OPINION

On cardboard and plastic packaging materials, spoilage and pathogenic microorganisms survive

Oliver Walton

Walton O. On cardboard and plastic packaging materials, spoilage and pathogenic microorganisms survive J. Environ. Microbiol. 2022;4(2):1-2.

ABSTRACT

The purpose of this research was to examine how pathogenic and spoilage microorganisms, which are typically associated with fresh fruit, interact with corrugated and plastic materials. Through conventional plate counting and scanning electron microscopy, the impact of the two packaging materials on the survival of microorganisms from the species Escherichia coli, Listeria monocytogenes, Salmonella enteritidis, Saccharomyces cerevisiae, Lactobacillus plantarum, Pseudomonas fluorescens, and Aspergillus flavus during storage was investigated (SEM). The findings indicated that cardboard packaging materials, when stored properly, reduced the risk of food contamination because they lost their viability more quickly than plastic ones due to deterioration and pathogenic microorganisms. In actuality, regardless of the inoculation level and packaging material employed, the cell loads of the pathogenic species under consideration decreased over time. However, when compared to plastic materials, cardboard experienced superficial viability losses much more quickly. For the spoilage bacteria under consideration, the similar tendency was seen. The SEM microphotographs show that the entrapment of the microbial cells within the fibres and pores of this material was responsible for the reduction of superficial contamination on cardboard surfaces. Additionally, SEM data demonstrated that, with the exception of molds, the entrapped cells were subjected to more or less rapid lyses depending on the species due to the lack of water and nutrients. The latter spoilers could only grow inside the cardboard fibres if water absorption was not stopped while being stored. In conclusion, this study's findings demonstrated that corrugated packaging materials, as opposed to plastic ones, have lower cross-contamination potential in the fruit and vegetable industry. The results did highlight the significance of cleanliness and low humidity during cardboard storage to stop mould growth on packaging.

Key Words: *Monocytogenes; deterioration; Pathogenic; Microphotographs; Aspergillus flavus; Entrapped cells*

INTRODUCTION

Fresh fruit and vegetable consumption has been linked in recent years to a number of food-borne illnesses. According to reports, norovirus is the main factor in outbreaks connected to fresh vegetables. In different stages of the product processing, pathogenic and spoilage microorganisms can contaminate fresh products and, in the absence of treatments that can eradicate microorganisms, can reach the final consumer. Additionally, it can be very challenging to maintain chilled temperatures along the whole supply chain, and thermal abuses can hasten the rate of microbial development on both the container surfaces and the items themselves. Additionally, some bacteria can quickly multiply and perhaps develop biofilms because to their long-term persistence on the packaging surface of fresh food. Pathogenic and spoilage microorganisms that can survive longer and be implicated in cross-contamination events from packaging to food may be protected by the presence of biofilm. Fresh product packaging, namely its microbiological condition, can have a significant impact on the product's quality and safety. There is very little and inconsistent information in the literature about the microbial cell loads found on the surfaces of packing materials. Nevertheless, it is known that pathogens and spoilage bacteria can be found on packaging surfaces. The microbial loads that are present on the packaging surfaces are significantly influenced by differences in chemical and physical properties, proper storage, and sanitising of packing materials. In actuality, virgin fibre packaging has cell loads ranging from 2 log CFU/cm^2 to 5 log CFU/cm^2, while reusable packaging often has aerobic mesophilic loads between 3 and 6 log CFU/cm^2.

Numerous microorganisms were found on the package surfaces, although aspergillus and cladosporium mould are the most harmful. Spore-forming bacteria including Bacillus and Clostridium are also present. However, it has been documented in the literature that poorly sterilised packaging materials can harbour harmful germs.

Editorial Office, Journal of Environmental Microbiology, UK

Correspondence: Oliver Walton, Journal of Environmental Microbiology, UK , Email: oliverwalton@gmail.com

Received:- 06-April-2022, Manuscript No. PULJEM-22-5843; Editor assigned:- 08-April-2022, Pre-QC No. PULJEM-22-5843 (PQ); Reviewed:- 12-April-2022, QC No. PULJEM-22-5843 (Q); Revised:- 15-April-2022; Manuscript No. PULJEM-22-5843 (R); Published:- 20-April-2022, DOI: 10.37532/puljem.22.4 (2).1-2

Given the circumstances, it is crucial to choose the right packaging based on the product's qualities in order to avoid any potential microbial contamination. One of the most popular forms of packaging for fresh goods is corrugated cardboard, which has major advantages over plastic materials in terms of the environment and microbes.

Determining how and in what capacity the packaging can contribute to microbial cross-contamination of the packed product is incredibly difficult at this time. In fact, due to its considerable diversity, the microbial presence on packaging surfaces as well as on fruits and vegetables that have been packaged is difficult to determine. Additionally, the possibility of cross-contamination from the package to the fresh product is affected by the storage conditions, including the temperature and relative humidity of the packed products, the eventual presence of biofilms, and the availability of nutrients. However, the characteristics of the packed fruit or vegetable, such as the level of ripeness, acidity, sugar content, and presence of physical damages, also influence cross-contamination phenomena from packaging to the product.

Recently, Patrignani et al. showed that peaches packed in Reusable Plastic Containers (RPCs) transferred microorganisms more readily than peaches packed in corrugated cardboard through challenge tests and a modelling approach. The authors showed that peaches stored in cardboard boxes had better microbiological quality and that there was less chance of cross-contamination from plastic fruit packaging.