

Title Development of antifungal hydroxypropyl methylcellulose-lipid edible composite films and coatings to control harvest green and blue molds on hybrid mandarins cv. Ortanique

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Abstract

New hydroxypropyl methylcellulose (HPMC)-lipid edible composite films and coatings containing food preservatives with antifungal properties were developed to control citrus postharvest green and blue molds, caused by the pathogens *Penicillium digitatum* (PD) and *Penicillium italicum* (PI), respectively. Tested chemicals were mainly salts of organic acids, salts of parabens, and mineral salts, all classified as food additives or generally recognized as safe (GRAS) compounds. The antifungal activity of stand-alone edible films were evaluated in vitro using disk diameter tests. Selected edible coatings containing food preservatives were tested in vivo on 'Ortanique' hybrid mandarins to determine their curative (coated 24 h after fungal inoculation) and preventive (coated 24 h before fungal inoculation) activity. Disease incidence and severity were determined on fruit artificially inoculated with the pathogens and incubated at 20°C and 90% RH for 7 days. Film disks containing sodium salts of parabens and the organic acid salts potassium sorbate (PS) and sodium benzoate (SB) were the most effective to inhibit both PD and PI. The use of mixtures of parabens or organic acid salts did not provide any additive or synergistic effect for in vitro pathogen inhibition when compared to the use of single chemicals. On 'Ortanique' mandarins treated after fungal inoculation, paraben-, PS-, and SB-based coatings only reduced the incidence of green and blue molds by about 40 and 20%, respectively. However, HPMC-lipid coatings containing a mixture of PS and sodium propionate (PS+SP) reduced disease incidence by more 75 and 65%, respectively. On these fruit, the severity (lesion size) of both molds was reduced by more than 90%. The incidence and severity of both green and blue molds on mandarins coated before inoculation (preventive activity) was not significantly affected by the application of any of the antifungal coatings.