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Emerging technologies boosting food processing

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Nowadays, the food processing sector in India plays an important role as it creates a link between the farmers and consumers in the domestic and international markets. With the invention of new food processing technologies, the profits related to food processing are increasing drastically which in turn helps in enhancing microbial safety and food quality.

One of the emerging food technologies in the food sector is high hydrostatic pressure (HHP), a method that helps in decontaminating packaged food items by subjecting them to water pressure ranging from 100 to 900 MPa. Food products such as dry-cured, marinated products, cooked meat products, sauces and fruit juices undergo HHP treatment. During the HHP process, the functional activities of the biological macromolecules and the physicochemical characteristics of the food product change, thus resulting in protein denaturation and the inactivation of enzymes and microbes.

Further, another emerging food processing technology is the pulsed electric field, a non-thermal process used to preserve food. This method works by using short pulses of high electric fields with an intensity of 10-80 kV/cm (kilovolt/centimetre) with a duration of microseconds to milliseconds. It is one of the most engaging technologies due to the minimal energy loss during the process of heating the food, short treatment time, etc.

The third emerging food processing technology is ultrasound. With the use of ultrasound in the food processing industries, preservation of food products is completed in minutes. Ultrasound is used in many food processing operations like filtration, drying, freezing, mixing, crystallisation of fats and sugars, etc. It helps in inactivating microbes by changing the temperature and pressure, ultimately causing the breakdown of the cell walls and leading to DNA damage.

Furthermore, emerging food technology includes the exposure of food to cold atmospheric plasma, a non-thermal technique used for the decontamination of foods and packaging materials at a temperature below 40°C. However, 30 minutes is required to inactivate the vegetative microorganism and spores.

Along with the above technologies, there are many other non-thermal techniques, such as osmotic dehydration, which helps to partially remove water from food. It is considered an energy-saving method that uses high-intensity pulsed light technology to inactivate microorganisms and reduce the spoilage of food. This process is usually used to decontaminate vegetables, dairy products, baked products, etc.

Therefore, additional research on all the aforementioned technologies and the invention of safer technologies for the production of good-quality food products will indeed aid the food industry.

Keywords: High hydrostatic pressure, Pulsed electric field, Ultrasound, Cold atmospheric plasma, Osmotic dehydration, High-intensity pulsed light

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