Survival performance of *Enterococcus durans* 39C using prebiotic-polymeric blend as an encapsulation matrix.

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Abstract

The use of prebiotic material for probiotic microencapsulation is presented here. The objectives are to enhance its survival rate, colonic release, and stability of these probiotic cultures in digestive condition during storage time. Nine types of biopolymers (alginate-psyllium) blend with different concentration of prebiotic; (inulin or fenugreek) were used as candidate for microencapsulation matrix. One strain of probiotic candidate, *Enterococcus durans* 39C was used in this study. The microencapsulation of this strain with the respective polymer blend was performed by using a simple extrusion method. All blend of formulations have recorded high encapsulation efficiency at value >98%. The survival rate of viable probiotic cells under simulated digestive conditions was also high with value above 47% as compared to non-microencapsulated cells. These nine gel formulations also displayed the high survival rate of viable probiotic cells during storage time (28 d). Their release occurred after 2 h in colonic condition and sustained until 12th h of incubation period. An increase of prebiotic effect value added was observed in incorporated inulin and fenugreek formulations, hence, an indication for their suitability as matrix material for probiotic encapsulation.

Image

Table 1 – Compositions, size, moisture content (%), water activity and encapsulation efficiency (%) of microencapsulated *E. durans* 39C with various prebiotic concentrations. Alginate-encapsulated cells (2% (w/v)) wasused as control. F1–F9: various gel formulations. Values shown are means ± standard deviations ($n = 3$).

Formulation	Prebiotics	Con. (%)	Diameter (μm) ($n = 50$)	Moisture Content (%)	Water Activity	Encapsulation Efficiency (%)
ALG	–	–	830–1100 ± 6	$3.27 \pm 0.2^{a*}$	0.42 ± 0.003^{a}	98.7^{a}
F1	–	–	240–330 ± 3	3.19 ± 0.03^{a}	0.38 ± 0.004^{a}	99.6^{a}
F2	Inulin	0.5	310–350 ± 2	3.06 ± 0.03^{a}	0.30 ± 0.002^{b}	98.5^{a}
F3	Inulin	1	210–270 ± 4	3.15 ± 0.02^{a}	0.28 ± 0.003^{b}	99.4^{a}
F4	Inulin	1.5	340–380 ± 5	3.23 ± 0.01^{a}	0.32 ± 0.001^{b}	98.5^{a}
F5	Inulin	2	300–370 ± 3	3.18 ± 0.02^{a}	0.27 ± 0.004^{b}	99.3^{a}
F6	Fenugreek	0.5	380–470 ± 7	2.92 ± 0.04^{a}	0.20 ± 0.003^{c}	99^{a}
F7	Fenugreek	1	410–540 ± 2	2.88 ± 0.03^{a}	0.21 ± 0.001^{c}	98.3^{a}
F8	Fenugreek	1.5	560–620 ± 5	3.02 ± 0.03^{a}	0.19 ± 0.006^{c}	98.8^{a}
F9	Fenugreek	2	580–780 ± 3	3.00 ± 0.01^{a}	0.22 ± 0.002^{c}	99.2^{a}

$^{a–c}$Values followed by the same letters are not significantly different ($P > 0.05$). Statistical analysis of each formulation was done separately. ALG: alginate-encapsulated cells, Con: Concentration.

Recent Publications

1. Samavati, R. and Abdullah, N. (2016). The experimental Assessment and study of Ubi Kayu starch as fluid loss control agent in water based drilling mud, International Journal of Scientific Research in Chemical Engineering, 3(1),1-6.
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6. Haghshenas B., Nami Y., Abdullah N., Radiah D., Rosli R. and Khosroushahi A. Y. (2015). Anticancer impacts of potentially probiotic acetic acid bacteria isolated from traditional dairy microbiota, LWT-Food Science and Tech., 60, 690-697.
7. Haghshenas B., Abdullah N., Nami Y., Radiah D., Rosli R. and Khosroushahi A. Y. (2015). Microencapsulation of probiotic bacteria Lactobacillus plantarum 15HN using alginate-psyllium-fenugreek polymeric blends, J. App. Microbiology, 118, 1048-1057.



Biography

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Notes/Comments: