# Alginate Production BY Different Fermentation Techiques Using Some Local Bacterial Strains

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Alginate producing bacteria, such as species of Azotobacter and Pseudomonas are used for alginate production by fermentation. Alginates are used widely as thickeners, stabilizers, gelling agents, and emulsifiers in the textile, papermaking and pharmaceutical industries as well as in food industries. The optimal conditions for cell growth and alginate biosynthesis are known to be quite different. In Egypt, studies concerning alginate are limited and it is not produced on large scale. In view of these facts, the present work was achieved to study alginate production by alginate producing bacteria. The study included isolation and selection of most efficient alginate producing bacteria from different soil samples, nutritional and environmental factors supporting their efficiencies to produce alginate. A part of the study concentrated on the use of some available raw materials and byproducts as substrates for production on large scale as well as the production in bioreactor as batch and two-stage batch cultures.Results could be summarized as follows:-1- Only six isolates of genus Azotobacter and fluorescence Pseudomonades out of fifty five and twenty isolates, respectively gave the highest alginate production in Clementi et al (1995) medium (med. 4). These isolates were isolated from different soil samples.2- Four and five cultivation media were compared as alginate productive cultivation media by selected Azotobacter and Pseudomonas isolates, respectively. Clementi et al (1995) medium (med. 4) and PIA medium (med. 7) were the preferable media for the propagation and alginate production by tested Azotobacter and Pseudomonas isolates, respectively. Moreover, Pseudomonas isolates No. P15 and No. P20 as well as Azotobacter No. Sh2 isolate were selected as a productive alginate producing bacteria for maximum production on these media.3- Alginate production by Azotobacter Sh2 isolate:-• Sodium citrate at 4.0 % concentration was the most favorable carbon source for alginate production which increased alginate concentration about 2.24 fold as compared with glucose medium (med. 4).• The mixture of 6.0 gL-1 yeast extract and 0.6 gL-1 of ammonium sulphate was the best nitrogen source for alginate production on productive medium after 5 days at 30 °C using shake flasks as a batch culture.• Five concentrations of Na2HPO4 ranged from 1.0 to 3.0 gL-1 were added to med. 4 for alginate fermentation. Maximum alginate yield and productivity were attained at 2.0 gL-1 Na2HPO4being 25 % and 0.083 gL-1h-1, respectively.• Five level of initial pH were used to study the alginate production by Azotobacter Sh2 isolate on modified med. 4. The highest growth and alginate parameters were observed at initial pH value of 7.0. whereas increasing

the initial pH to 8.0 led to decrease the alginate concentration about 30 %.• Inoculum sizes of Azotobacter Sh2 ranged from 1 - 10 % (O.D. 0.9) were tested. The inoculation with 9 % standard inoculum gave the highest alginate concentration, yield and productivity being 10.24 gL-1, 25.6 % and 0.085 gL-1h-1, respectively.• The fermentation period of 72 hrs was the optimum time for highest alginate concentration and productivity (12.14 gL-1 & 0.101 gL-1h-1) produced by Azotobacter Sh2 isolate on modified med. 4 using shake flasks as a batch culture which increased about 5.4 and 5.31 fold as compared with med. 4.• Using shake flasks as a two stage batch culture led to increase the alginate concentration about 39 % than that obtained in batch culture after 72 hrs.• Using bioreactor as a batch culture increased the alginate concentration, productivity and yield from 12.14 to 17.42 gL-1, from 0.101 to 0 gL-1h-1 and from 30.4