Trenolin®

Effect meets efficiency:

Optimum vinification of reds, rosés and whites

Trenolin® Enzyme:

- Nature's tools
- Effective vinification tools
- Increased yield
- Colour extraction
- Improved clarification
- Increased filtration performance
- Sensory optimisation

ERBSLÖH

Progress is our future

Trenolin® FastFlow DF

It has been possible to develop a highly active arabinogalactan-II-hydrolase (AG-II-hydrolase) through a detailed screening programme. This makes it possible to degrade arabinogalactan-II side chains and to bring about a significant reduction in the whole pectin's ability to bind water. Trenolin® FastFlow DF makes it possible to access the pectin complex further and faster than classic pectinases do. The result is a drastic reduction of must viscosity. This improves pressability, the user obtains more free-run juice and the introduction of bitter compounds and tannins is reduced. Fewer sediment particles are precipitated and they settle better. The more complete depectinisation also splits colloids which inhibit filtration, which in turn facilitates much higher filtration throughputs in young wine.

Successes in practice

Trenolin® FastFlow DF has already been used to a great extent since the vintage of 2011. Users were rewarded with increased wine yields (Fig. 2), improved must and young wine clarification and consequently better filtration performance (Fig. 3).

Trenolin® FastFlow DF is still very effective at temperatures below 10°C.

Fig. 2: Increased press yield and reduced pressing time with Trenolin® FastFlow DF, Rheinhessen Silvaner, destemmed mash, enzyme dosage 4 mL/100 L, maceration time 8 hours, 12 °C.

Sample	Specific hourly output
Control	500 L/m²/h
Standard pectinase	600 L/m²/h
Trenolin® FastFlow DF	800 L/m²/h

Fig. 3: Filtration performance and duration for Rheinhessen Pinot noir following enzymation with Trenolin® FlastFlow DF in a 3,000 L tank, enzyme added to mash 6 mL/100 L.

Advantages of Trenolin® FastFlow DF

- **Can be used to make white and red wine**
- **Faster, more effective pectin degradation in mash and must, including pectin-rich grape varieties**
- **Improved must and young wine clarification**
- **Enhanced colloid degradation in must and young wine made from white and red grapes**
- **Improved filtration for young wine, including from pectin-rich white grape varieties and young red wines in general**
- **Unlike standard pectinases the effectiveness is still outstanding below 10 °C**

Trenolin® Frio DF

Trenolin® Frio DF

Oenologists around the world are relying increasingly on cold maceration processes in an effort to achieve the highest quality wines. They are being assisted in this endeavour by low-temperature enzyme Trenolin® Frio DF. It is now possible to achieve effective pectin degradation at temperatures as low as 5 °C, through selection and development of cryo-tolerant pectinases.

Trenolin Frio DF degrades pectins with a high capacity to bind water reducing the viscosity of the grape juice. Even at low pressing pressures, the use of Trenolin® Frio DF produces a higher proportion of free-run juice. Trenolin® Frio DF also makes it possible to increase juice yield by up to 12%, even at temperatures around 5 °C. Pressability is significantly improved.
The extraction of undesirable bitter compounds and tannins is reduced. The sediment particles suspended in the juice lose their water-binding ability as a result of the enzyme's work and can be removed more quickly by filtration, separation or flotation.

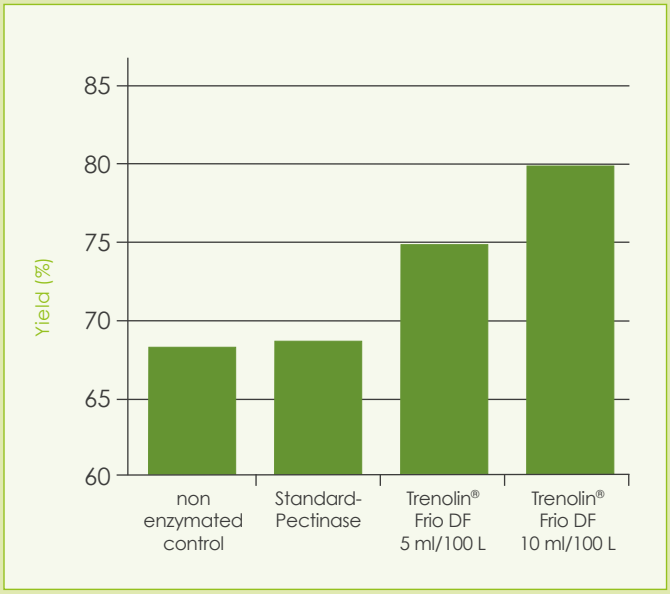

Fig. 4: Yield increase through the use of Trenolin® Frio DF (yield following mash enzymation at 8 °C).

Advantages of cold maceration/cold clarification with Trenolin® Frio DF

- **Fast, effective pectin hydrolysis in white and red mashes for cold maceration processes above 5 °C**
- **Improved press performance at low grape temperatures**
- **Reduced extraction of bitter compounds and tannins**
- **Promotes release of aroma precursors during cold maceration of white grape mashes**
- **Supports colour extraction during cold maceration of red grapes before mash fermentation**
- **Improved colour leaching from pomace cap during mash fermentation following carbonic maceration, as a result of lower mash viscosity during pumping over and CO_2 pressure reducing techniques**
- **Optimised must clarification as a result of complete pectin degradation at cold clarification temperatures as low as 5 °C**
- **Accelerated clarification with Seporit PORE-TEC, IsingClair Hausenpaste and Klar-Sol Super treatment agents**

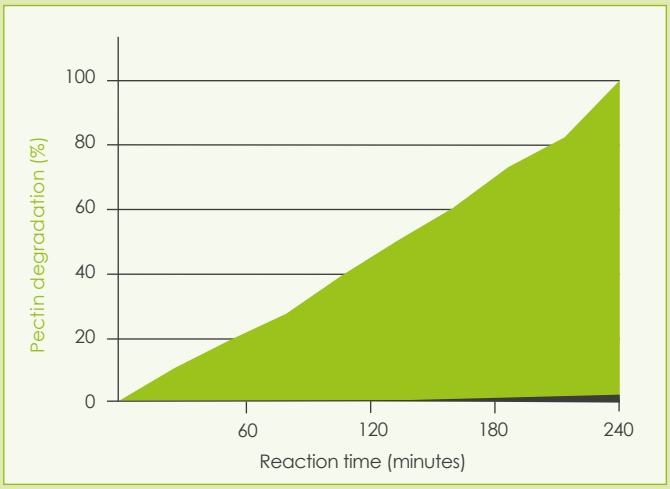

Fig. 5: Pectin degradation in must using Trenolin® Frio DF (green) compared to a standard wine pectinase (black).

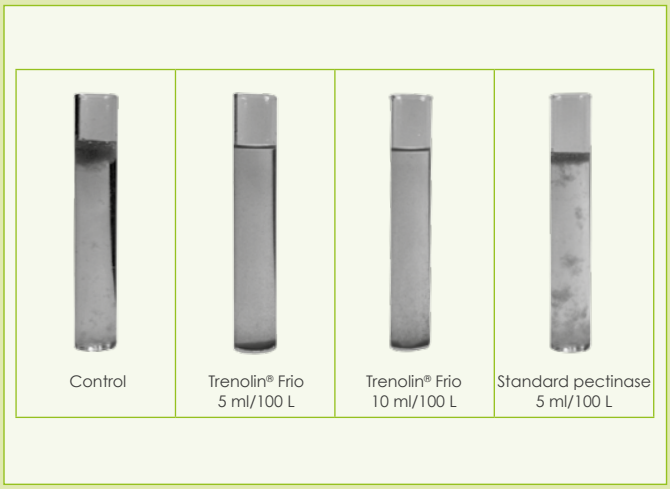

Fig. 6: Pectin test after five hours' reaction time for Trenolin® Frio DF at 5 °C. Any pectin residues settle out.

Trenolin® T-Stab DF

If mash is heated to temperatures over 80 °C the resulting wine is often criticised for a certain "jamminess" and lack of tannin structure. In order to combine the benefits of mash heating and mash fermentation it is common to reduce the temperature range to 65-75 °C. This prevents the formation of the undesired „cooked" flavour.

Trenolin® T-Stab DF helps this process because it is effective at up to 75 °C.

Trenolin® T-Stab DF is a pectinolytic enzyme complex which, in addition to a particulalrly temperature-stable pectinase (75 °C), contains other valuable active enzymes, such as acid proteinases and hemicellulases.

These activities cause an intensive, but gentle mash breakdown. The optimum temperature for Trenolin® T-Stab DF is 65 °C and it is active and stable even at temperatures of up to 75 °C. The enzyme is most active and sufficiently stable during thermal treatment (Fig. 7) in the red wine pH range.

Use of this enzyme accelerates release of valuable contents (e.g. catechins), which have a positive effect on red wines' structure and colour.

The resulting short maceration time saves a lot of time and considerably reduces the microbiological risk.

The mash's pumpability and pressability is much improved and results in better clarification and filtration at the must and young wine stage.

Technical processing advantages of Trenolin® T-Stab DF

- **Reduction of standing time**
- **Faster, almost continuous operation**
- **More mash processed per time unit**
- **Energy saving**
- **Low microbiological risk through reduced standing time**
- **Minimisation of Maillard reaction through deactivation of laccase and polyphenoloxidase**
- **Improved pumpability**
- **Improved pressability**
- **Improved mash throughput of must and young wines**
- **Better filterability at the wine stage**
- **Increased fruit intensity**
- **Shorter wine maturation time**

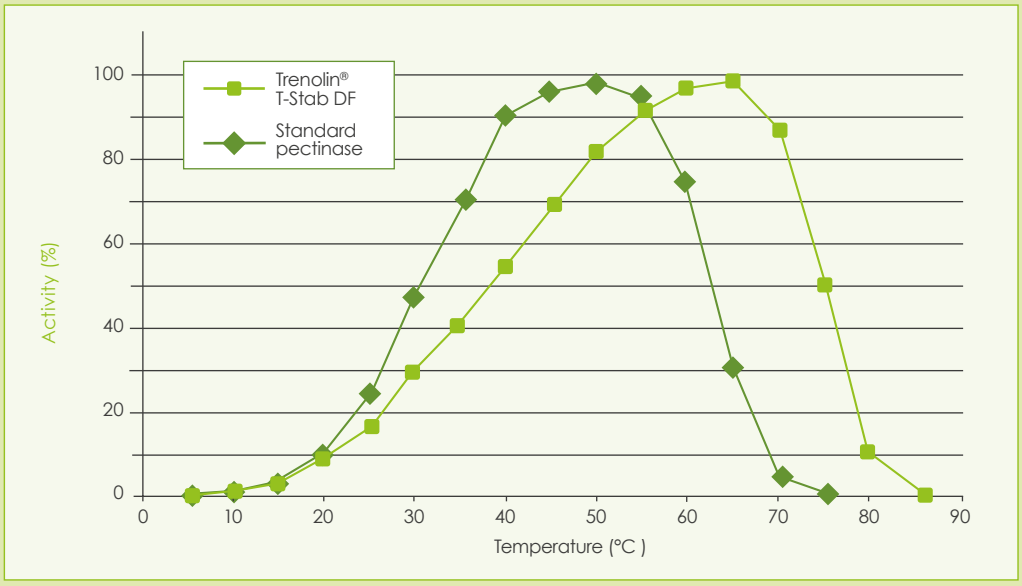

Fig. 7: Comparison of a standard pectinase with Trenolin® T-Stab DF with regard to activity and temperature.

Optimum vinifikation

Optimum vinification in red, rosé and white

For more than 40 years Erbslöh Geisenheim has developed and marketed special enzymes for optimising wine production. From initial outsourced production, in 1994 Erbslöh developed its own, newly equipped enzyme laboratory, in-house research and development and the latest refining technology. Since then users have been supplied with more than 15 different red and white wine enzymes of the Trenolin® brand.

Use of these oenological enzymes accelerates the processes and therefore makes vinification faster, easier and more reliable. They are tools the winemaker uses to achieve specific aims in a certain time.

They also allow greater flexibility when creating novel wines by improved aroma and colour extraction.

All Trenolin® enzymes comply with EU regulations, International Organisation of Wine and Vine (OIV) specifications, are depsidase free and have been produced without the use of genetically modified organisms.

You can contact our Technical Service or refer to the wine compendium, which is available free of charge, for comprehensive recommendations on the range of enzyme uses.

Innovations in enzyme technology at extreme temperatures

Technical applications for enzymes in wines, musts and juices usually fall within the 15 °C to 55 °C temperature range. Previously the effect of enzymes was severely limited below 15 °C, whilst normal wine enzymes were deactivated above 55 °C.

As a result of Erbslöh Geisenheim's own biotechnology research and development, the company is able to make available three special enzymes which are extremely effective outside the customary temperature ranges.

- **Trenolin® FastFlow DF**
  Intensive, rapid pectin degradation in mash/must, even below 10 °C and in pectin-rich, tough-skinned white and red grape varieties.
- **Trenolin® Frio DF**
  Cold enzymation as low as 5 °C.
- **Trenolin® T-Stab DF**
  Red mash heated up to 75 °C.

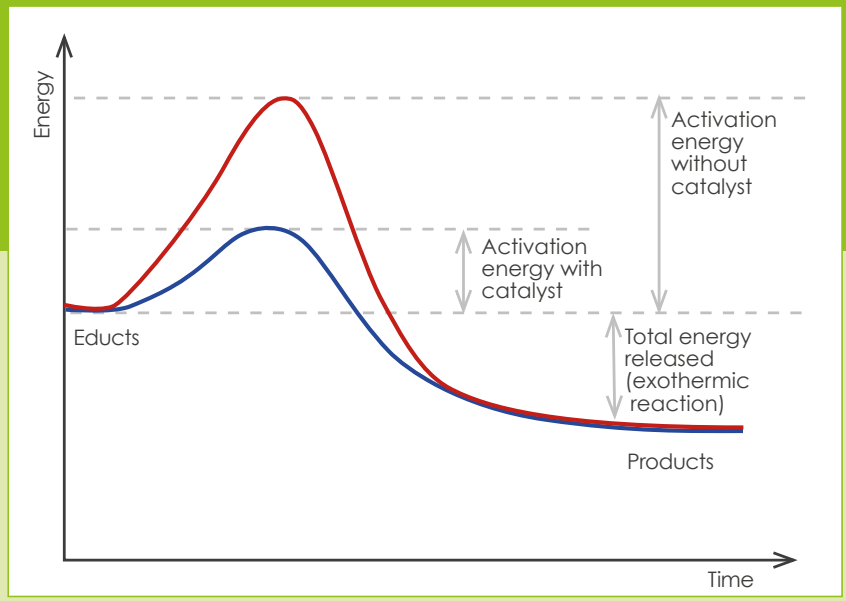

Fig. 1: Energy-time diagram for chemical substance conversion. The energy barrier for the reaction with the catalyst (enzyme) is much lower than for the reaction without an enzyme.

Depsidase-free Trenolin® enzymes for white, red and rosé wine vinification

Products	Use	Description	Special features/ Guidance	Recommended grape varieties	Dosage	Time of addition
Trenolin® Mash DF	Specially developed for MashZeration, enzymatically accelerated maceration, no extraction of bitter compounds	Highly active pectinase complex, also for breaking down hairy regions which are difficult to degrade. Contains ß-glucosidase and proteinase side activity	For high-quality, extra-rich wines with storage potential, intensification of the grape aroma at the mash stage	Classic grape varieties such as Riesling, Silvaner, the Pinot group, Sauvignon blanc	1–4 mL/100 kg	As soon as possible on the mash
Trenolin® Super^{PLUS} NEW	For rapid processing, increased juice extraction and compact deposition of sediments	Formulation containing various active pectinases for rapid splitting of the complex pectin molecule	Can be used universally	All white grape varieties	3–10 mL/100 kg	Mash, must, young wine and Süßreserve (conserved grape juice)
Trenolin Opti DF®	Fine granulate for mash, must and young wine-treatment in white wine preparation	Pectinase with the principal fractions of pectinesterase, polygalacturonase and pectinlyase	Can be used universally	All white grape varieties	1–3 g/100 kg (L)	At all stages of winemaking
Trenolin® 4000 DF	For producing Süßreserve (conserved grape juice) improved clarification and filtration	Pectinase with good pH tolerance and increased SO_2 tolerance	Particularly for producing Süßreserve (conserved grape juice) from healthy grapes	All white grape varieties	8–12 mL/100 L	After pressing
Trenolin® Flot DF	Special flotation enzyme, highly active for ideal buoyancy of sediment particles	Special composition with a high proportion of pectin esterase for rapid reduction of must viscosity and sediment destabilisation	Very short reaction time	All white grape varieties	2– 8 mL/100 L	viscosity
Trenolin® Bouquet^{PLUS} NEW	Heightened aroma profile through early release of aromatic precursors during winemaking	Special enzyme with newly developed glycosidase activity which facilitates effective release of aromas even in the presence of sugar	Can be added as soon as the start of alcoholic fermentation to achieve the maximum diversity of aromas	All bouquet types	5–10 mL/100 L	Juice, end of fermentation, young wine
Trenolin® Filtro DF	Special clarification and filtration enzyme, particularly for mashes contaminated with mucilage and colloids, musts and young wines from botrytis affected grapes	Pectinase for degrading plant-based and microbial colloids, with a broad spectrum of side activities	Glucanase activity even at 8 °C, specifically also for preparation of Süßreserve (conserved grape juice) from high-quality, botrytis-affected musts	All varieties, in case of potential filtration problems	10 –20 mL/100 L	Must, young wine and Süßreserve (conserved grape juice)
Trenolin® FastFlow DF **Trenolin® FastFlow DF**	For intensive pectin degradation in pectin-rich and tough-skinned white or red grape varieties	Modern, pectin-degrading active enzymes with arabinogalactan-II-hydrolase. Particularly effective on hairy region side chains. due to cryotolerance also effective below 10 °C	Increased yield, better press performance, better must clarification, increased filtration rates	All white and red varieties, particularly effective for pectin-rich grapes such as Silvaner, Traminer, Grüner Veltliner, Muscatel, etc.	4–10 mL/100 kg (L)	At all stages of winemaking, preferably on mash/must
Trenolin® Frio DF **Trenolin® Frio DF**	Special cryotolerant enzyme for effective pectin degradation during cold maceration and cold clarification from as low as 5 °C	Selected novel raw pectinases with high conversion rates even at extremely low temperatures	Promotes release of aroma precursors, improves colour release, optimises must sedimentation and flotation	All white and red varieties	2–10 mL/100 kg	At all stages of winemaking, preferably mash/must
Trenolin® T-Stab DF	For structure-forming mash breakdown during mash heating	Pectinase complex with proteinases and hemicellulases, effective and stable at temperatures up to 75 °C	Avoids jamminess, improved tannin structures, for early drinking wines with good aging potential	Pinot noir, St. Laurent	2–5 mL/100 kg	As soon as possible before mash heating
Trenolin® Thermo DF	Specially developed for optimised mash heating and decanter juicing	Highly active pectinase complex with cellulitic activities, also for breakdown of ramified pectin regions known as the hairy regions.	Wines with balanced structure which can be early marketed	Lemberger, (Blaufränkisch), Dornfelder, St. Laurent	1–4 mL/100 kg	After mash has cooled down again (< 55 °C)
Trenolin® Rouge DF	For intensively fruity, rich red wines	Highly effective pectinase with selected side activity for increased release and stabilisation of anthocyanins	For classic mash fermentation, stable colour complexes, especially for wines with colour pigments from the cyanidin group	Rich Pinot noir, Trollinger, Zweigelt, Blaufränkisch, Shiraz	3–10 mL/100 kg	To mash
Trenolin® Premium Red^{PLUS} NEW	For premium, deep red, characterful, heavy red wines	Special liquid enzyme for optimum maceration of grape skins and extraction of valuable substances. Optimum ratio of anthocyanins to tannins	A greater degree of polymerisation improves the colour's stability and shelf life	Cabernet sauvignon, St. Laurent, powerful Merlots, Blaufränkisch	1–4 g/100 kg	To mash
Trenolin® Rot DF	For elegant, fruity and lean rosé and red wines	Pectinase for gentle intensification of colour	universal application during vinification of red wine	Portugieser, Trollinger, light Pinot noir and Zweigelt	12–20 mL/100 kg	To mash

All Trenolin® enzymes are depsidase free. This enzyme purity is a prerequisite for retaining wine's acidity and aromatic compounds, as well as for promoting the storage potential. Most Trenolin® enzymes are liquid and therefore very easy to use. The fine granulate Trenolin® Opti DF must be dissolved in water before use. The relevant technical product data sheets contain specific recommended dosages for individual applications.

ERBSLÖH Geisenheim AG • 65366 Geisenheim • Tel.: +49 6722 708-0 • www.erbsloeh.com

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