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# Novel *Bacillus* sp. isolates producing 2,3-butanediol have the potential to degrade lignocellulose

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2,3-Butanediol (2,3-BD) is a valuable bulk-chemical with industrial applications as fuel additive and reagent in manufacturing of moistening and softening agents, perfumes, fumigants, insecticides, explosives, plasticizers and printing inks. The present work is dedicated to the development of bio-based process for its production by non-pathogenic strains from renewable, waste, abundant, and inexpensive substrate as the lignocellulosic biomass. Ten *Bacillus* sp. strains were isolated from different soil, rhizosphere, and yogurt samples and selected for their ability to produce 2,3-butanediol from glucose. Based on 16S rRNA gene sequences, seven of them (13, 14, 16, 24, 39, 49, and 55) were affiliated to *B. licheniformis*, two (1RA, 1RB) - to *B. cereus* group, and one strain (5RB) belonged to *B. amyloliquefaciens* group. Considering the strains potential to degrade lignocellulose, their hydrolytic enzyme activities were tested using AZCL (azurine cross-linked) substrates. Nine strains were able to degrade cellulose, since they liquefied HE-, DEAE-cellulose, and β-glucan. Several strains degraded the hemicellulose polysaccharides xyloglucan, xylan and arabinoxylan. Importantly, the strains fermented the main lignocellulose monosaccharide components D-xylose, L-arabinose, D-mannose, and D-galactose. Eight of the strains utilized branched arabinan, 7 of them - galactomannan, and 7 - inulin (all spread in the plant biomass). Disaccharides utilization profiles revealed that all novel strains were able to ferment sucrose, lactose, maltose, and cellobiose. In conclusion, promising non-pathogenic producers of 2,3-BD were isolated. Displaying wide spectrum of active hydrolytic enzymes, they could be successively used in the development of a new biotechnology for 2,3-BD production from lignocellulose, currently known as the world largest, but weakly explored biomass source.

## Biography

Kaloyan K Petrov is Head of the Department of Chemical and Biochemical Reactors in the Institute of Chemical Engineering, Bulgarian Academy of Sciences. His work is devoted to optimization of downstream processes by the techniques of bioprocess and metabolic engineering. The team develops biotechnologies for microbial production of platform chemicals and fuels by conversion of waste or renewable energy resources, including the cutting-edge biotechnologies for 2,3-butanediol production from glycerol and starch by the use of natural and recombinant strains, and novel bio-processes for lactic acid synthesis by utilization of starch and inulin. Other topics of his work are the fermentative production of enzymes and valuable chemicals in respect of their industrial application, strain's improvement by gene engineering, microbiological and molecular biological tools, development and analysis of probiotics and prebiotics.

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