

Formation of Multispecies Biofilms and Their Resistance to Disinfectants in Food Processing Environments: A Review

QUN LI; LING LIU; AILING GUO ; XINSHUAI ZHANG; WUKANG LIU; YAO RUAN

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ABSTRACT

In food processing environments, various microorganisms can adhere and aggregate on the surface of equipment, resulting in the formation of multispecies biofilms. Complex interactions among microorganisms may affect the formation of multispecies biofilms and resistance to disinfectants, which are food safety and quality concerns. This article reviews the various interactions among microorganisms in multispecies biofilms, including competitive, cooperative, and neutral interactions. Then, the preliminary mechanisms underlying the formation of multispecies biofilms are discussed in relation to factors, such as quorum-sensing signal molecules, extracellular polymeric substances, and biofilm-regulated genes. Finally, the resistance mechanisms of common contaminating microorganisms to disinfectants in food processing environments are also summarized. This review is expected to facilitate a better understanding of interspecies interactions and provide some implications for the control of multispecies biofilms in food processing.

HIGHLIGHTS

- Multispecies interaction of biofilms is often cooperative, competitive, or neutral.
- QS molecules, EPS, and biofilm-regulated genes affect multispecies biofilm formation.
- Disinfectant resistance of multispecies biofilms depends on EPS and biofilm age.
- Studies of multispecies biofilms are less focused on high-diversity biofilms.