

[BIO22]

**Production and quality of chitosan extracted from local fungal isolates**

**Dawn Carmel Paul, Kalaivani Nadarajah, Abdul Jalil Abdul Kader**

School of Biosciences and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan  
E-mail: dawner@lycos.com

Growth of three local fungal isolates *Absidia* sp. DR, *Absidia* sp. 2a1 and *Rhizopus* sp. on three growth media: YPG (complex media), BG (semi defined medium) and TVB (defined medium) were compared. The fungi were grown as batch cultures for 96 hours with harvesting performed at 12-hour intervals. *Absidia* sp DR grown on YPG for 60 hours gave the highest yield (18% chitosan/biomass). Effects of media composition, and the extraction parameters such as temperature, incubation period, acid concentration and acid type towards the chitosan yield and chitosan quality were studied. In both alkaline treatment and acidic treatment, incubation period and temperature gave significant differences in chitosan production ( $P < 0.05$ ). Maximum chitosan yield was obtained at the highest temperature used for both alkaline and acidic treatments (121°C and 95°C respectively). In addition, acid concentration (2%, 6% and 10%) and acid type (acetic, formic and hydrochloric acid) used in the acid treatment were also found to give significant differences in the production of chitosan ( $P < 0.05$ ). Acid treatment employing formic acid 6%, incubation period 12 hours and temperature 95°C gave the highest chitosan yield (~22% chitosan/biomass). The fungal chitosan produced from the above treatment combinations were also tested for their degree of deacetylation, colour and molecular weight (selected samples). The use of hydrochloric acid gave significantly higher degree of deacetylation values and produced darker coloured chitosan as compared to acetic acid and formic acid. The highest degree of deacetylation obtained was 90.45% (hydrochloric acid 10%, incubation period 12 hours and temperature 95°C). Chitosan was found to have the highest lightness value ( $L > 80$ ) when treated using formic acid 2%, incubation period 3 hours and temperature 60°C. Chitosan extracted from fungi grown on defined media was also found to have higher lightness values compared to samples extracted from fungi grown on complex medium. Average molecular weight for selected chitosan samples ranged from  $6.765 \times 10^4$  Da to  $2.757 \times 10^5$  Da. The trend for the bacterial inhibition of fungal chitosan and crustacean chitosan were similar whereby Gram positive bacteria were more susceptible towards the action of fungal and crustacean chitosan as compared to Gram negative bacteria. It was also observed that fungal chitosan had a bactericidal effect towards *Bacillus cereus*. In general, the minimum inhibition concentration (MIC) for fungal chitosan was 0.156 mg/ml and 0.078 mg/ml for crustacean chitosan ( $2.216 \times 10^6$  Da to  $8.099 \times 10^6$  Da). On the whole, it can be concluded that treatment combinations for the extraction protocol need to be selected based on the chitosan properties desired.