

# ENZYMES ENHANCING FLOUR QUALITY

by Pinar Erdal, R&D Manager of Mirpain Bakery Ingredients, Turkey

Bread, is the most widely consumed food in the world and its main ingredient is flour. For making bread, the most consumed flour is Wheat Flour and the most important value of wheat is its quality.

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**T**he quality of the wheat flour depends on its compounds which depends on wheat variety its compounds, harvest season (winter or spring), climatic effects (rainfall), storage conditions-durations, crop and after crop treatment, planting regime, biological effects and so on. These conditions affect the bread's characteristics like crumb and crust colour even and smooth crumb texture, higher water absorption, uniform loaf shape, better-knife opening and higher tolerance to various processes.

When your flour cannot meet these factors, functional ingredients especially ultra concentrated enzymes that catalyse chemical reactions in the case of flour/dough, take a big role in improving the flour. As a result of being ultra concentrated, when a little enzyme is used it yields desired effects on the flour quality. For example, they enhance gas production by yeasts and can help control the strength of the dough.

Each enzyme acts upon only one specific substrate and ignores the others. Like proteins, they have an optimum temperature

and pH to react. On top of these factors, water content, enzyme amount, substrate content and the given time for reaction are also important. Also it is known that amylases and xylanases are the enzymes most added to dough.

## Amylases

Most widely used Amylases are reported as being the first enzymes to be added to bread dough. They are also the topic of most current research on enzymes in dough. While the initial use was for generating fermentable sugars (increasing gassing power), current interest focuses on their ability to delay crumb firming, the anti-staling effect.

Amylases action on damaged starch granules produces dextrins and oligosaccharides. The key factor of amylase in wheat flour is to break down complex starches into simple sugars. The presence of amylase is essential for fermentation of dough because yeast requires simple sugars to produce carbon dioxide. Although flour contains a tiny amount of sugar, one to two percent, this amount is not enough to make dough rise during fermentation.

However, wheat kernels contain naturally occurring alpha amylase because they need to break starch molecule into sugar to have the needed energy during the germinating of the kernels. The amount of naturally occurring amylase is affected by wheat variety, harvest season (winter or spring), climatic effects (rainfall), storage conditions-durations, crop and after-crop treatment, planting regime, as well as biological effects of the wheat.

Falling Number Method is a key analysis to determine the quality of flour by figuring out indirectly the alpha amylase activity. In the case of deficiency in naturally occurring amylase, the flour is supplemented by adding commercially available amylases or it is possible to blend flours to balance the amount of amylases.

## Hemicellulases

Hemicellulases transform water-insoluble hemicellulose into soluble form, which binds water into dough then dough. Thus firmness of the dough decreases, specific volume increases and crumb texture properties are affected positively (finer and uniform crumb).

It also significantly improves the machinability of the dough. The increased stability and improved machinability of the dough are obtained by hemicellulase besides it increases the elasticity of gluten network. Hemicellulases also have a softening effect.

## Mirpain Alphamill

Mirpain Alphamill is an alpha amylase enzyme with different concentrate types depending on requirement profiles. Its benefits include improved levels of dough rising, improved volume of the final product, and improved crust colour by participating in browning reactions are amongst its benefits. It also improves the shelf life of the final product.

## Mirpain Hemimill series

Mirpain Hemimill is hemicellulase enzyme with concentration and type depending on the customer profiles. The most consumed is Hemimill spring. Indeed, after our long research and development studies, we have created this specific hemicellulose. Hence the name of it, it is mostly used for its significant effect on Oven-spring.

Some of the benefits of the Hemimill spring include improved extensibility and machinability of the dough, improved volume of the final product and greater fermentation tolerance. Finally, it improves oven-spring.

## Alpha amylase and hemicellulase combinations

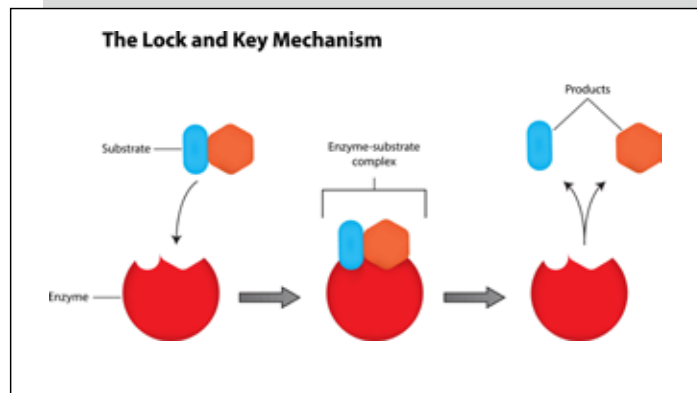
At times, bakers and flour millers have difficulties in deciding the correct dosage of the enzymes. Subsequently, this causes wrong classifications of the quality of the enzyme. Therefore after our R&D studies, we created and launched the Compomill, as an optimum combination of alpha amylase - hemicellulase to reduce the possible headaches of the end users and to maximise the benefits of synergistic action of these enzymes.

Not only does it improve gas production and protection, machinability and stability, and optimises dough consistency, it also improves visual appearance of the final product (crust colour, finer crumb, finer structure). It improves the volume of the final product and improves oven spring.



Table 1:

BREADS	5 PPM COMPOMILL	8 PPM COMPOMILL	10 PPM COMPOMILL	12 PPM COMPOMILL
VOLUME (ml)	1888,368	2224,814	2274,289	2416,068
Specific volume (ml/g)	4,769	5,61	5,69	5,958
Length (cm)	16,3	16,4	16,4	16,5
Height (cm)	13	14,7	14,9	15,8



## Future trends

Regarding baked goods, the usage of enzymes will exist for the development of gluten-free products and for obtaining dietary fiber-enriched bread and products with increased contents of arabinoxylan oligosaccharides with prebiotic potential. Offering label-friendly answers with clear-cut activity, today's enzymes are also used as shell-life extenders of the end-product. ☺