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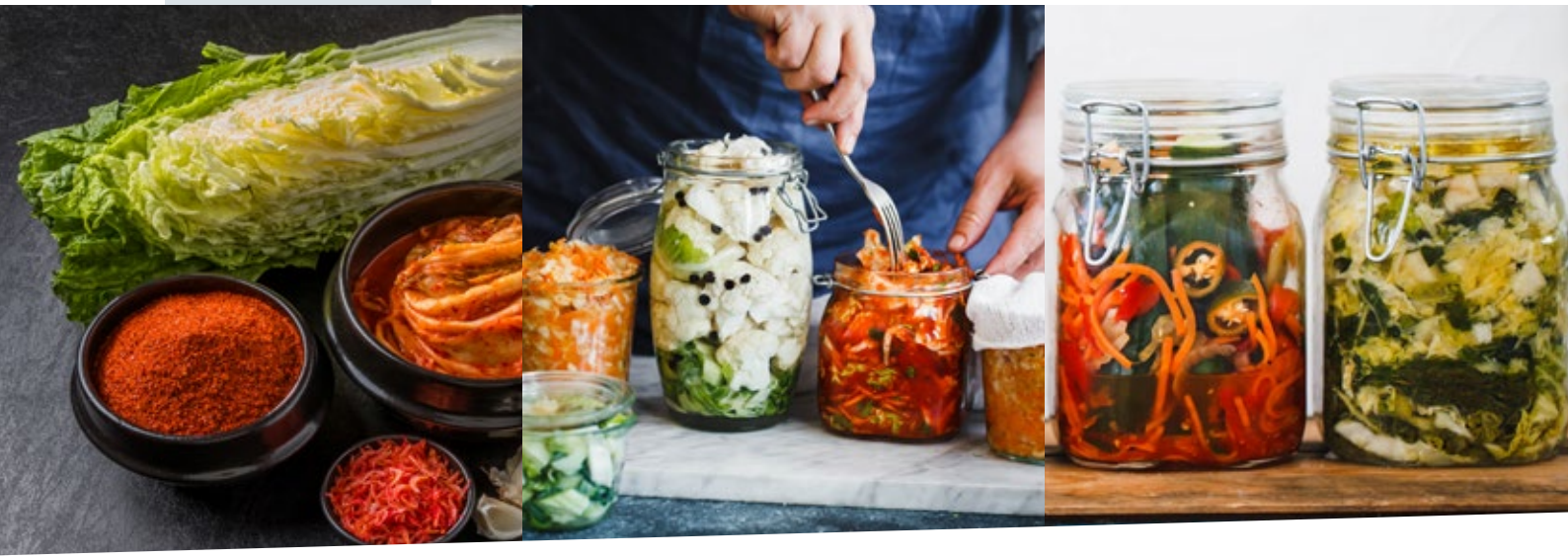

news digest #006

Microbial Community in Fermented Foods

Understanding the science behind the health benefits of fermented foods

Fermentation is a popular food process in which microorganisms such as yeast and bacteria break down a food's sugars. The reason people originally chose to ferment foods, by soaking them in salt solution, was to preserve them, but consumers now opt for fermented foods for their flavor and digestive health benefits.

With a long history in human nutrition and recently lauded as superfoods, fermented foods are rich in probiotic bacteria, and consuming them adds beneficial bacteria and enzymes to the body's intestinal flora, supporting gut health, benefiting the microbiome and digestive system, and enhancing the immune system.[1]

The main area of research into the health benefits of fermented foods is in their probiotic content. Probiotics are live microorganisms that are intended to have health benefits when consumed. The most common are bacteria that belong to groups called *Lactobacillus* and *Bifidobacterium*.[2]

Although there are currently no authorised European health claims for probiotics, there is a growing recognition for the importance of the gut microbiota, both for gut and non-gut health outcomes.[3]

However, the positive effects of probiotics are strictly strain-specific and the strain composition and stability of the microbes in fermented foods is - with a few exceptions - not well understood. At Bruker Microbiology and Diagnostics, we are seeing a growing number of studies[4] on fermented foods in the clinical and food sectors to monitor microorganisms at different stages, with the goal to find scientific evidence for claims that these foods provide health benefits beyond their basic nutritional value, or to generally understand the interaction between food and humans.

A good example of a fermented food is kimchi, a popular Korean side dish that is usually made from fermented cabbage. It can also be made from other fermented vegetables such as radishes. Importantly, kimchi is eaten raw and not heated or cooked in any way, so the living microorganisms contributing to its health benefits are not destroyed.

To make kimchi, vegetables are fermented in salt water using so-called 'good' lactic acid bacteria – which already live on the surface of fresh vegetables. During fermentation, the lactic acid bacteria multiply. When the salt penetrates the cell structure, sugar from inside the vegetables is released, providing nutrients containing energy for the microorganisms. The salt plays an essential role in removing liquid from the vegetables. The lactic acid bacteria grow in the brine, whereas many pathogenic bacteria do not survive in this sour environment having little or no oxygen usually needed for their metabolism.

One recent study[4] shows that Matrix-Assisted Laser Desorption/Ionization Time-Of-Flight mass spectrometry (MALDI-TOF MS) is an effective method for investigating viable microbial communities in kimchi. This study analyzes the cultivable microbial community in kimchi fermented at different temperatures using the Bruker MALDI Biotyper® with its extended reference library, with the objective of understanding the factors affecting the quality and potential health benefits of kimchi.

The MALDI Biotyper reference library contains a high number of entries of lactic acid bacteria, with *Lactobacillus*-related genera, *Weissella*, and *Leuconostoc* identified as the dominant genera during kimchi fermentation. The study identified a total of 5204 strains isolated from fermented kimchi using the MALDI Biotyper and demonstrates that MALDI-TOF MS is a robust method for investigating viable microbial communities.

The Bruker MALDI Biotyper is a benchtop system with an easy-to-use workflow, requiring only little training efforts. It enables the unbiased and rapid identification of microorganisms in food and agriculture applications, down to species level.

By determining the unique proteomic fingerprint of an organism, the MALDI Biotyper matches characteristic patterns with an extensive reference library that is continually being expanded. Signature organisms during fermentations like *Weissella cibaria*, *Lactobacillus sakei* and *Leuconostoc mesenteroides* are standard entries in the Bruker reference library. Our open microbiology concept supports researchers in creating their own dedicated libraries to suit their individual requirements.

For more information, visit
https://www.bruker.com/en/applications/microbiology-and-diagnostics/food-beverage-microbiology/maldi-biotyper-for-food-microbiology.html

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