LALLEMAND
DISTILLING

DistilaZyme®

Essential processing aids

Where Science Meets Art

WHY DO WE NEED ENZYMES IN GRAIN SPIRITS PRODUCTION?

- **To break starch and non-starch viscosity down**
- **To break starch down to fermentable sugars**
- **To break peptides down to amino acids (for nutrition purpose)**

All the cereals (corn, rye, barley, rice, etc.) and some roots, i.e. potatoes, contain starch which is glucose polymers. Starch cannot be fermented by yeast directly and must be broken down to simple sugars: glucose, maltose.

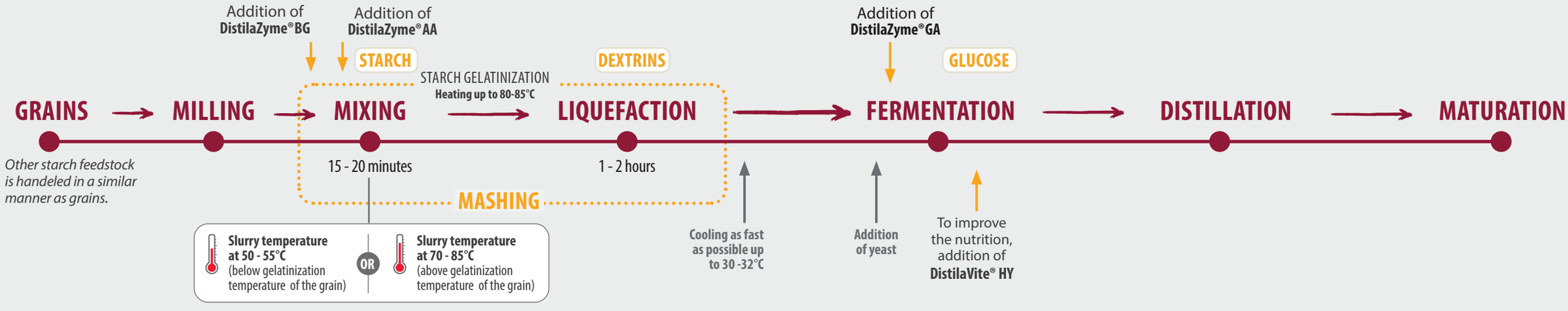
HOW DO ENZYMES WORK?

Enzymes are highly specific: one enzyme catayses one biochemical reaction… one key for one lock!

- **Beta-glucanase (BG) reduces non-starch viscosity**
- **Alpha-amylase (AA) breaks down starch into dextrins**
- **Glucoamylase (GA) breaks down dextrins into glucose**
- **Protease breaks down proteins into amino acids (for nutition purpose)**

The activity of the enzymes depends mainly on the pH, the temperature and the dosage.

DIAGRAM OF GRAIN SPIRITS PRODUCTION



DistilaZyme® BG
DistilaZyme® AA

Goal: to break down viscosity to pump the mash and to provide a substrate for DistilaZyme® GA action.

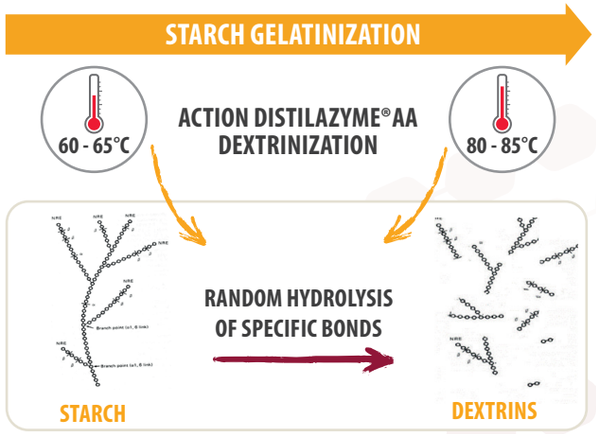
How does it work?

DistilaZyme® BG

is a liquid β-glucanase enzyme complex that quickly hydrolyzes non-starch polysaccharides (NSPs) such as β-glucans and xylans reducing viscosity in mashes that contain high proportions of rye, wheat or other small grains. It works well in combination with DistilaZyme® AA.

DistilaZyme® AA

After the mixing, the temperature is increased progressively. During the heating, the granules swell irreversibly and the granular structure collapses: gelatinization. For each type of grain there is a typical gelatinization temperature range. This changes according to variety, region, year, etc. We increase the temperature up to 80-85°C which is the optimum range of temperature for DistilaZyme® AA activity and for the liquefaction (dextrinization) to occur.



Importance of having the right AA dosage for a completed fermentation:

Dosage too low: not possible to pump the mash.

Dosage too high: the efficiency of DistilaZyme® GA will be impacted.

DistilaZyme® GA

Goal: to convert dextrins resulting from DistilaZyme® AA action into fermentable sugars: saccharification.

How does it work?

Glucoamylase breaks Alpha-bonds to convert dextrins (oligosaccharides) into glucose units.

When to add DistilaZyme® GA

Simultaneous Saccharification and Fermentation (SSF): after liquefaction, the mash is cooled to fermentation temperature and DistilaZyme® GA is added 1-2 hours after yeast directly in fermenter.
It allows control of contamination and osmotic stress due to the controlled sugar release therefore a good start of fermentation.

We do not recommend to use DistilaZyme® GA before the fermentation vessel because it can cause significant issues with contamination and osmotic stress.

Importance of having the right GA dosage for a completed fermentation:

Dosage too low: will lead to slow fermentation: yeast will be starving. Fermentation will not be complete efficiently.

Dosage too high: will produce high amount of glucose in the start, which will lead to osmotic stress for the yeast. Fermentation will not be complete efficiently.

The optimal DistilaZyme® BG, DistilaZyme® AA and DistilaZyme® GA dosages are variable according to individual distillery production processes.

DistilaZyme®

Specific gravity	1.15 – 1.20	1.15 – 1.25	1.15 – 1.20
Food-grade	✓	✓	✓
Dosage	Please refer to each product Technical Data Sheet and/or to your technical sales representative.		
Storage	Cool and dry area (5 °C-10 °C)	Cool and dry area (3 °C-7 °C)	Cool and dry area (< 25 °C)
Shelf life	12 months	18 months	12 months
Packaging	1 kg, 20 kg, tote	1 kg, 25 kg	1 kg, 20 kg, tote

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distilledspirits@lallemand.com
@Company/Lallemand-Biofuels-&-Distilled-Spirits
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LALLEMAND BIOFUELS & DISTILLED SPIRITS