

SIHAZYM™ Panzym™ Enzyme Navigator



ENZYMES



Powering Business Worldwide

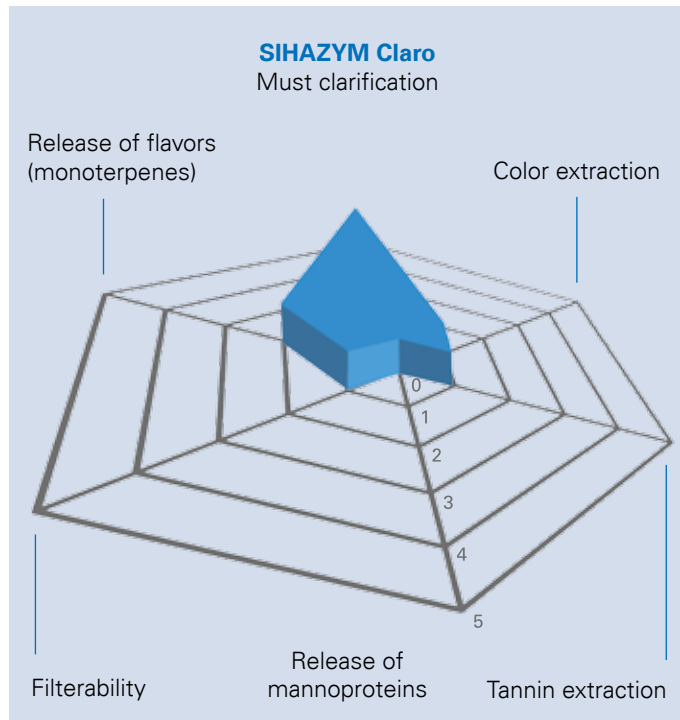
Must Clarification & Mash Extraction

The process of using wine enzymes is simple and gentle in many stages of wine production. Areas of

application for wine enzymes include must clarification, mash extraction, aroma release in white wines, and

filtration improvement. Wine enzymes weren't invented by industry. Naturally occurring wine enzymes served as the

basis for development of more efficient enzymes in higher concentrations.



Must clarification: natural and gentle with SIHAZYM Claro enzyme

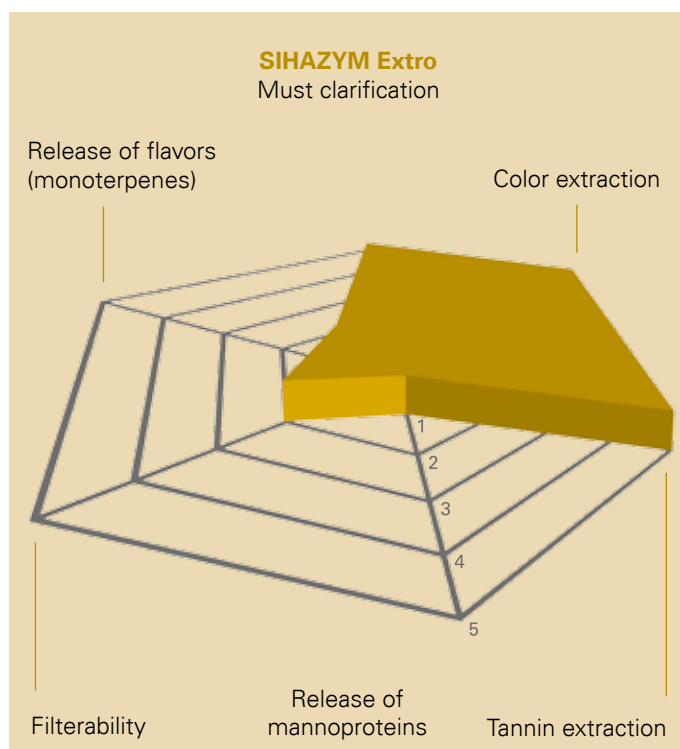
Must clarification plays a key role in speeding the fermentation of grape must with the complete break down of pectin. Grape must can be clarified quickly and effectively with the aid of SIHAZYM Claro enzyme, either through flotation or sedimentation.

SIHAZYM Claro enzyme is a highly active, pectolytic must clarification enzyme. It enables very fast must clarification at a low dosage. Use 1 – 1.5 g/hl at approx. 15 °C in order to obtain pectin-free, clarified must within two to four hours. At must temperatures of approx. 10 °C, a dosage of 2 g/hl has the desired effect within two

hours. During enzymatic clarification of cold grape must SIHAZYM Claro enzyme (4 g/hl at ≥ 5 °C) speeds up sedimentation. Since the enzyme is active up to 1,000 mg/l SO_2 , common grape/must sulphurization (20 – 50 mg/l SO_2) is possible.

Benefits:

- Fast, gentle and natural must clarification
- Preservation of aroma precursors
- No input of oxidation, reductive operation possible
- High clarifying level, low NTU levels
- Sixty percent lower sediment than non-treated musts



Mash extraction: increase juice and colour yield with SIHAZYM Extro enzyme

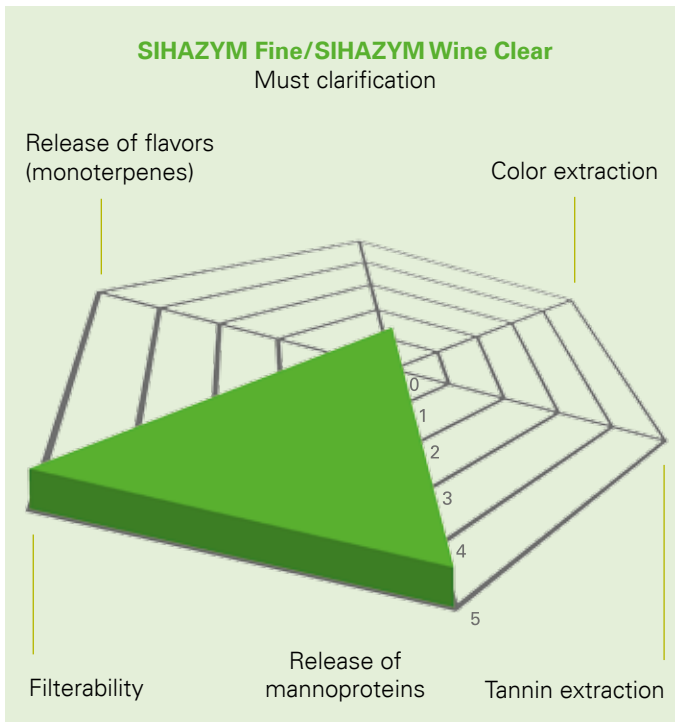
The pulp of grapes cells contains mainly natural, pectolytic enzymes. During maturation they aid continuous growth of the pulp cells. At the end of the maturation they are located in the grape skin and transfer to the mash during the subsequent grape extraction. Their natural enzyme activity is inhibited through this transition, the low pH value, and low or excessive mash temperatures.

SIHAZYM Extro enzyme enhances the natural enzyme activities, resulting in optimal mash extraction. In addition to pectinlyases, it contains pectinesterases and polygalacturonases as an enzyme complex and is therefore

ideally adapted to the specific oenological requirements. SIHAZYM Extro enzyme is effective in a wide pH range between 2.9 and 4.0 and large temperature range (10 – 60 °C).

Benefits:

- Highly active enzyme for both white and red mash
- Faster and more effective break down of residual pectins
- Fast sedimentation, low NTU content
- Fast must clarification
- Increased proportion of free-run grape must
- Increased aroma and color extraction



Filtration improvement: gentle and simple break down of filtration-inhibiting substances with SIHAZYM Fine and SIHAZYM Wine Clear enzymes

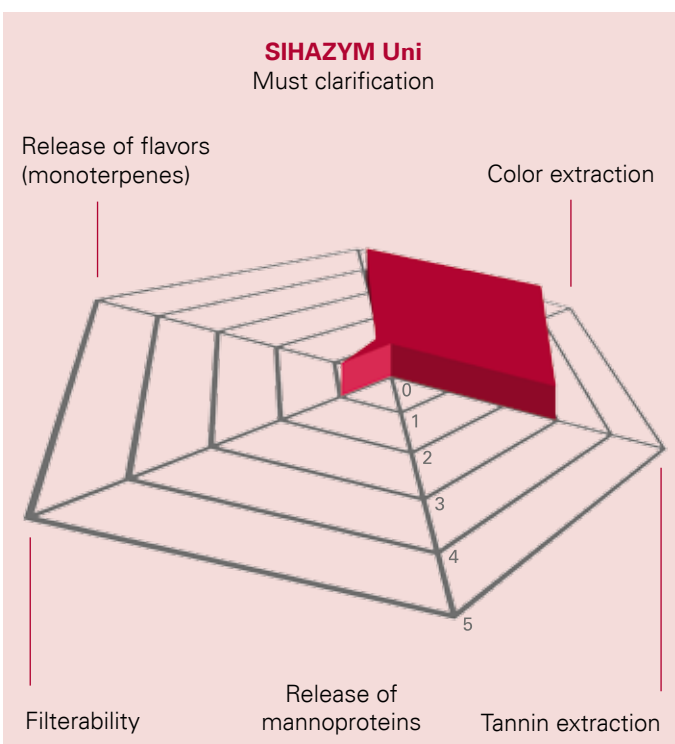
Filtration problems can be ascribed to the state of health of the grapes. The main filtration-inhibiting substance is β -glucan, which is produced by *Botrytis cinerea* on the grapes. This inhibitor can cause filtration problems from 0.6 mg/l. The only way to break down β -glucan is to use β -glucanase, which is contained in SIHAZYM Fine enzyme.

SIHAZYM Wine Clear enzyme can be used in grape mashes and during alcoholic fermentation. It accelerates wine

clarification and increases wine filterability due to the combination of pectolytic and β -glucanase enzyme activities.

Benefits:

- Improves filtration of grapes affected by botrytis
- Simplifies fining and clarification of the wines
- Reliably breaks down pectin and filtration-inhibiting substances

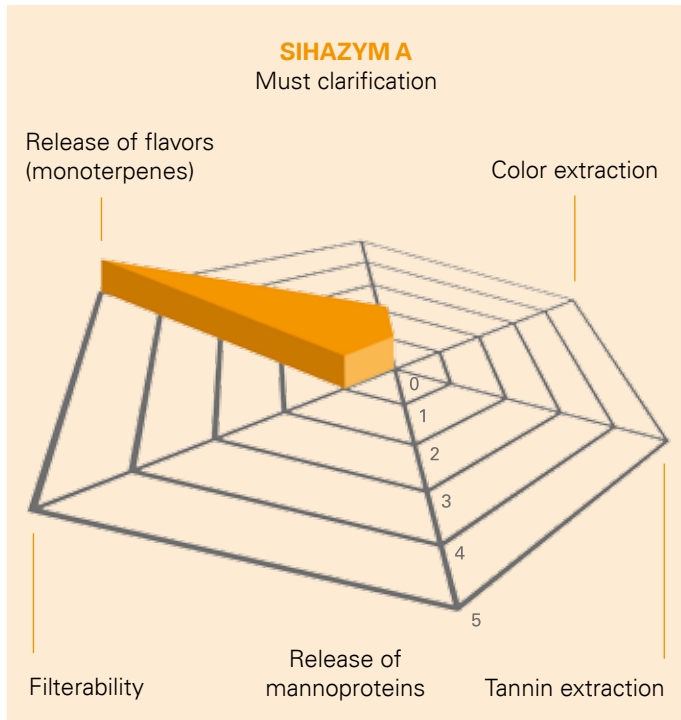


General application: must clarification and mash extraction with SIHAZYM Uni enzyme

SIHAZYM Uni enzyme is a special enzyme combination for must clarification and mash extraction. A dosage of 3 g/hl at approx. 15 °C during must clarification results in pectin breakdown and clarification of the grape must within four to ten hours. For mash extraction dosages of 3 – 4 g/100 kg of mash are required, in order to achieve improved process yield, i.e., more free-run must.

Benefits:

- Wide action spectrum
- Fast must clarification with low NTU levels
- Higher quantity of free-run must
- Enhanced extraction of pigments (anthocyanins)



Monoterpene release: release of odor-active aromas with SIHAZYM A enzyme

In aroma-intensive, white wines a variety of flowery aromas are bonded in the grape skin. These β -glucosidically-bonded aromas transfer to the wine after pressing and fermentation. The application of SIHAZYM A enzyme releases the odor-active aromas and makes them sensorially noticeable for the wine taster.

SIHAZYM A enzyme is optimized for white wine applications. Since the enzyme is inhibited by must sugar, it cannot release the aroma substances until after the alcoholic fermentation. It should therefore be used at the young wine stage. After the required reaction time, it

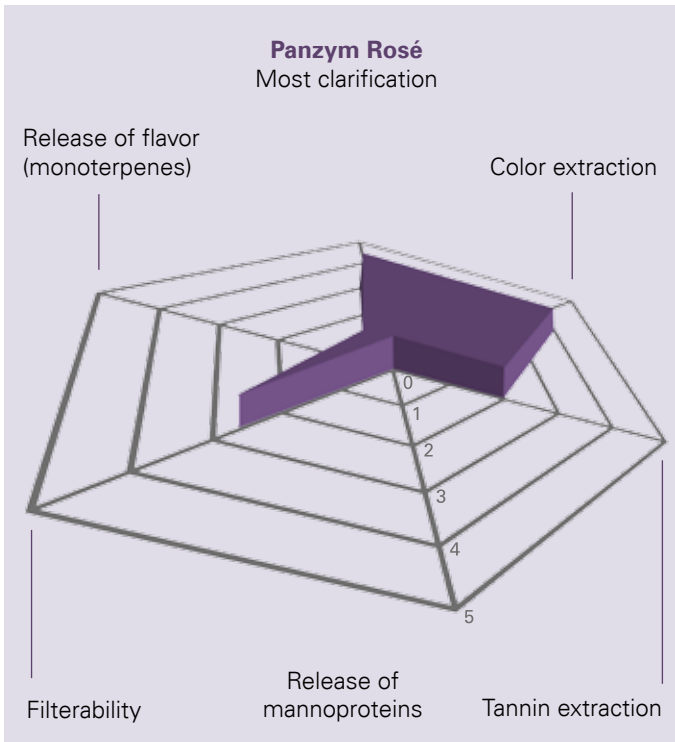
should be deactivated through bentonite fining.

Since SIHAZYM A enzyme splits pigments, resulting in decolorization, it should not be used in red wine.

Benefits:

- Releases monoterpenes in white wines
- Increases the content of flowery aromas
- High β -glucosidase activity
- Temperature range > 16 °C





**Mash extraction
Rosé wine preparation with
Panzym Rosé**

Enzymes are required for specific and fast depectinization in the preparation of rosé wine. An enzymatic breakdown during the pressing of the „rosé mash“ results in gentle juice extraction, i.e. an increase in the proportion of free-running must. The high polygalacturonase activity of Panzym Rosé additionally protects against over-extraction and improves the color stability of the rosé. Panzym Rosé is optimized for use in rosé mashes.

Benefits:

- More free-running must
- No over-extraction
- Gentle processing up to 5°C



Application Table

| Enzyme | Application – wine production stage | Use in | Temperature | |
|--------------------|---|---|--|---------------|
| SIHAZYM Claro | Must stage | Clarification tank, flotation, sedimentation | Must clarification: sedimentation | approx. 10 °C |
| | | | Must clarification: sedimentation | approx. 15 °C |
| | | | Flotation | approx. 15 °C |
| SIHAZYM Extro | Mash stage | Mash transport, mash maceration time, mash fermentation, re-cooled mash (approx. 50 °C) | White and red mash | 8 – 18 °C |
| | | | White and red mash | 18 – 25 °C |
| | | | Conventional red wine mash fermentation | 15 – 25 °C |
| | | | Flash pasteurization | 30 – 40 °C |
| SIHAZYM Fine | End of fermentation, yeast storage, extraction of mannoproteins | Fermentation tank, young wine storage | Grapes affected by botrytis, fermentation tank | approx. 16 °C |
| | | | Abating fermentation | > 16 °C |
| | | | Yeast storage, mannoproteins | > 16 °C |
| | | | Difficult to filter young wines | > 16 °C |
| SIHAZYM Wine Clear | Mash stage, end of fermentation | Mash transport, mash maceration time, mash fermentation, re-cooled mash (approx. 50 °C), alcoholic fermentation | White wine mash | approx. 15 °C |
| | | | Re-cooled mash | approx. 15 °C |
| | | | Musts difficult to clarify | > 16 °C |
| | | | Grapes affected by botrytis | approx. 16 °C |
| SIHAZYM Uni | Must and mash stage | Mash transport, mash maceration time, mash fermentation, re-cooled mash (approx. 50 °C), clarification tank, flotation, sedimentation | White wine mash | 12 – 15 °C |
| | | | Conventional red wine mash fermentation | 18 – 20 °C |
| | | | Re-cooled mash | approx. 50 °C |
| | | | Must clarification: sedimentation | approx. 15 °C |
| | | | Difficult to filter young wines | approx. 16 °C |
| SIHAZYM A | Release of monoterpenes, young wine stage, only for white wines | Storage tank | Young wine with yeast storage | > 16 °C |
| | | | Young wine without yeast storage | > 16 °C |
| Panzym Rosé | Rosé mash stage | Mash transport, cold maceration (5°C), press | Rosé wine grapes | 5 – 20 °C |
| | | | Rosé wine mashes | 5 – 20 °C |
| | | | Recooled mash | approx. 60 °C |



| Dosage | Time | Cinnamyl esterase activity | Product formulation | Production process |
|--------------------------------|------------------|----------------------------|---------------------|---|
| 2 g/hl | 2 – 6 hours | Cleaned, free | Granulate | Combination of solid-phase and submers method |
| 1 – 1.5 g/hl | 2 – 4 hours | | | |
| 2 g/hl | 0.5 – 1 hour | | | |
| 3 g/100 kg | 4 hours – 2 days | Cleaned, free | Granulate | Submers method |
| 2 g/100 kg | 5 – 20 days | | | |
| 2 – 3 g/100 kg | 5 – 20 days | | | |
| 2 g/100 kg | 0.5 – 6 hours | | | |
| 3 – 5 g/hl | | Cleaned, free | Granulate | Combination of solid-phase and submers method |
| 2 – 3 g/hl | 8 – 14 days | | | |
| 2 – 3 g/hl | Up to 21 days | | | |
| 5 – 8 g/hl | Up to 8 days | | | |
| 3 – 5 g/100 kg | 4 – 6 hours | Cleaned, free | Granulate | Submers method |
| 3 – 5 g/100 kg | 4 – 6 hours | | | |
| 3 – 4 g/100 kg | 4 – 6 hours | | | |
| 3 – 7 g/100 kg | | | | |
| 3 – 4 g/100 kg | 2 – 4 hours | Cleaned, free | Granulate | Combination of solid-phase and submers method |
| 3 – 5 g/100 kg | 5 – 20 days | | | |
| 2 g/100 kg | 2 – 4 hours | | | |
| 3 g/hl | 4 – 10 hours | | | |
| 2 g/hl (+ SIHAZYM Fine 3 g/hl) | 2 – 6 hours | | | |
| 4 – 6 g/hl | 2 – 8 weeks | Weak | Granulate | Combination of solid-phase and submers method |
| 3 – 5 g/hl | 1 – 2 weeks | | | |
| 2 – 4 ml/100 kg | 1 – 2 hours | Low | Liquid | Submers method |
| 2 – 3 ml/100 kg | 1 – 2 hours | | | |
| 1 – 2 ml/100 kg | 1 – 2 hours | | | |





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