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"Solidarity in a competing world — fair use of resources"

Natural Preservatives Minimizing Products Waste in the Supply Chain of the Future

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Abstract

The global population is expected to increase from 7.3 billion in 2015 to around 9 billion by 2050. As a result world demand for food is expected to be 70 % higher in 2050 compared to 2015, mostly in developing and emerging economies in Asia. In recent decades, there has been much research into innovative food preservatives and packaging technologies and solutions. This includes research aimed at reducing the need for chemical preservatives while maintaining the nutritional and sensorial properties of food and increasing the shelf-life of products. Essential oils are a good source of several bioactive compounds, which possess antioxidative and antimicrobial properties; they can extract from different non-edible parts of plants; which are considered as agricultural wastes. Efficient use of natural preservatives has an important role on prevention of losses in supply chain. In this regards, Sour orange old leaves and sour lemon peels were considered as essential oils resource. Following oil extraction, one of the Iranian native citrus (*Citrus sinensis*) treated with different concentration (0, 250 and 500 μll^{-1}) of essential oils to prevent of spoilage and mold growth during storage period; than fruits stored in the passive MAP condition. Treated oranges were evaluated for post-harvest quality after 30 days of 4°C storage. The quality parameters included: weight loss, loss in firmness, colour change, total soluble solids, acidity, and percentage of spoilage. It was found that all treatments have significant effects on various parameters of citrus fruit. Independent of treatments, total sugars and organic acids decreased continuously with increasing storage duration. Packaging provided protection against weight loss and loss of firmness; although delaying the rate of colour change in compare to control was observed with high concentration of sour orange oils. Regarding antifungal activity, the results were satisfactory against gray and green mold growth which varied significantly ($p < 0.05$) with respect to concentration of sour orange oil treatments versus sour lemon. This data allowed deduction to be made fruit and vegetable waste is recycled through essential oils and minimising the amount of product losses and increasing the fair use of resources.

Keywords: Essential oils, natural preservatives, product losses, waste

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