

Bacterial cellulose production on apple juice

Biomaterials and biopolymers, such as bacterial cellulose (BC), are gaining increased importance as perspective eco-friendly materials with wide range of potential applications. BC is an exopolysaccharide produced mainly by certain acetic acid bacteria strains. BC exhibits unique physical and mechanical properties and has many potential applications starting from biomedicine to food industry. However, BC industrial production still is associated with several difficulties, one of which is to achieve high BC production yield. Costs of growth media for BC production can reach up to 30 % of the total production costs and, therefore searches for alternative growth substrates are challenging. For instance, as it has been showed in several studies, juice from low quality apples can be used instead of standard growth medium. At present food loss and refuse is one of the great global problems. Annually, about one third of all foods produced (1.3 billion tons/year) is lost during harvest, processing and retail. Approximately 30 – 40 % of annual apple harvest remains unsold. Apples can be used to produce apple juice which is rich in such sugars as glucose 9.3 – 32.2 g/L, fructose 66.1 – 96.0 g/L, sucrose 8.5 – 55.1 g/L and total sugars reaching 110.9 – 164.4 g/L. Moreover, apple juice is rich in macro- and micronutrients, including B group vitamins, that may also enhance bacterial growth and BC synthesis. In the current study BC synthesis on apple juice was evaluated. The optimal dilution factor of unmodified apple juice was 1:6 that corresponds to 15.28 ± 0.68 g/L of total sugar concentration and resulted in 0.89 ± 0.01 g/L of dry BC production, which is higher as compared with reported previously. Further research showed *Komagataeibacter hansenii* B-22 as the best BC producer strain on the unsupplemented apple juice (0.79 ± 0.03 g/L) as compared with two other strains *K. rhaeticus* P-1463 and *K. hansenii* DSM 5602, which produced 0.67 ± 0.03 g/L and 0.26 ± 0.03 g/L of BC, respectively. Currently the work is in progress for further apple juice media composition's optimisation including determination of optimal N source.

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Keywords: bacterial cellulose, biopolymers, apple juice, *Komagataeibacter*, acetic acid bacteria.

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