
Antimicrobial coating based on essential oils encapsulated in sodium caseinate-guar gum blend to preserve quality of fresh fruits

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Essential oils (EOs) have received much attention as active agent in biopolymer active coating, as promising technology to preserve quality of fresh and minimally processed fruits and vegetables. Sodium caseinate based coatings has been showed to be good carrier of active compounds. Thus, the main aim of the present study was to develop antimicrobial coating based on EOs encapsulated into caseinate/guar gum blend for preservation of fresh and minimally processed strawberries and pears.

Thyme oil (TEO), peppermint oil (PEO), and lemon oil (LEO) were chosen as EOs. The antimicrobial activity of EOs was assessed determining the minimal inhibitory concentration (MIC) against 37 bacterial and fungal isolates from pears and strawberries. EOs at 1,5 % were included in a blend system made of sodium caseinate /guar gum to obtain the active coating. Physical stability, granulometry and rheological properties of the active coatings at 1.5% of OEs has been assessed. For TEO, antimicrobial activity of the active coatings at 0.1%, 0.2% and 1.5% were evaluated by agar well diffusion assay.

TEO showed MIC from 25 to 0.098% (lowest % EO with antimicrobial activity) against all isolates; MIC of PEO and LEO ranged from 50 to 0.098% and from 50 to 12.5% respectively, against 50% of isolates. All the systems showed good physical stability over time. D_{4,3} values varied from 72 µm for PEO-based blend to ? 50 µm for the other two blends. Low uniformity and span values of all the EOs based blends were observed indicating that a quite uniform coarse emulsion was obtained for all. Blends presented high values of zeta potential, from -30 mV for PEO to -54 mV for LEO. Systems showed a shear thinning behavior; LEO-based blend presented the highest viscosity values. 1.5% TEO-based blend confirmed good antimicrobial activity in accordance with MIC results; 0.1% and 0.2% TEO-based blends did not present antimicrobial activity.

All the active blends showed good physical properties for coating application. TEO showed the best antimicrobial activity against natural strawberry and pear microbial populations. TEO and sodium caseinate/guar gum blend at 1.5% can be promising antimicrobial coating for pears and strawberries.