



Risk assessment of fungal spoilage: A case study of *Aspergillus niger* on yogurt



Maria Gougouli^{a, b}, Konstantinos P. Koutsoumanis^{a, *}

^a Laboratory of Food Microbiology and Hygiene, Department of Food Science and Technology, School of Agriculture, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece

^b Department of Food Science and Technology, Perrotis College, American Farm School, Thessaloniki 55102, Greece

ARTICLE INFO

Article history:

Received 29 July 2016

Received in revised form

9 March 2017

Accepted 10 March 2017

Available online 20 March 2017

Keywords:

Risk assessment

Model

Spoilage

Fungi

Aspergillus niger

Yogurt

ABSTRACT

A quantitative risk assessment model of yogurt spoilage by *Aspergillus niger* was developed based on a stochastic modeling approach for mycelium growth by taking into account the important sources of variability such as time-temperature conditions during the different stages of chill chain and individual spore behavior. Input parameters were fitted to the appropriate distributions and *A. niger* colony's diameter at each stage of the chill chain was estimated using Monte Carlo simulation. By combining the output of the growth model with the fungus prevalence, that can be estimated by the industry using challenge tests, the risk of spoilage translated to number of yogurt cups in which a visible mycelium of *A. niger* is being formed at the time of consumption was assessed. The risk assessment output showed that for a batch of 100,000 cups in which the percentage of contaminated cups with *A. niger* was 1% the predicted numbers (median (5th, 95th percentiles)) of the cups with a visible mycelium at consumption time were 8 (5, 14). For higher percentages of 3, 5 and 10 the predicted numbers (median (5th, 95th percentiles)) of the spoiled cups at consumption time were estimated to be 24 (16, 35), 39 (29, 52) and 80 (64, 94), respectively. The developed model can lead to a more effective risk-based quality management of yogurt and support the decision making in yogurt production.