

# Olive oil extraction

Today's health-conscious consumers are buying more olive oil, a business opportunity for producers. You can get more out of your valuable olives with Novozymes solutions.

Even when your olives and harvest vary, Novozymes Viscozyme<sup>®</sup> L and Pectinex<sup>®</sup> Ultra Olio let you increase yields, reduce loss, ensure optimal quality and achieve more efficient processing. Even at the highest enzyme dosage, the application remains economical and profitable.

## Benefits

- Improved production process with smoother operation of machines and equipment
- Faster, more efficient separation of oil and water
- Yield increases by 1-2% compared to non-enzymatic treatment, resulting in 10-20 liters more oil per ton of olives
- Less residual oil in the pomace
- Quicker, better oil clarification
- Works with all extraction systems
- No change in the oil quality

## Performance

The performance of the enzyme depends on local conditions, olive variety and moisture content in the olives to be processed. Higher extraction yields, and other benefits can be achieved at dosages higher than 200 ml of enzyme per ton of olives. Even at the highest enzyme dosage, the application remains economical and profitable. Trial results obtained with Picual and Arbequina olives and different enzyme combinations and dosages are shown below.

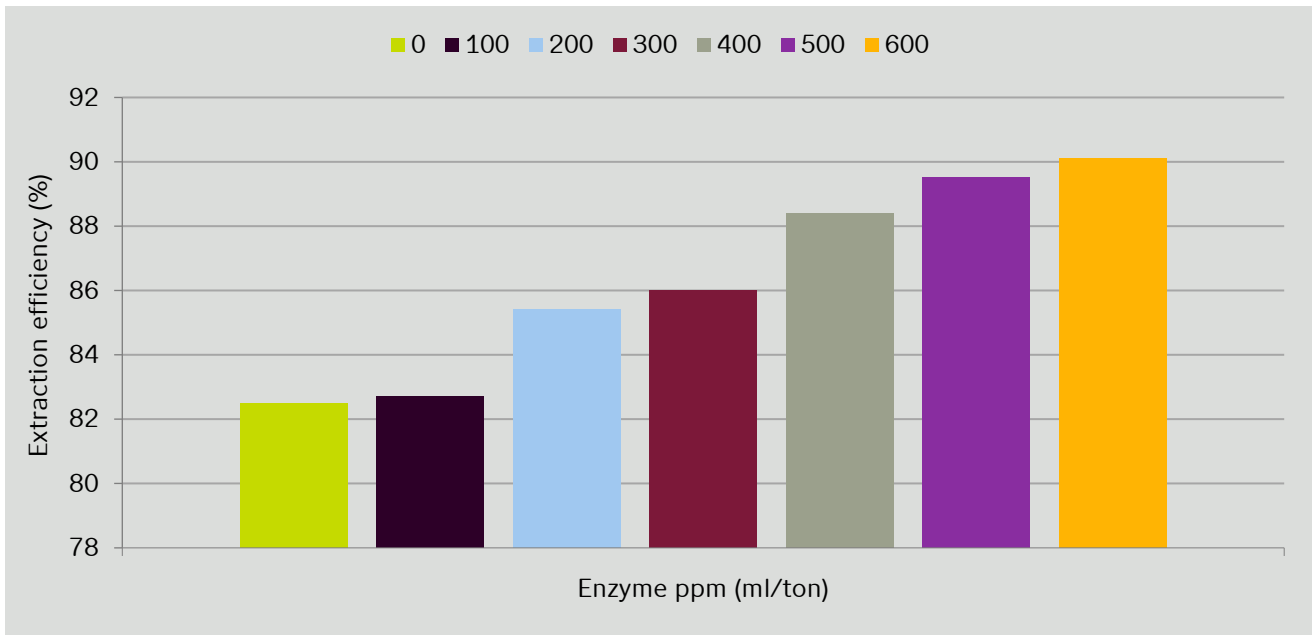


Fig. 1. Impact on oil extraction efficiency with different enzyme dosages on Picual olives, using a blend of Viscozyme® L/Pectinex® Ultra Olio, each 50%.

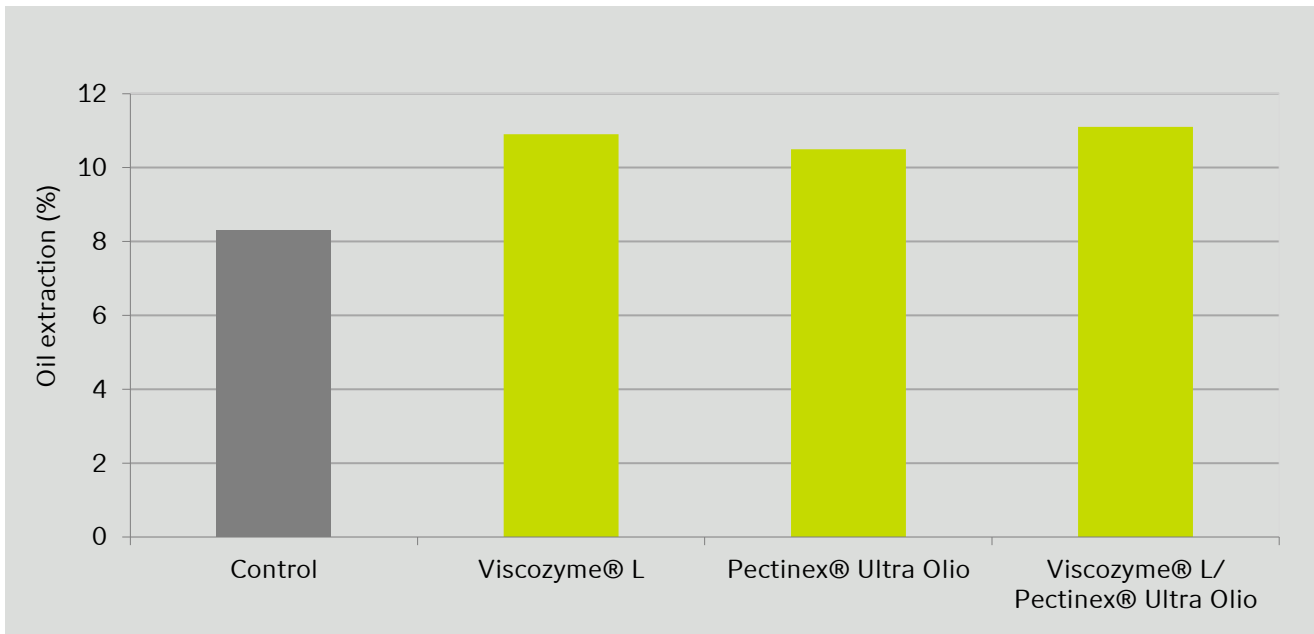


Fig. 2. Results obtained with different enzymes used at 300 ppm on Arbequina olives with maturity stage 1.5

Table 1 shows the results of oil extraction from olive pomace with enzymes, dosages total 200 ml/t, 45°C, 90 minutes

<b>Trials</b>	<b>Oil content in pomace at entrance of malaxer (%)</b>	<b>Oil content at exit of decanter (%)</b>
Control	3	2.9
Viscozyme® L	2.6	1.6
Pectinex® Ultra Olio	2.6	2
Viscozyme® L/ Pectinex® Ultra Olio	2.3	1.4
Competition	2.6	2.2

Table 1. Better extraction rates are achieved with Novozymes enzymes compared to both control and competition

## Usage

In discontinuous lines, a diluted enzyme solution is added directly into the mill, divided into 3-4 portions. The optimal dilution is 10% in clean tap water at ambient temperature.

In continuous lines, the solution can be added either directly into the mill or into the first compartment of the malaxing unit. In this setup, the use of a simple dosing pump is recommended.

### Application/process type

The enzyme can be used alone or in combination with talcum, depending on the structure and moisture content of the olives as well as the olive variety (easy, medium or difficult – please see below).

The moisture content in olives can vary from < 50% to > 70%. The use of talcum in combination with enzyme blends improves extraction yields with moisture contents > 55%.

Highest extraction yields using Novozymes enzymes have been obtained with green olives having a maturity index of < 3.5. To obtain a high-quality oil, the olives should be processed at an early maturation stage 0-3. Processing overripe olives with MI 6-7 should be avoided.

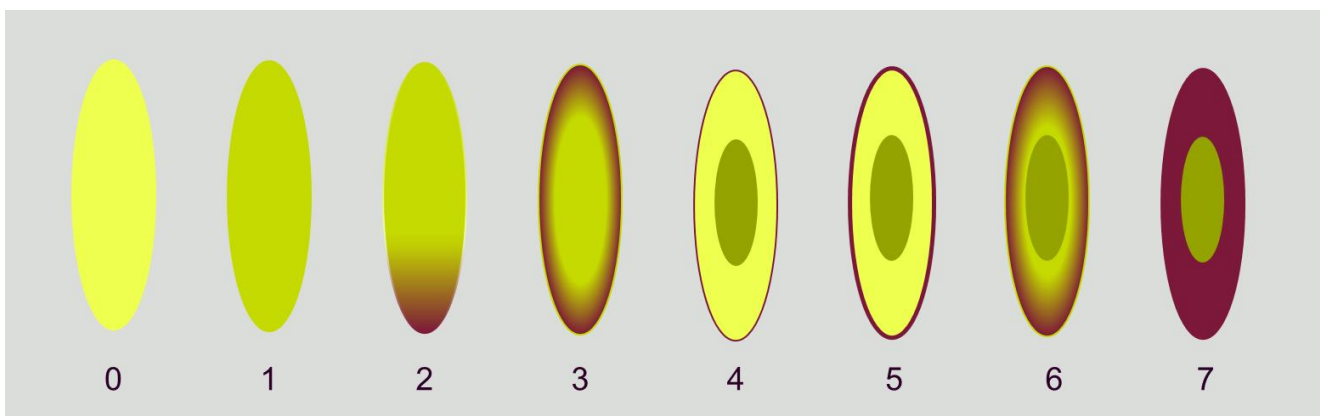


Fig. 3. Maturity Index (MI) of olives from 0 to 7

## Olive varieties and processability

Easy: Frantoio, Nevadilla Blanco, Koroneki  
Medium: Arbequina, Bornea, Picholino, Corotina  
Difficult: Manzanilla, Picual, Hojiblanca, Leccino

The highest benefit is seen when using Novozymes enzymes with difficult-to-process olive varieties. But good results are also achieved with olive varieties that are medium and easy to process.

Enzymes can be used as processing aids in olive oil production according to relevant local regulations (e.g. EU; US, AU, NZL, and others). It is the responsibility of users to ensure compliance with regulations regarding the use of processing aids in their region.

## Dosage

Viscozyme® L alone or in combination with Pectinex® Ultra Olio (ratio 50:50) should be applied at a dosage of 200 – 400 ml/ton of olives or pomace equivalent. An initial dosage of 300 ppm is recommended, which should then be adjusted depending on residual oil content in the pomace and dosing pump capacity.

## Optimum temperature and pH

### Temperature

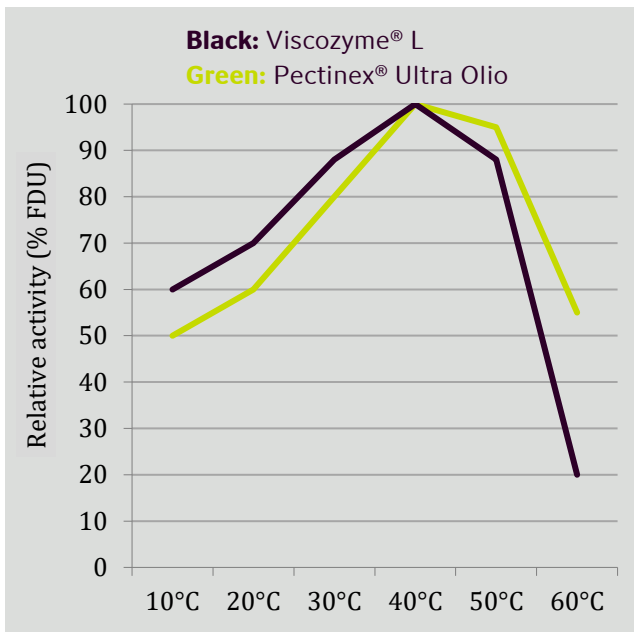


Fig. 4. Relative pectolytic enzyme activity (% FDU) depending on temperature.

### pH

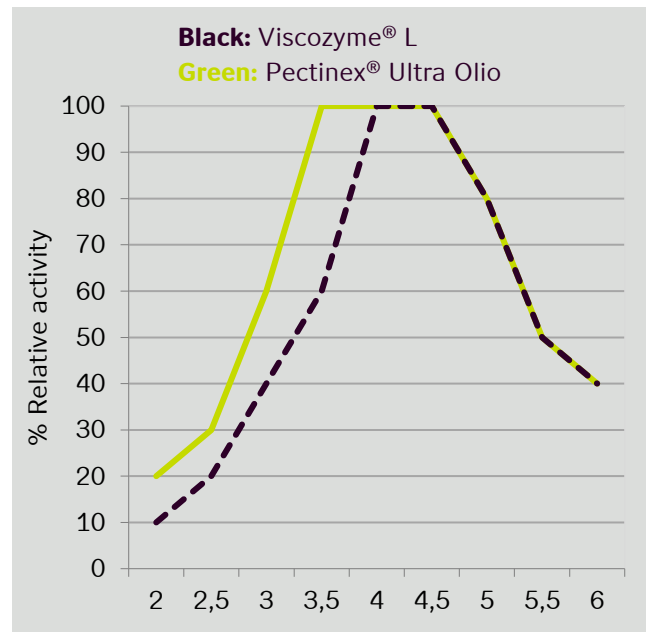


Fig. 5. Relative pectolytic enzyme activity depending on pH.

Both enzymes have sufficient activity at ambient temperatures such as 25-27°C. Pectinex® Ultra Olio has higher pectinase activity when compared to Viscozyme® L. But Viscozyme® L has even more side activities than Pectinex® Ultra Olio such as mananase, betaglucanase and rhamnogalacturonase. So, depending on raw material conditions, the best extraction yields can be achieved with either Viscozyme® alone or in blend with Pectinex® Ultra Olio.

## Products

Viscozyme® L and Pectinex® Ultra Olio are natural enzyme preparations produced by the fungus *Aspergillus* spec, such as *Aspergillus aculeatus*. The production strains are not genetically modified, meaning that they are also suitable for organic olive oil processing.

Aside from the primary pectolytic activities, Viscozyme® L and Pectinex® Ultra Olio have various side activities including hemicellulases, mannases, betaglucanase, rhamnogalacturonase, etc. These enzyme activities can be naturally present in very small amounts in the olive cells and are responsible for the softening of the fruit during maturation.

Additional olive oil extraction documents are available at [Novozymes Market](#).

## Safety, handling and storage

Safety, handling and storage guidelines are provided with all products.

## Get ahead

Staying ahead of the dynamic food and beverage market requires the best technology and expertise to become even more flexible, efficient and profitable. With our solutions and expertise, Novozymes can support you on that journey. Let's transform the quality and sustainability of your business together.

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### About Novozymes

Novozymes is the world leader in biological solutions. Together with customers, partners and the global community, we improve industrial performance while preserving the planet's resources and helping build better lives. As the world's largest provider of enzyme and microbial technologies, our bioinnovation enables higher agricultural yields, low-temperature washing, energy-efficient production, renewable fuel and many other benefits that we rely on today and in the future. We call it Rethink Tomorrow.

### Novozymes Switzerland AG

Neumattweg 16  
4243 Dittingen  
Switzerland

Mail:

[foodandbeverages@novozymes.com](mailto:foodandbeverages@novozymes.com)

### Novozymes A/S

Krogshøjvej 36  
2880 Bagsvaerd  
Denmark