



ClearUp BIO Yeast Cell Walls

“The problem solver”

ClearUp BIO is a, highly purified, functional yeast cell wall preparation. In contrast to standard yeast cell walls, ClearUp BIO provides a range of new applications which include replacing numerous standard fining products that are environmental unfriendly (microplastic) or highly allergenic (animal based ingredients).

ClearUp BIO offers a range of properties which provide several interesting application tools in the winemaking process. These include the absorption of undesired phenols, odours and substances which act inhibitory and can create stuck fermentations. Examples of such inhibitory substances are fatty acids (C12-C20) but also pesticide residues or fungal toxins (Mycotoxine). ClearUp BIO is certified organic.

Application

Due to its significantly higher content of lipids ClearUp BIO has multiple properties which are desirable for modern wine making. Among those are the adsorption of phenols or fermentation inhibiting fatty acids, as well as critical pesticides or even mycotoxins that are often responsible for inhibited fermentations.

The main application/benefit of ClearUp BIO is the replacement of microplastics, animal and silicate-containing fining tools for the removal of undesirable phenols in must and wine. The wines are rounded without sensory substances being removed.

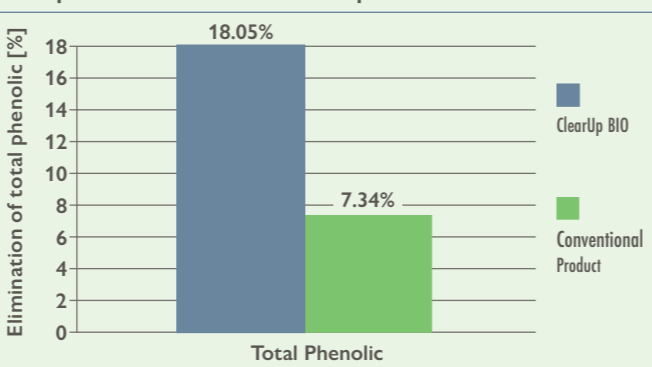
Graph No. 1 shows the depletion of total phenols in a trial with ClearUp BIO versus a standard fining product. Graph No 2 illustrates the highly efficient depletion of inhibitory fatty acids versus a standard cell wall product from the market. It's obvious that is highly efficient and multifunctional.

ClearUp BIO can also eliminate a number of sensorial off-flavours such as *Brettanomyces* and negative Thiol-flavours. ClearUp BIO is a real all-rounder.

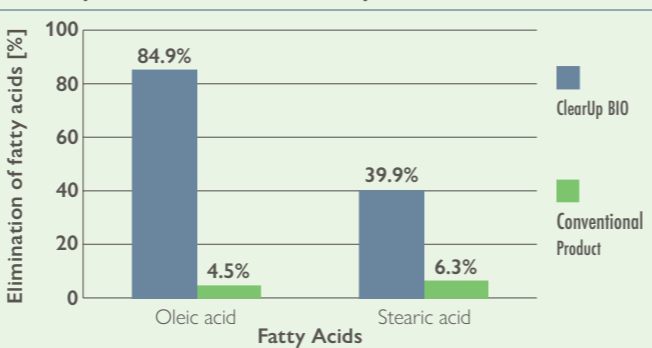
Properties

- Elimination of undesirable phenolics in juice and wine
- Improves sensory characteristics of wines from stressed fermentations
- Removes inhibitory medium chain fatty acids in must and young wines (e.g. C12-C20)
- Can notably reduce the content of volatile phenols (e.g. *Brettanomyces*)
- Binds many pesticide residues and mycotoxins with inhibitory effects on fermentation

Graph 1: Elimination of total phenolics in white wine



Graph 2: Elimination of fatty acids in white wine



- Can reduce sulphur off-flavours in young wines
- Can be used for colour correction in white, rosé and sparkling wines
- Ideal for increasing the internal surface with heavily pre-clarified musts (e.g. flotation)
- Highly purified so no negative impact on sensory characters
- Helps prevent stuck or sluggish fermentations
- Certified organic (regulation EC 834/2007 and 889/2008)

Juice phase

- Reduces undesirable characters and phenolics
- Stabilises colour by removing laccase from juice
- Increases NTU in highly clarified juice
- Reduces taint (including smoke and pesticide)
- Reduces elemental sulphur and spray residue
- Treatment of powdery mildew and sour rot
- Certified organic and vegan alternative for floatation

Ferment phase

- Reduces sulphides
- Helps stuck and sluggish ferment by binding with fatty acids
- Increases nutrient uptake
- Improves fermentation dynamics in difficult conditions

Post ferment phase

- Reduces bitter phenolics
- Reduces late sulphides and off-flavours
- Palate correction in stressed ferment
- Pre-bottling fine tuning
- Reduces *Brettanomyces* taint 4-EP 4-EG

Note: Bench trials are recommended to determine dosage rates

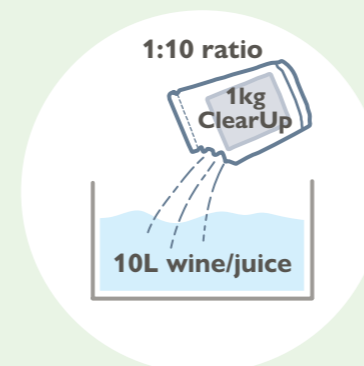
Application	Dosage
For fining of juice and wine*	10-40g/hL
Sluggish or stuck fermentations	20-40g/hL
To absorb off-flavours and odour defects*	10-40g/hL

* Juice/ Wine must be racked 24-48 hours after application.

Adding ClearUp BIO in clarified juice	NTU Increase*
10g/hL	25 – 50
20g/hL	50 – 75
30g/hL	75 – 100
40g/hL	100 – 125

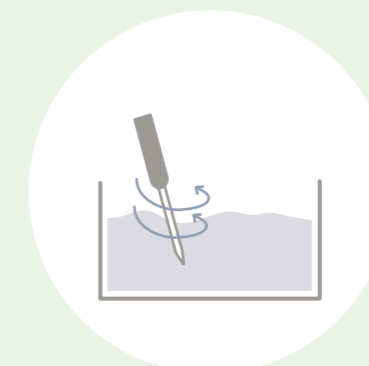
* Depending on juice-treatment, temperature, shape of the tank.

Addition Instructions



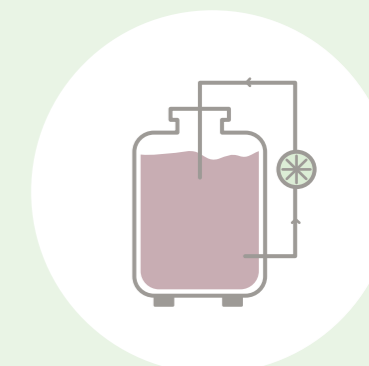
STEP 1

Add ClearUp BIO to wine/juice (>20°C).



STEP 2

Stir well until you have a homogenous suspension without any solids.



STEP 3

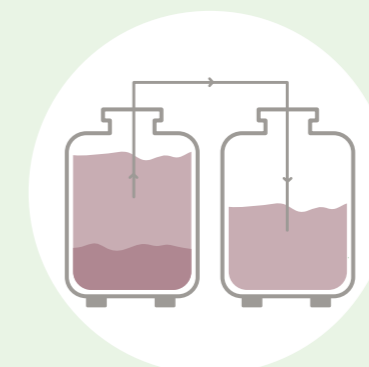
Add to tank and mix well.

Note: For addition to increase internal surface (NTU), please follow steps 1 to 3 only, then rack as usual following fermentation.



STEP 4

Allow contact time of up to 48hrs depending on application.



STEP 5

Then remove ClearUp BIO by racking or filtration (do not use a centrifuge).

Practical Application

For all applications it is important to ensure that ClearUp BIO is well suspended and well distributed in the wine.

Any bentonite-fining should be applied after the ClearUp BIO fining.



ClearUp BIO: Application Advice

The market offers various fining additives for the removal of undesired components in juice and wine.

There are basically two binding principles for standard fining products; Fining additives such as PVPP and active carbon adsorb molecules in a large range of molecular weight and size, but the binding is not very selective. The consequence is that besides the undesired components also desired flavours will partially be removed. All protein based fining products like egg white, casein or isinglass are not very selective and potentially highly allergenic.

For undesired non-polar components such as smoke taint, spray residues, heavy metals, TCA, TBA or volatile phenols, traditional industrial additives are not very effective as they are not specific. The solution is ClearUp BIO, which is a novel organic yeast cell wall preparation with a very high content of lipids. The lipids provide a selective binding mechanism to non-polar substances in wine by so called hydrophobic interaction; meaning encapsulation (micellization).

ClearUp BIO is a fully organic and allergen free fining tool based on a special preparation of yeast cell walls. The technical difference to standard yeast cell walls is the production method. Due to the new method, the cell walls contain up to 14% of total lipids, where standard cell walls only have a content of 1-2% of total lipids. The lipids have the ability to chemically bind the undesired components and precipitate them in the sediment. This polar binding mechanism is relatively stable and can rest in the sediment (lees) for up to one week. However, we recommend separating the ClearUp BIO 48 hours after addition.

PART I: Polar Substances

Protocol for the secure removal of polar charged components in juice and wine such as undesired phenolics and fatty acids

- ClearUp BIO can be applied in all kinds of juices and wines. Please dissolve the ClearUp BIO in a small quantity (1:10) of juice or wine, adding while stirring to make sure it's well dissolved and homogenously suspended
- The best timing of the application is right after press or while cold settling prior to fermentation. The polar mechanism of the positively charged ClearUp BIO removes negatively charged undesired phenols and mid-chain fatty acids very selectively and efficiently. We recommend an average dose rate of 20g/hL of juice
- Allow a **minimum contact time of 30 minutes** before settling, and rack after 24 hours from the sediment. Due to the stable binding of the undesired components with ClearUp BIO, it can also rest in the sediment for up to one week prior to racking. The temperature of the wine should be higher than 10°C; optimal temperature is 18°C
- If winemakers intend to use flotation, it's recommended to add ClearUp BIO right after press to achieve a contact time of **min. 30 minutes** before flotation. ClearUp BIO can be used in conjunction with all enzymes and other fining additives but it should always be added last
- For all applications in wine, we recommend to filter latest after **one week** by coarse filtration to remove the ClearUp BIO. This will give the best sensory results
- All fermentations tend to run faster after fining with ClearUp BIO because inhibitory substances for the fermentation will be removed
- **Spray Residue Reduction** - For juices where elemental sulphur or other residues are anticipated:
 - » **White Must:** apply 15g/hL of ClearUp BIO during cold settling phase and rack off within 2 days; or if floating, add at the press tray
 - » **Red Must:** apply 15g/hL of ClearUp BIO during cold soak and use FermControl™ BIO (not oxygen) during fermentation. Upon pressing apply 30g/hL ClearUp BIO and rack off within 24 hours. Keep cold soak time to a minimum, even if this requires the addition of tannin immediately following press off (we recommend ViniTannin™ Multi Extra or ViniTannin™ Supreme)

PART II: Non-Polar Substances

Protocol for the secure removal of non-polar substances in juice and wine such as spray residues, heavy metals, fatty acids, *Brettanomyces* and smoke taint

- The application timing for white and rosé wines is the addition of ClearUp BIO to the juice prior to cold settling. Dissolve the ClearUp BIO in a small quantity (1:10) of juice, adding while stirring to make sure it's well dissolved and homogenously suspended
- We recommend a minimum dose rate of 20g/hL of juice. If the smoke, TCA or volatile phenol taint is very intense you can go up to 40g/hL. You can use ClearUp BIO in conjunction with all other clarification or fining products but it is important to respect the correct order of additions to achieve the best efficiency
- If desired, add clarification enzymes first (except for removal of volatile phenols such as smoke taint or *Brettanomyces*), then add ClearUp BIO. Allow a reaction time of **min. 2 hours in full suspension**, this is important for a complete encapsulation (micellization), then settle it out with or without bentonite. The temperature of the wine should be higher than 10°C, optimal is 18°C
- For winemakers intending to use flotation, it is recommended to add ClearUp BIO right after pressing to achieve a contact time of **min. 2 hours before** flotation
- For red wines, we recommend an average dose rate of 20g/hL to the fermentation and another dose after pressing for the settling of the gross lees. Determine the correct dose rate in a lab scale trial in order to make sure that there is no taint left prior to MLF and ageing. For all applications in wine, it's important to filter **after 48 hours** by coarse filtration to remove the ClearUp BIO together with the encapsulated substances. Otherwise, after this time these encapsulated substances will be slowly released back into the wine. Do not filter together with the ClearUp BIO in full suspension, let it settle for 48 hours and then filter it off
- There is no negative impact on yeast or bacteria, it's rather the opposite. All fermentations tend to run faster after ClearUp BIO fining because inhibitory toxins for the fermentation such as spray residues, heavy metals and mycotoxins will be removed

PART III - ClearUp BIO as a Fermentation Aid

- For white juices clarified below 80 NTU, add 15g/hL ClearUp BIO prior to commencement of Fermentation; to increase NTU and improve fermentation kinetics. Do not rack off
- For any ferment with slow or H₂S developing, add 15g/hL of ClearUp in conjunction with a remedial dose FermControl™ BIO (see application guide for rates). In this application, the ClearUp BIO is binding fatty acids and toxins allowing the trace elements, micronutrients and amino acids of FermControl™ BIO to assist the yeast in completing fermentation. In this application, ClearUp does not require racking off
- In slow or sluggish ferments, to avoid attenuated characters and to speed up turnover of fermenters; add 15g/hL of ClearUp BIO and 15g/hL of FermControl™ BIO at approx 3 Baumé/5 Brix. Do not rack off



Alternative application of wine fining with novel yeast derivatives in organic quality



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Introduction

The aim of this work was to compare the adsorption power and the quantitative statement of organic yeast cell walls against a conventional product. The organic product are specially prepared yeast cell walls of organic quality, the other product however, is conventionally produced.

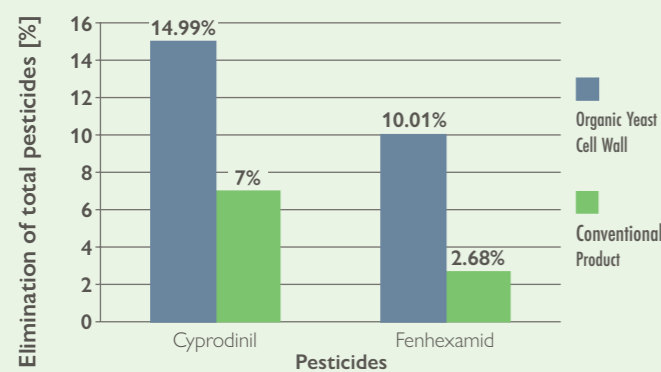
We tested three different kinds of substances with negative influence on wine were tested: fatty acids, total phenols and pesticides.

Method

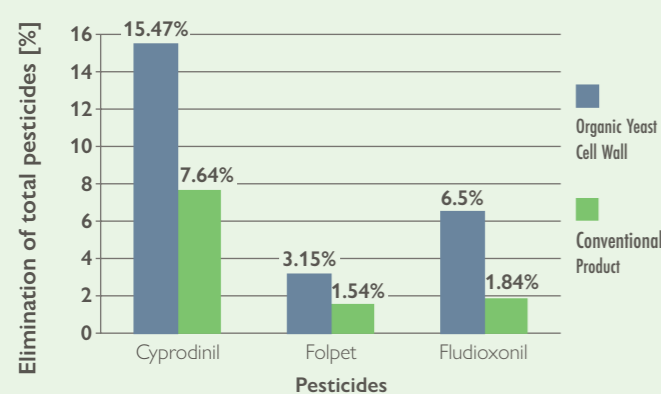
Fatty acids and pesticides were analysed using gas chromatography and mass spectrometry (GC-MS). Total phenolics were determined photometrically using Folin-Ciocalteu.

Results

Graph 1: Elimination of pesticides in white wine

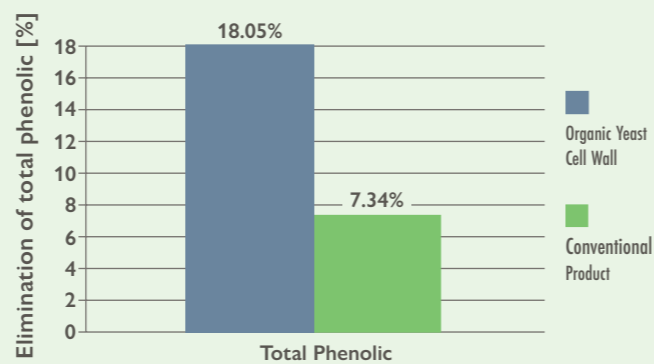


Graph 2: Elimination of pesticides in red wine



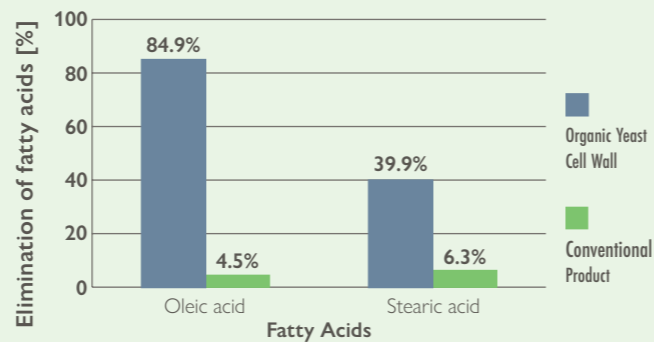
Pesticide reduction of **organic yeast cell walls** (Graph 1 and 2): The organic product shows an excellent adsorption power across a range of the pesticides. Significant differences in reduction of the pesticides Fenhexamid (73.2%) and Cyprodinil (53.3%) were shown in white wine treated with **organic yeast cell walls** and the conventional product, respectively. Similar results were obtained for three pesticides in red wine. Adsorption differences were 71.7% (Fenhexamid), 51.1% (Fludioxonil), and 50.6% (Cyprodinil), respectively.

Graph 3: Elimination of total phenolics in white wine

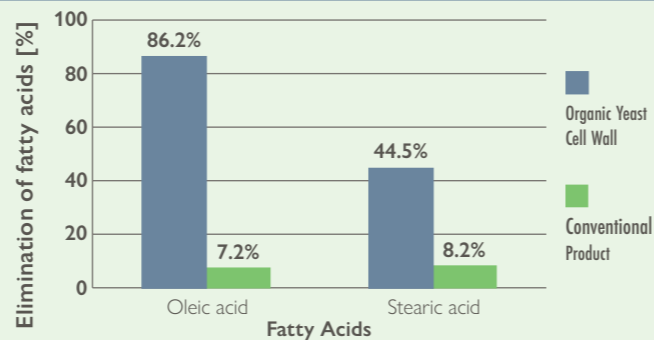


Total phenolics (Graph 3): **the organic yeast cell walls** show an adsorption of phenolics that is by 59.33% higher than that of the conventional alternative.

Graph 4: Elimination of fatty acids in white wine



Graph 5: Elimination of fatty acids in red wine



Reduction of fatty acids: The biggest difference of performance of **organic yeast cell walls** vs. an alternative was shown when analysing fatty acid reduction in white and red wine. As shown in Graphs 4 and 5, the organic yeast cell walls worked equally well for red and white wine.

Reduction of oleic acid was almost 95% (94.7% in white wine, 91.5% in red wine) more efficient with **organic yeast cell walls** than with the conventional product, for stearic acid efficiency of reduction was more than 80% higher (84.2% white wine, 81.5% red wine) for organic yeast cell walls compared to conventional product.



Seasonal Quick Tip: Sour Rot

Recommendations, Precautions and Treatments of Sour Rot Affected Grapes

Sour rot is often caused by undesirable yeast and bacteria however; it can occasionally be seen in association with other fungal rot diseases including *Botrytis*, *Penicillium* and *Rhizopus*. Sour rot pathogens enter grape berries through cracks and wounds caused by wasps, hail, birds, powdery mildew, botrytis, or by berry splitting caused by excessive vigour in tight clusters. During favourable conditions (warm moist weather, sugar accumulation in berries), the fruit fly will lay hundreds of eggs and start a new generation every ten to twelve days. High infection levels and frequent sprays have a tremendous impact on the winemaking process and the overall sensory quality of the resulting wines. Apart from the powdery mildew fungal taint in the wine, the accumulation of sprays and for organic farms the accumulation of molecular sulphur have a further impact on the fermentation kinetics and final sensory.

Stages of Intervention

1) Vineyard & Harvest

- Determine type of rot
- If possible, cut out vinegar nests and hand pick (to avoid selection of sour rot grapes)
- Consider earlier harvest date and pick when cool (morning or night)

2) Crush & Press

- Early SO₂ addition of min. 50-60ppm at crush or in the combined harvester
 - Reductive treatment of juice: low oxygen input, SO₂ control
 - Early pH control and adjustment below 3.4
- Whole cluster pressing if possible. No maceration time or cold soak

3) Clarification

- Fast clarification with cooling if possible
- Treat spray residue and fungal odours in juice by using a combination of active carbon, bentonite and **ClearUp BIO** (rule of thumb = 3g/hL of each fining product per 1% of rot)
 - Aim for 50-80 NTU, using flotation techniques or enzymes
- If levels of Sour Rot are greater than 10%; juice pasteurisation is recommended to inactivate laccase
- Add **ClearUp BIO** 15-20g/hL, rack off within 12-24 hours; or if floating add the **ClearUp BIO** at press tray

4) Fermentation Management

- Select robust yeast with short lag phases, low nutrient requirements and fast conversion of sugars. We strongly recommend VitiFerm™ BIO Rubino Extra, Esprit or Vulcano as they offer beneficial Bio-Protection effect against spoilage yeast. Higher addition rates of 40g/hL are recommended
- We recommend the addition of yeast nutrition FermControl™ BIO at a higher rate than standard (up to 60g/hL) to ensure a high supply of key trace elements, micro-nutrients, and amino acids are available to the yeast throughout fermentation; in order to minimise the output of fermentation by-products and to assist in keeping total SO₂ low
 - Moderate to higher fermentation temperature, at least 18-20°C
- After completion of fermentation, fast racking and early SO₂ stabilisation after acetaldehyde has been degraded



Seasonal Quick Tip: Powdery Mildew

Background

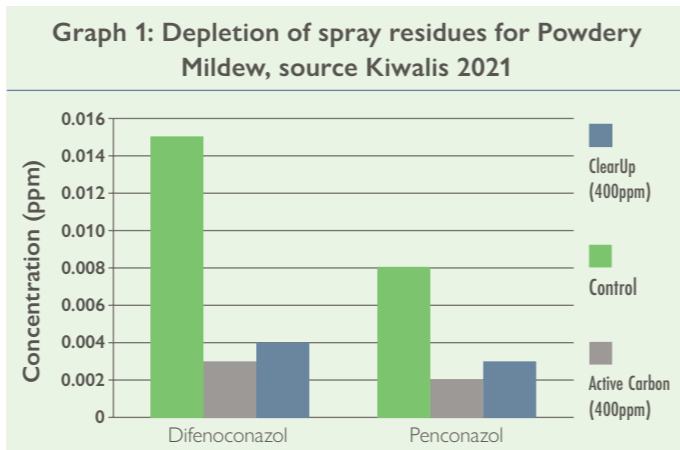
In growing seasons with high infection pressure of powdery mildew, the viticultural treatments in the vineyards must be considered by any winemaker. High infection levels and frequent sprays have a tremendous impact on the winemaking process and the overall sensory quality of the resulting wines. Apart from the powdery mildew fungal taint in the wine, the accumulation of sprays and for organic farms the accumulation of molecular sulphur have a further impact on the fermentation kinetics and final sensory.

In vintages with high powdery mildew pressure, the plant cultivation measures have priority also during the final stages of grape ripening. After completing regular vine sprays and complying with recommended waiting times, there are limited ways to securely process powdery mildew affected grapes for clean winemaking.

Above a ratio of max. 5% affected grapes, the production of wines without any fungal taint becomes almost impossible. For grapes with lower infection levels (< 3-5%), specific measures are recommended, same as specific measures for any grapes with an accumulation of spray residues. The functional yeast cell wall product **ClearUp BIO** absorbs spray residues and mycotoxins. In contrast to active carbon, **ClearUp BIO** won't affect the native flavour profile of the grape varieties. See Graph 1.

Grape Reveal and Processing

If possible, grapes with infection rates higher than 3-5% must be rejected. Depending on the infection level, the decision must be taken whether rosé or red wine preparation is done. At higher levels, rosé wine is preferable. For rosé winemaking, the same measures apply as described below for white wine. Due to the intensive skin contact, the migration of undesired spray residues and mycotoxins is significantly higher in red wine mash fermentation.



White Wine Processing	Red Wine Processing
<ul style="list-style-type: none"> Fast and cool grape processing 	<ul style="list-style-type: none"> Fast and cool grape processing
<ul style="list-style-type: none"> Preferably whole bunch press, avoiding harsh mechanical action 	<ul style="list-style-type: none"> Preferably low mechanical treatment, less pump overs or punch downs
<ul style="list-style-type: none"> Addition of 50ppm SO₂ to crush 	<ul style="list-style-type: none"> Addition of 50ppm SO₂ to crush
<ul style="list-style-type: none"> Addition of 200ppm ClearUp BIO to crush Gentle and smooth press process with less mechanical action Separation of free run juice 	<ul style="list-style-type: none"> Addition of 200ppm ClearUp BIO to crush Optional use of 80ppm ViniTannin™ SR to mask fungi characters
<ul style="list-style-type: none"> Using a strong flavourful yeast, e.g Esprit, Alba Fria or Vulcano 	<ul style="list-style-type: none"> Using a strong flavourful yeast, e.g Rubino Extra or Vulcano
<ul style="list-style-type: none"> Relatively fast fermentation at 18°C with complete nutrition by 2 x 200ppm FermControl™ 	<ul style="list-style-type: none"> Relatively fast fermentation at 18°C with complete nutrition by 2 x 200ppm FermControl™
<ul style="list-style-type: none"> Optional use of 30ppm of ViniTannin™ W to mask fungi characters 	<ul style="list-style-type: none"> Gently press and 2nd treatment of the wine with 200ppm ClearUp BIO at settling
<ul style="list-style-type: none"> Addition of 200ppm ClearUp BIO at settling or clarification. Juice clarification to 50 NTU 	<ul style="list-style-type: none"> Racking after 48hr and sensory evaluation of results. If necessary, repeat treatment

Conclusions

- Under powdery mildew conditions, minimal extraction and low phenolic charge conditions are the objective
- Good experience exists in the use of **ClearUp BIO** with its natural, adsorbing lipid bonds. The outstanding selective properties with respect to reduction of mycotoxins, plant agent residues and phenolic influences can be mentioned here
- Additionally, **ClearUp BIO** is an excellent natural alternative to active carbon, without its negative sensory effect on the wines



Flotation Protocol

Extraction of juice and modifying the degree of solids in the juice prior to fermentation is a key step in white winemaking. If the juice contains high levels of suspended solids, this can lead to although many winemakers today experiment with varying levels of juice solids to achieve style diversity in their white wines. Reduction of suspended solids prior to fermentation should typically occur quickly, while trying to minimise the amount of juice lost during the process. Flotation is one process that can be used to achieve both of these aims.

Preparation of Juice

Juice must be 100% pectin negative

- To pectin test, mix 5mL of clear juice and 5mL 96% alcohol in a test tube.
- Carefully mix and wait 5 minutes
- The formation of thread like turbidity indicates the presence of pectin, If this happens, wait longer or add more pectinase
- Repeat the test. If the juice remains clear, then it clear of pectin. Flotation can commence

Flotation Instructions

- Ensure juice temperature is above 16°C and the percentage of solids is under 20%
 - Maintain 7 bar pressure of Nitrogen supply to the flotation pump at all times. (**Note:** This can be compromised if additional nitrogen outlets are running from the same supply)
 - Hose lines between the pump and tanks are to be between 3-5m. If a longer hose is required, partially close the valve of the flotation tank, to avoid flotation beginning in the hose
 - Connect the pump outflow to the lees valve (bottom outlet), and pump inflow to the racking valve
 - Add **ClearUp BIO** to the juice for juice fining (dose rate to be determined by bench trial)
- ClearUp BIO** needs to be kept in suspension and mixed slowly. A mixing tank would be the preferred method. Inject **ClearUp BIO** as slowly as possible. Mix the tank for 20 to 25 minutes at a saturation pressure of 2 to 3 bar, without addition of gas
- Bentonite can be added at between 200 and 400ppm to solid compaction and juice recovery
 - The gas flow rate should be between 2 – 3 m³/h and 25 – 40 L/min
 - The saturation pressure should be kept constant at 5 bar. (Adjusting the pump restrictor lever on the outlet side of the saturation cylinder.) There is no benefit of pressure over 6 bar
 - The circulation time for flotation is 1 – 1.5 times the volume of juice
 - Leave the tank for 120 minutes so that lees can rise to the surface
 - Do not leave the tank longer than 240 minutes. Gravitational force can cause lees separation and resuspension of the lees if the waiting time is too long
 - Target is reached if the NTU is >100 (not less than 50; otherwise there is a risk of stuck fermentation). If NTU is lower than 50, add some turbid juice

