Incidence of strict anaerobes in brewery bottling halls

Dagmar Matoulková 1,*, Karel Kosař 2, Petra Kubizniaková 3, Markéta Jelínková 4, Jürgen Felsberg 2

1 Department of Microbiology, Research Institute of Brewing and Malting, PLC, Lipová 15, Prague 120 44, Czech Republic
2 Institute of Microbiology, Academy of Sciences of the Czech Republic, v.v.i., Vídeňská 1083, 142 20 Prague, Czech Republic

AIM OF THE STUDY

- Investigation of the incidence of strictly anaerobic bacteria in brewery bottling halls
- Identification of the bacterial genera
- Assessment of the risk of beer spoilage by strict anaerobes

RESULTS

- The current trend in the development of bottling technologies leads to the lowering of oxygen content in finished beer to a minimum - beer thus becomes a medium in which strictly anaerobic bacteria can thrive.
- Strictly anaerobic bacteria adjusted to the brewery environment fall within four bacterial genera: Pectinatus, Zymophilus, Selenomonas and Megasphaera
- The ability of these bacteria to utilize different carbon sources, e.g. lactate and unusual sugars is particularly dangerous in beer breweries where there is a mixed infection of beer, or in diet beer, which are normally expected to have reduced susceptibility to spoilage precisely because of the very low content of fermentable sugars.
- More prone to bacterial spoilage are non-pasteurized, non-alcoholic, low alcohol and low hopped beers.
- Pectinatus and Megasphaera proliferate in beer with an oxygen content of less than 0.3 mg/l. Beer spoiled by Megasphaera and Pectinatus bacteria is characterized by massive haze and an intense odor reminiscent of rotten eggs.

MATERIALS AND METHODS

- Modified MRS-T medium containing a mixture of tetrahydrodriolo-o-acids and β-phenylethanol was used for detection of Pectinatus, the MRS-T medium without β-phenylethanol was used for the isolation and subsequent PCR-identification of Selenomonas lacticifex in the brewery bottling hall environment (according to Matoulková and Kosař, 2015; Matoulková et al., 2014a,b; Felsberg et al., 2014).
- Samples were taken from bottling lines in 12 brewery plants over a 6-year period.
- Swab samples were taken from the surfaces on and near the filling machine and crown-cork machine (in all cases situated in a monoblock arrangement), on the floor and conveyor belt in the filling halls.
- Storage cellars and filtration areas of 3 breweries were sampled accidently.
- Primers for identification of Selenomonas lacticifex developed in this study are based on the species-specific sequences of the 16S rDNA region (Felsberg et al., 2014).
- Primers for identification of the genus Zymophilus were designed on the basis of genus-specific sequences of the 16S-23S rDNA internal transcribed spacer region (Felsberg et al., 2015).

ACKNOWLEDGEMENT

Tools for detection of strictly anaerobic bacteria: Many of the tools used for detection of strictly anaerobic bacteria have been developed at the FACS Institute of Microbiology of the Academy of Sciences of the Czech Republic, v.v.i., Vídeňská 1083, 142 20 Prague, Czech Republic.

REFERENCES