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Commentary

Effects of Novel Heating Products on Fermentation Processes

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DESCRIPTION

Fermentation one of the most popular processes used to make flour products, but it is also a crucial stage in establishing the final texture and caliber of wheat products. Both Western baked bread and Eastern steamed bread are created from dough that has between 50% and 60% water content after being fermented using different fermentation techniques, such as pure yeast fermentation (which takes around 2 hours) and sourdough fermentation (up to a few days). The basic mechanism of fermentation is that the yeast breathes using sugars like glucose and fructose while releasing carbon dioxide to cause gas cells to form in the dough. Due to the variety of bacteria, sourdough accelerates the process of breakdown of several macromolecular compounds (protein, starch, etc.) in the dough as compared to dry yeast. Additionally, unlike yeast, sourdough may be classified into four categories based on the technical and fermentation process:

Yeast and Lactic Acid Bacteria (LAB), which grow spontaneously under favorable conditions, are components of type I sourdough.

Type II sourdough is created by introducing various bacterial concentrations into the dough.

The type II sourdough is simply dehydrated to produce the type III sourdough.

Type IV sourdough, which is often transformed into liquid during culture, is a combination of type I and type II sourdoughs.

The possibility of introducing dangerous bacteria and microbial toxins during the fermentation process is further increased by high moisture content and prolonged fermentation times. In order to reduce the number of dangerous compounds while maintaining the quality of the fermentation, it is necessary to minimize the fermentation period as much as feasible. Consumers anticipate great quality and a lengthy shelf life from fermented goods. As many quality changes occurring during the distribution and storage of these foods are caused by harmful microorganisms and enzyme catalyzed reactions involving *Escherichia coli, Staphylococcus aureus,* peroxidase, polyphenol oxidase, pectin methyl esterase, etc., traditional heating treatments have been used to reduce the quantity of microbes in fermented foods and deactivate enzymes. Thermal processing, however, also modifies the nutritional value and textural characteristics of the dough and products. Traditional heating techniques may cause certain unfavorable modifications linked to the conversion of thermo labile chemicals into other products throughout the fermentation process. Therefore, to reduce product quality loss, contemporary fermentation technologies often use continuous temperature control systems. Novel physical technologies have the potential to completely or partially replace conventional heating processes, and they have been gaining more and more attention from researchers in terms of industrial applications as a result of technological advancements and rising expectations for high-quality fermented products. Novel heating methods effects on the products and processes of fermentation

- Microwave heating
- Radiofrequency heating

Microwave heating

A method known as microwave heating uses electromagnetic radiation with frequencies between 300 to 300,000 MHz numerous researchers have investigated the viability of a number of possible microwave applications connected to fermentation processes, including the synthesis of hydrolases, the generation of bio hydrogen. Ion conduction and dipole rotation in macromolecules are directly impacted by microwave heating. When microwave heating is used, the dough absorbs energy, especially from polar macromolecules like water, which helps the fermentation process. Microwave heating is so typically used in the fermentation of liquid fermentation products like juice, yogurt, etc. The economic feasibility of microwave heating in the fermentation process.

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Radiofrequency heating

The traditional heating process for food products depends on the conduction and convection of heat. However, because wheat flour dough does not transfer heat well, it is challenging to heat those evenly using conventional heating techniques. An efficient substitute for traditional heating is radiofrequency heating. The wavelength frequency of radiofrequency heating (0.003-300 MHz) and WMH (300-300,000 MHz) are absolute opposites. The longer wavelength of radiofrequency heating penetrates deeper into the material, producing more uniform heating, and the electromagnetic energy of radiofrequency heating is delivered directly to the substance being heated. Under typical conditions, radiofrequency heating is utilized to process packaged food components in addition to bulk items. In other words, packaged goods and prepared foods may be processed using radiofrequency heating technology.