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Stability, growth and decrease of bacteria in fiber-based food packaging materials

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Microorganisms can be found ubiquitously and were previously shown to be present also in various types of packaging materials. Although the microbial community of fiber-based packaging materials has been studied extensively for years, the interaction of bacteria with the surrounding packaging matrix still needs more research.

Therefore, this study investigated the survival of food relevant species e.g. *E. coli*, *S. aureus*, *B. cereus* as well as the environmental strains *Cytobacillus firmus* and *Niallia circulans* (directly isolated from packaging material) and bacterial spores of *B. cereus* and *B. subtilis*. All strains were separately spiked into sterilized and homogenized packaging material samples of different fiber types. The stability of the added bacteria differed between the packaging material samples. Respecting on the different fiber types, some packaging samples appeared to supply more nutrients for bacteria than others resulting in prolonged bacterial stability, higher growth rates and spore germination. Furthermore, none of the strains could grow in all included samples. Rather, the use of fiber based packaging materials as a nutrient is no universally applicable strain characteristic, but depends on the bacterial strain and the type of packaging material. Moreover, one sample strongly reduced all added bacteria within 24h suggesting antimicrobial activity. Bacterial spores were able to germinate in only one out of four sample, while spores remained dormant in the other three samples.

Although further investigations are needed, this knowledge is essential for the development of packaging materials and their application as food packaging to understand and control bacterial growth in packaging material.