

POSTER SUMMARY**MICROBIAL DIVERSITY PROFILING OF GUM-PRODUCING BACTERIA ISOLATED FROM A LOCAL SUGARCANE PROCESSING FACTORY**

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Abstract

Limited data on the identities of gum-producing bacteria in sugarcane processing factories are available. Historical attempts at identifying sugarcane spoilage bacteria were constrained by the lack of bacterial identification methods with a high discriminatory power. The use of phylogenetic analysis of 16S rRNA gene sequences, in combination with housekeeping gene sequence analysis and Amplified Ribosomal DNA Restriction Analysis (ARDRA), is a novel approach for the identification of sugarcane processing spoilage bacteria. The advantage of this approach is its ability to accurately discriminate between closely-related species.

The first aim of this study was to establish a profile of the location and the identities of gum-producing bacteria present in/on harvested sugarcane and the subsequent factory processing streams. A total of 430 gum-producing bacteria were isolated; 110 of the strains were isolated during spring (sampled in September), when low dextran concentrations were reported in the raw sugar, and 320 strains were isolated during summer (sampled in November), when high dextran raw sugar was produced. Based on the phylogenetic analysis of 16S rRNA gene sequences, the isolates were identified as belonging to the genus *Weissella* (47%), followed by members of the genera *Bacillus* (24%), *Leuconostoc* (19%) and *Lactobacillus* (10%). Methods with a high discriminatory power, viz. the phylogenetic analyses of housekeeping gene sequences and ARDRA, were used to identify the isolated bacteria to species level. The isolates clustered with the relevant type strains of *Weissella cibaria*, *Weissella confusa*, *Bacillus amyloliquefaciens*, *Bacillus subtilis*, *Lactobacillus fermentum*, *Leuconostoc mesenteroides*, *Leuconostoc pseudomesenteroides*, *Leuconostoc citreum* and *Leuconostoc lactis*.

The diversity of gum-producing bacteria when low dextran raw sugar was produced, was similar to that when high dextran raw sugar was produced. It was found that the majority of gum-producing bacteria enter the factory with the cane, and that *Le. mesenteroides* was not the dominant species isolated from the prepared (shredded) sugarcane; instead, high numbers of *W. cibaria* and *W. confusa* were found. This was the first report of *W. cibaria*, *W. confusa* and *B. amyloliquefaciens* being isolated from a sugarcane processing factory and, contrary to expectations, *B. amyloliquefaciens* and *B. subtilis*, and not *Le. mesenteroides*, were isolated from the juice screen and mixed juice tank.

The second aim of the study was to evaluate the efficacy of two dithiocarbamate biocides, viz. Busan[®]1021 and Preventol[®]Z, against the selected isolates at the manufacturers' recommended dosages. Both these biocides proved to be effective in inhibiting the growth of *W. cibaria* A1-17, *W. confusa* B-24, *Le. mesenteroides* A16-9, *Le. lactis* B9-3, *Lb. fermentum* B19-18, *B. subtilis* B7-19 and *B. amyloliquefaciens* B7-51. Differences were observed in the levels of sensitivity to these biocides, and the possibility that some bacteria may develop resistance suggests that different doses may be required for different bacteria, to maintain a bactericidal (killing) effect. Further studies pertaining to microbial diversity in sugarcane processing factories may be necessary to ensure effective sanitation strategies.

Keywords: Microbial diversity, gums, *Leuconostoc*, biocides