EFFECT OF CARBON SOURCES ON XANTHAN BIOSYNTHESIS BY *Xanthomonas* STRAINS ISOLATED FROM TOBACCO LEAVES

Aleksandra Katanski, Ivana Mitrović, Jelena Dodić, Zorana Trivunović

University of Novi Sad, Faculty of Technology Novi Sad, Department of Biotechnology and Pharmaceutical Engineering, Bulevar cara Lazara 1, 21000 Novi Sad, Serbia
e-mail: aleksandra.katanski@gmail.com

Abstract

Xanthan or xanthan gum is microbial exopolysaccharide that is produced by aerobic submerged batch cultivation of bacteria of the genus *Xanthomonas* on the appropriate media under optimal conditions. Due to its unique structure and excellent rheological properties, xanthan is commercially the most important biopolymer widely used in different branches of food and non-food industry as well as in agriculture. The success of xanthan production process mostly depends on the metabolic activity of applied *Xanthomonas* strains and the composition of cultivation medium. Among *Xanthomonas* strains that are capable for xanthan biosynthesis, reference strain *Xanthomonas campestris* ATCC 13951 is commonly used in industrial production of this biopolymer. Besides, glucose and sucrose are the most exploited carbon sources in the xanthan production media. However, the rise in prices and the growing demand for mentioned sugars indicate the need for usage of another carbon sources. Although the lack of this idea is difficulty of the reference strain to successfully metabolize most of appropriate carbon sources, the isolation of new *Xanthomonas* strains and selection of adequate substrates are current research topics.

The aim of this study was to evaluate the effect of various carbon sources in cultivation media on xanthan biosynthesis by the reference strain *Xanthomonas campestris* ATCC 13951 and *Xanthomonas* strains isolated from tobacco leaves.

Within the experimental part, the cultivations of reference strain and two isolates (D1 and D2) on semi-synthetic media with fructose, glucose, sucrose, lactose and starch as a carbon sources, respectively, were performed. Xanthan biosynthesis was carried out in aerobic conditions on media with the same initial carbon source content (20 g/L) at temperature of 30°C with agitation (rotary shaker, 250 rpm) for 120 h. The bioprocess success was estimated based on the xanthan concentration and rheological properties of cultivation broths.

The obtained results confirm the possibility of xanthan biosynthesis on all investigated media by all examined *Xanthomonas* strains. In applied experimental conditions, the reference strain was the most productive on media with sucrose (12.62 g/L), glucose (11.03 g/L) and fructose (9.18 g/L), while the lowest product concentration was determined in the media that contained lactose (4.14 g/L) and starch (7.61 g/L). On the other hand, *Xanthomonas* strains D1 and D2 produced xanthan on fructose, glucose, sucrose, lactose and starch containing media in quantity of 1.50 g/L and 0.29 g/L, 0.90 g/L and 1.11 g/L, 1.29 g/l and 4.18 g/L, 5.03 g/L and 4.85 g/L as well as 9.27 g/L and 10.25 g/L, respectively. Comparison of obtained results indicate that strains isolated from tobacco leaves could also represent adequate xanthan producers, whereby lactose and sucrose were considered as the most suitable carbon sources for cultivation of these *Xanthomonas* strains in applied experimental conditions. Results obtained in this research study present a suitable background for future investigations.

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