

# MICROBIOLOGICAL SAFETY AND QUALITY EVALUATION OF THE RAW MATERIALS USED IN BEER PRODUCTION

Linda Luarasi<sup>1\*</sup>, Rozana Troja<sup>2</sup>, Luljeta Pinguli<sup>2</sup>

<sup>1</sup>Department of Biotechnology, Faculty of Natural Sciences, University of Tirana, Bulevardi "Zogu I", 1016 Tirana, Albania

<sup>2</sup>Department of Industrial Chemistry, Faculty of Natural Sciences, University of Tirana, Bulevardi "Zogu I", 1016 Tirana, Albania

\*e-mail: linda.luarasi@gmail.com

## Abstract

The safety and quality of the final beer product depends not only on the fermentation process, but also on the quality of the raw materials used. Microbiological contamination of raw materials can lead to a premature spoilage of the beer, caused by spoilage bacteria, yeasts and molds, and gushing - an unhealthy strong beer foaming - caused by barley *Fusarium* spp. Water is an important raw material. It is used in malt steeping, boiling and even in the cleaning processes and beer containers, so it must meet the microbiological standard of drinking water. The ionic composition of water is also important for mashing, hop boiling, fermentation and contribution to beer flavor. The routine microbiological analysis is to ensure absence of pathogenic bacteria that are spread by contaminated water supplies. Hops or hop extracts have not actually been implicated in instances of contamination.

The experimental work involved a general microbiological evaluation of raw materials using morphological and physiological methods for the microorganisms' determination. Coliform counting in brewing water, as an indicator of the presence of enteric bacteria, was performed using McConkey culture medium, applying limited dilution method. Malt microbiological examination of *Fusarium* spp. and others, a potential risk caused by the heat stable mycotoxins or the polypeptide gushing factor, was performed using pour plate method in Czapek and Plate Count Agar medium for the identification of the superficial microorganisms in malt grain. Microbiological control of hop and hop extracts was considered a negligible risk because of the hop antimicrobial properties.

The gained results showed a microbiological purity of brewing water related with water pretreatments applied in the brewery. Some specific microbial populations were observed during malt microbiological control. These species include *Fusarium* spp. and some colonies of *Penicillium* and *Aspergillus*.

The brewing water was treated using reverse osmosis technique, so the respective microbiological charge was negative. The most problematic specie was a *Fusarium* sp. identified during the experimental work, deriving from the surrounding environment of the malt storage.

**Key words:** *Microbiological, Raw material, Quality control, Malt, Water.*