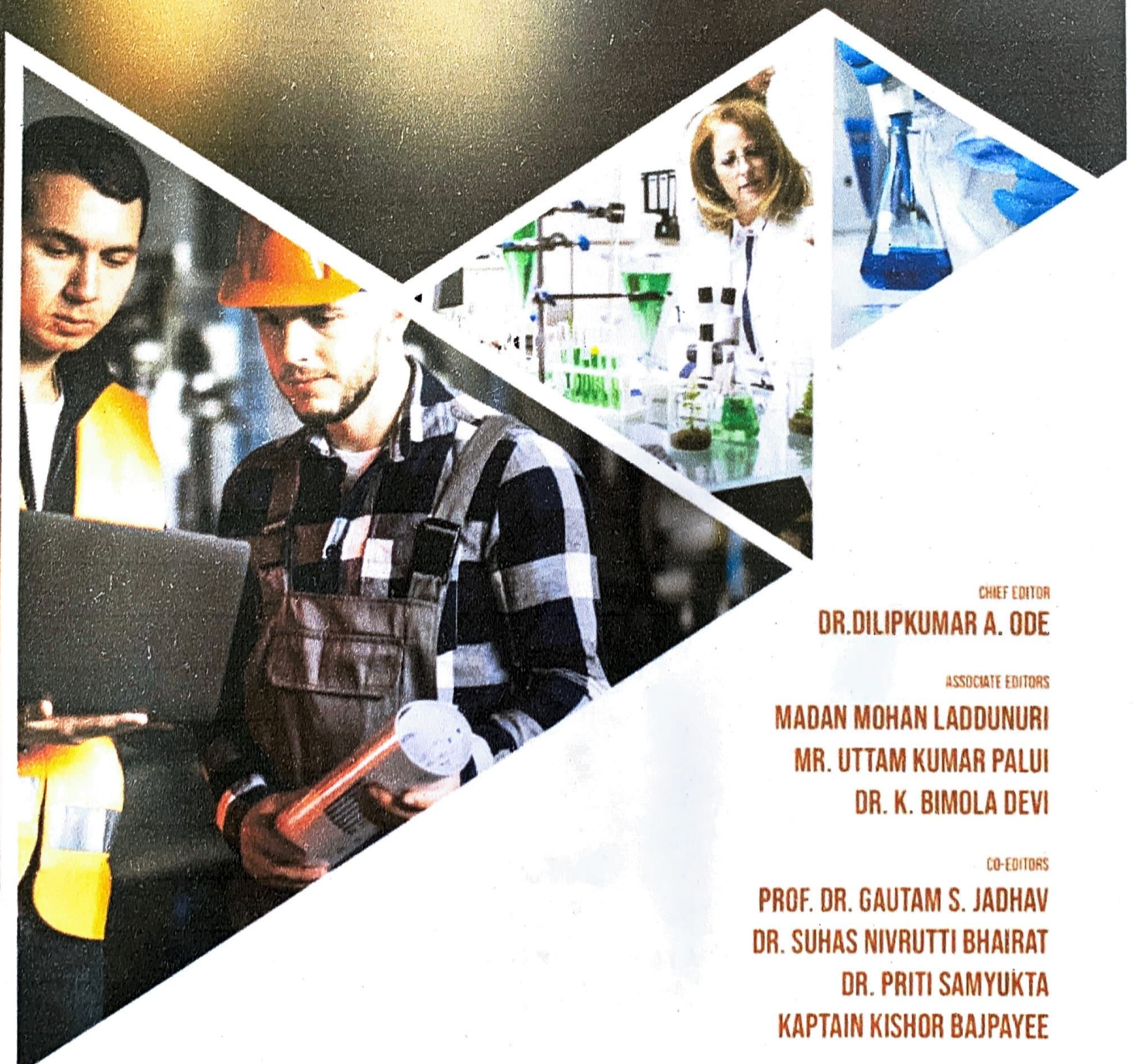


# Multidisciplinary Approach in **RESEARCH** **VOL-12**



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# Multidisciplinary Approach in Research, Volume-1

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**LATEST TRENDS IN FOOD PROCESSING INDUSTRY-A BRIEF REVIEW****MS. AWANTI HODLUR<sup>1</sup>**

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**❖ ABSTRACT:**

Food processing and preservation is an extended arm of both food science and food technology, which has evolved over time and is a dynamically changing industry. Traditionally the purpose of food processing was shelf life stability which included microbiological and sensorial attributes. This has now evolved to include additional key aspects of health, nutrition, sustainability along with the primary aspect of food safety to meet the consumer demands.

The food processing industry has seen a surge in new players coming into the market who have entered with the aim of supplying good quality food products. With increase in demand in fresh, tasty and healthy food there has also been an increase in the technologies that are available to assist in making this happen. While conventional technologies are still been used on a large scale new technologies are rapidly coming up and getting adopted quickly.

Conventional food processing methods have always used the application of direct or indirect heat to keep the food safe from pathogenic micro organisms without impacting the key quality attributes of the product such as modification of components, extraction or separation. New technologies have emerged in the last few years which have aided in achieving high quality food products with minimum changes in the finished product with respect to nutritive and sensory properties. With advent in food technology we have also seen introduction of non-thermal processes and more advancement in thermal processes offering more innovative food solutions.

Conventional food preservation techniques have used the application of heat as a means to reduce the microbiological load of products in order to increase the shelf life of the product while this same technology has also been known to cause some changes in the texture, taste & sensorial attributes of the



products. For addressing such concerns of higher processing times along with degradation in sensorial aspects new technologies are being introduced to ensure a safe & quality product to the final consumer. As we are moving into a fast paced world where consumer demand for fresh, healthy and sustainable food is increasing some examples of recent technologies can be seen as below:

### ❖ HIGH PRESSURE PROCESSING:

High pressure processing or HPP is a new 'Non Thermal' technology which is designed to obtain microbiologically safe product while overcoming challenges of undesirable changes of sensory & physicochemical & nutritional properties of food. HPP is a technology where the food is processed under high pressure (**up to 6 bar**) for short period of time which leads to inactivation of microorganisms thus making the food safe. The pressure is uniformly applied across the product. HPP interrupts the cellular function of microbes without the application of heat thereby killing the microbes while enhancing the taste texture & nutrition of food.

Foods that are suitable for HPP are ready to eat meals, Soups, Sauces, gravies processed meats, dairy products & fruit juices. The products can be packed in vacuum packs or flexible packaging like plastic bottles.

- **Bar is a metric unit of pressure**

In India, the application of HPP is limited to some products such as fruit and vegetable juice and RTE meals. The concept of HPP in fresh natural juice in India was first introduced by Raw Pressery in 2013., NuTy is India's first company to use non-thermal HPP technology in food products like ready-to-eat curries and meals.

Some advantages of HPP are extension of shelf life, higher sensorial value of delicate products like avocado, maintain nutritional values & most importantly improving food safety.

Some recent examples of HPP foods that have been successful in the commercial process have been Guacamole, Meat & fish industry products, purees coulis etc.

USDA has approved the use of HPP for application in low acid food.

### ❖ PULSED ELECTRIC (AND POSSIBLY PULSED MAGNETIC) FIELD PROCESSING:

PEF is a non thermal process of preserving food by the use of short electric pulse. It's a technology where short pulses of high electric fields with a duration of microseconds which reduces the impact of high heat treatment, thus improving the sensorial quality & nutrient content of food. It's suitable for preserving liquids & semi liquid foods, removing microorganisms & producing functional constituents eg milk, juices, soups, fruits & vegetables & eggs. The technology is based on pulsed electrical currents deliver to a product placed between a set of electrodes. The generated high voltage results in an electric field that leads to microbial inactivation. The product experiences a force which is responsible for the irreversible cell membrane breakdown in microorganism. This technology is suitable for pasteurisation of products like juices, dairy products like curd, yoghurt, milk etc. The advantage of this treatment is that it retains quality & heat sensitive vitamins along with increase in the shelf life & maintains food safety with low processing cost. Food quality is fresher due to lower processing parameters. Eg. of companies following this process are potato chip manufacturers & dehydrated fruit makers. Italian *potato chips* manufacturer Amica, Kellogg's- cornflakes, PepsiCo, Inc

### ❖ IRRADIATION OF FOOD:

Food irradiation is a process of subjecting food to a controlled level of radiation to kill harmful bacteria & preserve its freshness. This is a non thermal process & hence also called as Cold Pasteurisation.



The food is passed through a radiation beam instead of direct contact with the radioactive material. The food is exposed to carefully measured amount of radiation. The most commonly used methods for irradiation are Gamma rays, Electron beam generators & X-Ray accelerators. Irradiation helps in increasing the shelf life of fruits & vegetables as it inhibits sprouting & the ripening is delayed. The advantage of irradiation is that the disease causing micro organisms are eliminated along with no change in the nutrient profile of the food & also the food does not become radioactive & hence considered safe. Some examples of irradiated foods are Onions, Potatoes & major companies like Jain Agro Foods & Universal Medica use this process.

This is an expensive technology which limits its usage across the range of food ingredients. It is ineffective against viruses. It needs to be handled carefully as improper radiation can make the organisms reproduce rapidly.

This irradiation of Food technology is permitted in 30 countries wherein 18 countries are actually irradiating food. The Countries like Canada allows irradiation of vegetables like potatoes, onions, spices, wheat and other grains, but such food is not being sold here. In countries like Germany, Britain, and Scandinavian this technology is not permitted to process food.

### ❖ HURDLE TECHNOLOGY:

Hurdle Technology is the use of several agents / ingredients that inhibit or slow down the metabolic activity of the food. These are several ingredients which can act like preservatives. These hurdles may be the salt content, temperature, water activity, pH and several lactic acid bacteria which do not allow fermentation of food. Several other hurdles may be the irradiation and ultra-high pressure processing. A proper combination of hurdles can work in synergy to provide a good safety effect on the product. Examples of hurdle technology can be seen in tomato based products like ketchups, sauces & condiments where the strategic combination of PH, Water activity & temperature control play a significant role in enhancing the product quality & its intended shelf life. Jam manufacturing is also a good example of Hurdle technology where the heating process & addition of sugar in combination with acid helps to control the microbiological activity thereby giving it a desired taste & shelf life.

In India many companies like Kisan, Heinz, Amul etc use this technology to create their products for the markets.

### ❖ RETORT PROCESSING:

Retort processing a form thermal sterilisation of food products where the product is subjected to a high time & temperature to obtain commercial sterility of the food. This is primarily applied to low acid foods at a certain time & temperature combination to achieve a commercial stable & sterile product. The food that needs to be retorted is cooked & then filled in retort stable pouches (which are specifically designed for this process) & then subjected to a pressurised chamber at a particular time & temperature to achieve commercial sterility. This process usually requires the food to be achieve a F0 (thermal sterility) of 6 to be considered to be safe. Typically, the sterilization temperatures vary from 230°F/110°C to 275°F/135°C.

Retort processing provides safe & longer shelf stable products & with the advent of newer technologies like agitation, rotary in the retorts the heating time is reduced considerably to get less degradation of food & improve the sensory parameters. The use of traditional can packaging still continues, but plastics in pouches and trays have become much more prevalent. Few examples of retort manufacturers in India are ITC (Kitchens of India), Gits, MTR & Tasty Bite.



## ❖ MAPS & MATS:

Today's consumers desire of foods with high quality and hygienically labelled food is met with a technology of Microwave food processing.

Microwave Assisted Thermal Sterilization (MATST<sup>TM</sup>) and Microwave Assisted Pasteurization (MAPST<sup>TM</sup>) is a recent trend in food processing industry that is patented and approved by FDA which preserves the taste, nutrients, and texture of packaged food without addition of any artificial additives and extra salt.

In this method the food is exposed to heat for minimum time without being exposed to high heat. Such foods are usually packaged meals and side dishes that are cleanly labelled looks and taste as good as freshly prepared. In conventional food processing methods or retort technology these packaged foods are placed in pressurized cookers at a frequency of 915 up to an hour, megahertz that eradicates pathogens and spoilage microorganisms in minute's time. Such exposure to high heat destroys the nutrients affecting the taste and texture of foods. To balance this loss of texture, taste, colour and flavour generally extra salt and artificial additives are added. This MATS processed foods are distinctly different than conventional food processing.

Such processed foods have an equally good shelf life as compared to conventionally processed foods. Thus, the product also appeals more to the consumers.

MAPS is a similar technology of food processing with microwave sterilization and pasteurization. Here the food and beverages are heated at 915 MHz to a temperature of 70-90° for up to 10 minutes, eradicating viral and bacterial pathogens. Such foods are restaurant-quality, ready-to-eat food and beverages with a better shelf life of up to 12 weeks that helps reduce the chances of food waste due to spoilage across the supply chain. Examples of MAP friendly foods are ready to eat meals, beverages, vegetables, fruits, dip, sauces and salsas, baby food, egg dishes etc.

The safety aspects of prepared, ready to eat and frozen foods sold and served by grocery chains, restaurant chains, convenience stores, nursing homes, hospitals, school meal programs and commissaries/cafeterias can be improved by adopting this MAPS processing technology.

MAPS and MATS has been commercially a success. Companies like 915 Labs, Centennial, Colo. holds the permanent exclusive license to the MAPS and MATS technologies. The first MATS technology used food became available in India in the 2017.

In India, Tata-Q-TSFL( Tata Smartfoodz) offers a range of innovative and differentiated products manufactured using MATS technology. This unique technology helps retain taste texture & nutrients and can be supplied and stored at ambient temperature conditions. They offer products like pasta, noodles, biryani and combo meals.

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