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The use of natural antimicrobial compounds in packaging of leafy greens: impact on microbial load and sensory quality

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Control of microbiological quality of leafy vegetables is essential, especially in the case of organic vegetables, which are more susceptible to microbial attack as they are produced without agrochemicals. Natural antimicrobial compounds in packaging may be an innovative and safe solution to inhibit microbial growth and maintain quality after harvest. The aim of this study was to evaluate the impact of selected natural antimicrobial compounds (eugenol, carvacrol or *trans*-anethole) on the quality of packaged organic wild rocket. The active compounds were incorporated into pellets. One sachet containing 1 g of pellets was placed in an empty tray that was then filled with 100 g of organic wild rocket and wrapped with laser perforated polypropylene film. After 7 days of storage at 5 °C, sensory descriptive analysis showed that the natural antimicrobial compounds masked off-odors that impaired the sensory quality of wild rocket but had no effect on the microbial load.

Abstract from Bari 2014

Microbial growth is one of the main causes of deterioration and postharvest loss of leafy green vegetables. Their control is essential especially in the case of organic vegetables, which are more susceptible to microbial attack as they are produced without agrochemicals. Application of natural antimicrobial compounds in packaging seems to be an innovative and safe solution as antimicrobial compounds can inhibit microbial growth and help to maintain the quality. The aim of this study was to select natural compounds based on their antimicrobial activity and to evaluate their impact on sensory quality of packaged organic wild rocket. Eugenol, carvacrol, trans-anethole, trans-cinnamaldehyde, and α-pinene were tested against selected pathogens for their antimicrobial activity in an in-vitro study. Eugenol, carvacrol, trans-anethole, and trans-cinnamaldehyde showed antimicrobial activity against storage rot and eugenol, carvacrol, and trans-cinnamaldehyde against human pathogens. Based on these results eugenol, carvacrol and trans-anethole were selected for a packaging study. Ten percent of active compound was incorporated into biodegradable pellets, which were inserted into biodegradable, non–woven sachets. One sachet with 1 g pellets was placed in an empty tray. The tray was filled with 100 g of organic wild rocket and wrapped with laser perforated polypropylene film. After 7 days of storage at 5 °C, sensory descriptive analysis was performed. A trained panel consisting of 9 panelist evaluated visual appearance (‘product height’, ‘tray/product liquid’, ‘green leaves’, ‘discoloration’, ‘brown cut-edges’, ‘rotten leaves’, and ‘visual freshness’) and odor (‘fennel/anis’, ‘clove’, ‘thyme/oregano’, ‘ketchup/tomato’, ‘vegetable soup’, ‘sweet’, ‘rotten/earthy’, ‘cabbage’, ‘ammonia’, and ‘off-odor’). The sensory analysis of appearance showed that there were significant differences ($P \leq 0.05$) between treatments on ‘product height’ and ‘tray/product liquid’ but not for the other visual attributes. For the eugenol, carvacrol, and trans-anethole odors there were also significant differences ($P \leq 0.05$) between treatments. Eugenol and trans-anethole tended to mask the released ‘off-odor’ from the wild rocket during 7 days storage at 5 °C, although differences were not significant ($P > 0.05$). The study showed that natural antimicrobials can mask off-odors that impair sensory quality of packaged leafy greens.