioxidants on irradiated aquatic productions for raw consumption (Mendes et al., 2005).

Chinese bayberry (*Myrica rubra* Sieb. et Zucc.) is a commercial fruit available in eastern and southern China. The production of bayberry juice and wine yields an abundance of residues which is traditionally considered as agricultural waste. Published studies reported that bayberry residues contain polyphenols and have strong antioxidant activities (Zhou et al. 2009; Chen et al., 2015). The recycle use of agricultural

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