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Opinion Article

Development of Virome Investigations of Food Production Systems

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DESCRIPTION

Consumers are getting more and more fond of fermented "super foods" as a result of growing consumer awareness and acceptance of functional foods. Data from market research projects that between 2020 and 2028, the demand for fermented foods and beverages would grow at a compound annual growth rate of 5%. The food sector would need to implement more extensive and dependable production regimens to fulfil the rising demand for fermented foods and drinks. This calls for understanding the make-up and function of the microbial communities that are present in fermented foods, and this has been the subject of a number of recent researches. To present, the discipline has employed a top-down strategy to understand the intricate interactions between food, microorganisms, and human health, starting most intensely with analysis of the human gastrointestinal tract's microbiota and its effects on the maturation of the immune system, mental function, and control of hunger. Similar methods have been used to describe how (fermented) food communities are organized. Many of the initial work on the food microbiota, however, relied solely on 16S rRNA gene or Internal Transcribed Spacer (ITS) sequencing, which leaves out the phage community or shotgun metagenomics, which can give a comprehensive picture of the total microbial diversity. Some metagenomic investigations detected bacteriophage-associated readings however, the nucleic acid extraction process is not phage-optimized, eliminating a large portion of the phage population or flavouring dominating bacterial populations and their resident phages. This emphasises the necessity for specific investigations of the role of phages in the dynamics of food fermentation and community growth.

The current state of food virome Investigations is examined in this study, with a special emphasis on fermented foods. In order to ensure high standards of food quality and food safety as well as sustainable food production systems, we emphasize the most recent advancements as well as knowledge gaps that may indicate areas of future growth.

Challenges to virome analysis of foods

Virome analysis of foods poses a number of difficulties that act as roadblocks to the field's advancement. The use of trustworthy and dependable virome extraction procedures is the first of them. The macromolecular composition, texture, and solubility of foods vary widely. In order to produce optimal yields with the least amount of DNA contamination, the extraction of nucleic acid from phages contained within a particular food matrix necessitates the use of a technology that has been optimised for the food in question. Sample solubilization, enzymatic treatment, and filtration are the most commonly changed processes in a number of optimised procedures for foods and agricultural samples that have recently been published. However, it has been found that specific phages or phage types, including RNA phages, may be excluded by certain processes such enzymatic treatments and filtering stages. As reported in a recent analysis, RNA phages are notably underrepresented in virome research. Together with its dsDNA phages, the Lactic Acid Bacteria (LAB) is among the most significant group of organisms in the context of food fermentations. Therefore, it is assumed that the typical extraction techniques used for agricultural and food samples would successfully catch these lactic acid bacteria infecting phages. However, it's possible that the actual scope of viral variety won't be revealed when taking into account the complete food supply chain where other species are more prevalent.

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