



## YEAST IN THE BAKING INDUSTRY

**Anagha A**

*M.Sc. Postharvest Management, College of Agriculture, Kerala Agricultural University*

*Corresponding Author Mail ID: [annaanu506@gamil.com](mailto:annaanu506@gamil.com)*

### Abstract

A single-celled organism called yeast is essential for baking, brewing, and wine production. Dough rise, gluten conditioning, and fermentation are some of its main duties. Bread and other goods leavened with yeast also benefit from the flavour imparted by yeast. Yeast comes in different varieties, such as *Candida milleri*-yeast, wild yeast, and baker's yeast. Yeast comes in different varieties, such as quick, dry, and fresh varieties. Over fermentation, taste alterations, alcohol generation, under fermentation, and poor flavour development are all problems in baking. The proper balance of lactic acid bacteria and wild yeast is necessary for the optimal taste and rising of sourdough bread.

**Keywords:** Single -celled microorganism (SCM), Yeast, Baking, Fermentation

### Introduction

Yeast, a single-celled organism from the Fungi Kingdom, is present in both nature and within our bodies. It ferments sugar, producing carbon dioxide, alcohol, and other compounds as byproducts. Yeast plays a crucial role in baking, brewing, and winemaking. As one of the oldest domesticated organisms, humans have been utilizing yeast for thousands of years in food and beverage production. Evidence of yeast used in bread-making dates back to Ancient Egypt around 1300–1500 BCE and China around 500–300 BC. However, archaeological evidence suggests that yeast may have been used even earlier for grain fermentation, including in bread making. For example, vessels found in Israel that date back to 5,000, 3,000, and 2,500 years ago contained yeast colonies, providing direct biological evidence of its use in early cultures. Yeast's ability to ferment sugar, convert it to

alcohol and carbon dioxide, and make bread and cakes rise has made it an essential component of human civilization. It's also given beer and wine their aroma and made champagne bubble.

The two primary purposes of yeast in fermentation are:

- To make the dough rise and become airy by converting sugar into carbon dioxide gas.
- To condition and soften the dough's gluten, allowing it to evenly absorb and retain the expanding gases.

In addition to increasing the volume of baked goods, yeast enhances their flavor, texture, crumb structure, color, and overall quality. When yeast is mixed with flour and water in the right proportions, it receives enough soluble protein and sugar to support the fermentation process.

For yeast cells to become active, complex sugars must first be broken down into simple sugars by yeast enzymes. Once the yeast cells absorb these simple sugars, they convert them into carbon dioxide gas and alcohol. Additionally, enzymes present in both the flour and yeast transform soluble starch into malt sugar, which is further converted by other enzymes into fermentable sugar, continuing the aeration process necessary for dough leavening.

### Role of yeast in baking

In baked goods production, yeast plays a crucial role by serving three main functions:

**Production of carbon dioxide:** As the fermentable sugars in the dough break down, the yeast produces carbon dioxide. The dough

expands due to the evolution of carbon dioxide, which is trapped in the dough's protein matrix.

**Causes dough maturation:** This process occurs through the physical stretching of the dough's proteins by carbon dioxide gas and the chemical reactions between the flour's proteins and the alcohols and acids produced by yeast. The result is the light, airy texture characteristic of yeast-leavened products.

**Development of fermentation flavour:** Yeast contributes to the distinctive flavor of bread and other yeast-leavened products. During dough fermentation, it generates various secondary metabolites such as ketones, higher alcohols, organic acids, aldehydes, and esters. While some, like alcohol, evaporate during baking, others interact with different dough components, creating more complex flavor compounds. These reactions primarily take place in the crust, with the resulting flavors permeating the crumb of the bread.

In addition to enhancing the flavor, yeast increases the volume and improves the texture, grain, color, and overall quality of baked goods. When mixed with water and flour under optimal conditions, yeast has access to sufficient soluble protein for cell growth and enough sugar to sustain fermentation.

### Types of Yeast Related to Baking

- ***Saccharomyces cerevisiae***- commonly known as baker's yeast or brewer's yeast, is a single-celled fungus that has been used in baking for thousands of years. During fermentation, it breaks down sugars and starches into carbon dioxide and alcohol, processes that are crucial in both baking and brewing. In baking, the carbon dioxide generated by the yeast acts as a leavening agent, making the dough rise. For optimal performance, baker's yeast should be osmotolerant, capable of withstanding chemicals such as salt and propionates, maintain a high growth capacity, resist aggregation, and have good storage stability.

- ***Saccharomyces exiguous***- also known as *S. minor*, is a wild yeast that is sometimes used in baking. It's found in the air, on plants, grains, and fruits, and is often propagated in sourdough starters. In sourdough starters, wild yeast acts as a leavening agent, producing carbon dioxide and alcohol as by-products. It's also necessary because commercial yeast would die in the acidic environment created by the bacteria in the starter. This acidic environment also protects the starter from bacteria that could make you sick.

- ***Candida milleri***-yeast is commonly used in the production of sourdough bread, contributing to its characteristic tangy flavour.

### There are many types of yeast used in baking, including fresh, dry, and instant yeasts:

**Fresh yeast:** Also known as cake yeast or compressed yeast, this block of yeast cells is soft, crumbly, and pale beige in colour. It contains about 70% moisture and has a stronger yeast smell than dry yeast. Fresh yeast must be dissolved into a liquid before use, but it disperses easily throughout the dough.

**Instant dry yeast:** Also known as fast-rising yeast, this type of dry yeast can be added directly to dough without rehydration. It works quickly and can reduce rising time, making it a popular choice for commercial bakeries. Instant yeast often contains dough enhancers that promote a stronger rise, making it ideal for quick bread.

**RapidRise Yeast:** A brand of instant yeast from Fleischmann's, RapidRise Yeast is said to be a different strain of instant yeast that's formulated to produce a single strong rise.

### Role of Carbon Dioxide in Bread Dough

The bread to rise even more. The CO<sub>2</sub> also forms bubbles, which create a fluffy and tender crumb. Carbon dioxide (CO<sub>2</sub>) plays a crucial role in bread dough, causing it to rise and creating a light and airy texture:

**Fermentation** yeast is added to flour and water to create dough, the yeast consumes sugars and starches in the flour, producing CO<sub>2</sub> gas and ethanol through a process called fermentation. The CO<sub>2</sub> gets trapped in tiny air pockets within the dough's gluten network, preventing it from escaping and causing the dough to rise.

**Baking**-During baking, the trapped CO<sub>2</sub> expands further, causing structure

### Challenges

#### Over-fermentation:

**Excessive Rising:** If the dough ferments for too long, it can lead to overexpansion and collapse of the gluten structure. This results in a dense and gummy texture.

**Flavour Changes:** Over-fermentation can also lead to changes in the flavour profile of the bread, producing off-flavours or excessive sourness.

**Alcohol Production:** Extended fermentation can cause the yeast to produce more alcohol, which can affect the taste of the bread.

#### Under-fermentation:

**Insufficient Rise:** If the dough doesn't ferment long enough, it may not rise adequately, resulting in a dense and heavy loaf.

**Lack of Flavor Development:** Proper fermentation allows the yeast to produce flavour compounds. Insufficient fermentation time may result in a bland-tasting bread.

#### Sourdough Considerations:

**Wild Yeast Management:** Sourdough bread relies on wild yeast and lactic acid bacteria. Bakers need to manage the balance between these microorganisms to achieve the desired flavour and rise.

### Conclusion

Humans have relied on yeast for thousands of years, particularly for its role in

fermentation processes that produce wine, beer, and bread. Yeasts also have various applications in the health food industry and are increasingly used as alternative sources of high-nutrient proteins, enzymes, and vitamins. Strains of *Saccharomyces cerevisiae*, the most widely available commercial yeast, are well known for their fermentative properties and technological traits, which enable the production of uniform, high-quality products. In the baking industry, yeast plays a vital role in leavening, flavor development, and the structure of various baked goods. Understanding yeast's function and applying correct activation and fermentation techniques are essential for consistently achieving high-quality results in baking.

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