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### COMPROMISED FRUITS: POWDERY MILDEW

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Powdery mildew is a fungal disease that affects grapevines, caused by the fungus *Erysiphe necator*. If not controlled, powdery mildew can cause crop losses and have negative impacts on wine quality. The presence of powdery mildew can also increase the risk of Botrytis infection. The contamination of grapes with powdery mildew can have many challenges for winemakers:

- Sensitivity to oxidation
- Stuck fermentations due to nutrient deficiencies, toxins accumulation and microbial contamination
- Fragile grapes, sensitive to secondary contaminations
- Off-aromas and flavors such as mushroom, earthy, wet fur and cooked tomato characters
- High protein content due to pathogenesis-related protein expression
- Increases 'oiliness' and viscosity sensation in the palate
- High pH, high TA
- High phenolic content and bitterness
- Color instabilities.

KEY WINEMAKING STEPS WHEN DEALING WITH POWDERY MILDEW AFFECTED GRAPES:

- Hand harvest and sort contaminated grapes in the vineyard and at the winery.
- Control any spoilage microbes as early as possible with SO<sub>2</sub> and bio-protection with [Excellence B-Nature](#)
- Use adequate antioxidant protection to limit browning, color loss and aroma oxidation such as [Tanin gallique a l'alcool](#) (for whites/roses) and [Pro Tanin R](#) (for reds). These tannins are essential as they also react with proteins, improving protein stability and preventing more color loss.
- Reduce skin contact to limit extraction of off-flavors, no cold soak, avoid extended maceration, use short pressing cycles and separate press fractions (first 10 gallons).
- Fining and clarification of juice to eliminate off-aromas and 'clean' the must for good fermentation conditions. We recommend using [Polymix Natur'](#) for an efficient fining during cold settling (whites/roses) or during a delestage (reds) done in the early stage of fermentation.
- Supplement must with vitamins, amino acids and ammonia to ensure complete healthy fermentation
- Boost fresh fruit aromatic expression by using specific yeast nutrient such as [OptiEsters](#)
- Reds: Improve color intensity and stability by promoting condensation and co-pigmentation reactions during fermentation with [Softan Vinification](#)
- Whites/Roses: Use bentonite during fermentation to improve protein stability and limit to total amount needed.
- Balance phenolic compounds early in fermentation with [Natur'Soft](#)
- Consider fining, mannoproteins or tannins additions to balance mouthfeel and remove aggressive phenolics.
- During ageing, it is essential to balance the redox potential of the wine and protect from microbial development to prevent premature ageing and spoilage.

### FOCUS PRODUCTS

**Excellence B-Nature** – non-Saccharomyces yeast, pure *Metschnikovia pulcherrima*, non-fermentative. It inhibits the development of spoilage microbes such as other non-Saccharomyces, and bacteria on grapes and juice. Excellence® B-Nature® is an organic anti-microbial solution, used as alternative to SO<sub>2</sub> on grapes. It protects grapes/juice from microbial contamination during transport and processing, does not inhibit *Saccharomyces cerevisiae*, and reduces SO<sub>2</sub> combining compounds production, thus increasing SO<sub>2</sub> efficiency. Excellence B-nature can be added directly to grapes, without rehydration. Simply sprinkle the yeast on the top of the grapes at picking.

**Pro Tanin R** – Pro-anthocyanidin tannin, use as sacrificial tannin. Developed for application on red grapes, to scavenge oxygen radicals, inhibit oxidative enzymes such as laccase and PPO and eliminates reactive proteins, thus protecting grape polyphenols. It is instantaneously soluble, simply sprinkle it on the top of the grapes at harvest.

**Tanin gallique a l'alcool** – pure gallic tannin, developed for whites and roses, to scavenge oxygen radicals and inhibit oxidative enzymes such as laccase and PPO. It protects grapes and juice from oxidation. It has strong affinity with proteins, improving protein stability, thus reducing the needs of bentonite on wine. It can be added directly on grapes or in juice. Simply sprinkle it on the top of the grapes at picking.

**Polymix Natur'** – PVPP, Yeast extracts, Bentonite. Vegan, allergen free fining agent focused on removing oxidized and easily oxidable phenolic compounds. Polymix Natur' treats and prevents oxidation, improves oxidative stability, wine expression and elongates wine shelf life.

**Oenozym Clar** – Pectinase with strong de-pectinization activity for a quick and effective clarification. Purified from side activities such as cinnamyl-esterase and anthocyanases. Resistant to low (5°C) and high (68°C) temperatures.

**OptiEsters** - Yeast nutrient composed of amino acids and ergosterols selected to increase the production of esters, acetates and ethylesters, thus increase red fruits, floral, berries notes. It increases aromatic complexity, freshness and intensity. Interesting tools to boost freshness and complexity of a wine, as well as compensate for off-aromas.

**Softan Vinification** – catechins tannins bounded to plant polysaccharides. Added during fermentation, Softan Vinification has a strong ability to stabilize color and protect it from loss during fermentation. It is a gentle tannin that contributes to mouthfeel and build up mid-palate.

**Natur'Soft** - preparation of specific yeasts hulls, selected for their high content of polysaccharides. It is strongly effective in color stabilization, as well as filling mid palate and improving mouthfeel. It increases wine complexity, reduces tannins perception, and stabilize color.

**Vinitan Advance** – pure grape tannin with low phenol content. It improves wine structure while respecting its finesse and balance. Excellent for color stabilization during ageing, it also boosts the fruits aromas and maintain a clean and balance wine profile during ageing.

**KillBrett** – pure chitosan, wide spectrum anti-microbial agent. KillBrett eliminates and inhibits *Brettanomyces*, Lactic Acid Bacteria and Acetic Acid Bacteria. It can be used during the entire process of winemaking, we recommend using it as preventive, post MLF, at 4 g/hL

**Aroma Protect** - inactivated yeasts, naturally rich in glutathione, a natural antioxidant, sulfurous tripeptide with great reductive power. It gives immediate protection against oxidative mechanisms, releasing glutathione (GSH) into the wine, thus slowing down oxidation.

**Tan&Sense Volume** – pure untoasted oak tannins, with high capacity to scavenge oxygen radicals, buffer redox potential and maintain wine freshness. It is a gentle tannin, increasing sweetness and roundness perception.

### WHITE /ROSE GRAPES COMPROMISED FRUIT WITH POWDERY MILDEW - WINEMAKING GUIDELINES

<p><b>HARVEST AND GRAPE TRANSPORT</b></p>	<p>Rigorously sort, in the vineyard or on processing in the winery. Protect from oxidation and microbial contamination as soon as possible when picking to limit browning.</p> <ul style="list-style-type: none"> <li>- <b>40-60 ppm of SO<sub>2</sub></b></li> <li>- <b>80-100 g/ton</b> of <b>Tanin gallique a l'alcool</b> sprinkled on the grapes at harvest to protect from oxidation and remove unstable proteins.</li> <li>- <b>Excellence B-Nature</b> at <b>50 g/ton</b>, sprinkle directly on grapes, as soon as possible after picking to prevent any microbial contamination and spoilage.</li> </ul>
<p><b>PRESSING</b></p>	<p>No skin maceration. We recommend a whole cluster pressing, short cycle with limited rotations and limited extraction. First juices coming from the bottom of the hopper or at press filling and the hard press fractions must be separated and treated separately with fining.</p>
<p><b>CLARIFICATION</b></p>	<p>Powdery Mildew leaves undesirable compounds in the must such off-aromas, oxidized compounds, phenolics and toxins that inhibit fermentation. It is therefore essential to properly clean the must for an optimal alcoholic fermentation, stabilize from oxidation and eliminate off-compounds.</p> <ul style="list-style-type: none"> <li>- Optimize and facilitate rapid clarification by using <b>Oenozym Clar</b>, at 4 ml/hL after pressing, in the press pan.</li> <li>- Juice fining is essential to eliminate off-aromas, the oxidized and oxidizable phenolic compounds and toxins that would inhibit alcoholic fermentation. We recommend using <b>Polymix Natur'</b>(PVPP, calcium bentonite, yeast extracts) at 40-60 g/hL depending on the contamination level and press fractions.</li> </ul>
<p><b>ALCOHOLIC FERMENTATION</b></p>	<p>Powdery Mildew contamination leads to nitrogen deficiencies which needs to be compensated to prevent stuck fermentation. It is essential rehydrate yeast with <b>OenoStim</b> at <b>30 g/hL</b> to reinforce yeast activity, increase aromatic production and ensure yeast health and resistance along the fermentation.</p> <p><u>Fruity, Floral and Terpenes</u></p> <ul style="list-style-type: none"> <li>- Temperature: 58-62°F</li> <li>- Yeast: <b>Excellence STR</b> at <b>20 g/hL</b> to produce fruity, fresh and delicate aromatic profile with smooth structure.</li> <li>- <b>OenoStim</b> at <b>30 g/hL</b> during rehydration</li> <li>- <b>OptiThiols®</b> at <b>10 g/hL</b> to improve wine's antioxidant potential.</li> <li>- <b>OptiEsters</b> at <b>30 g/hL</b> to promote the production of fresh, floral and fruity aromas.</li> </ul> <p><u>Thiolic, Tropical</u></p> <ul style="list-style-type: none"> <li>- Temperature: 62-66°F</li> <li>- Yeast: <b>Excellence FTH</b> at <b>20 g/hL</b> to produce thiolic, fresh, mineral wine profile</li> <li>- <b>OenoStim</b> at <b>30 g/hL</b> during rehydration</li> <li>- <b>OptiThiols®</b> at <b>20 g/hL</b> to boost thiolic compounds expression and improve wine's antioxidant potential.</li> <li>- <b>OptiEsters</b> at <b>20 g/hL</b> to promote fresh fruit, tropical aromas and improve aromatic expression.</li> </ul> <p>1 DAY AFTER INOCULATION</p> <ul style="list-style-type: none"> <li>- Ensure good yeast nutrition and limit off-flavors production with <b>Optiflore O®</b> at <b>40 g/hL</b> (complete organic nutrient based on inactivated yeast). Optiflore O also helps detoxifying the must for better fermentations.</li> <li>- 20 g/hL <b>Natur'Soft</b> to improve mouthfeel, fill mid palate, balance high phenolics and increase wine volume.</li> </ul> <p>AT 18 BRIX</p> <ul style="list-style-type: none"> <li>- Add <b>20-40 g/hL of OptiFerm</b> (ammonium salts and vitamin B1) at 1/3 of fermentation.</li> <li>- Improve protein stability with <b>40-80 g/hL of Bentosol Poudre</b> during fermentation</li> </ul>
<p><b>AGEING</b></p>	<p>Once AF completed: rack off gross lees, using inert gas during transfer.</p> <ul style="list-style-type: none"> <li>- SO<sub>2</sub> 3-4 g/hL + <b>KillBrett</b> at <b>4 g/hL</b> to stabilize wine from oxidation and microbial contamination</li> <li>- Rebalance the redox potential and natural oxidation resistance of the wine by using <b>Aroma Protect</b> at 20 g/hL. It will maintain wine freshness, protect from oxidation, lower redox potential and limit SO<sub>2</sub> loss during ageing.</li> <li>- Use <b>Tan&amp;Sense Volume</b> at <b>0.5 g/hL</b> (pure untoasted oak tannins) every racking to protect from oxidation, regulate redox potential and scavenge oxygen radicals. It will also give some roundness to wine.</li> </ul>

### RED GRAPES COMPROMISED FRUIT WITH POWDERY MILDEW - WINEMAKING GUIDELINES

<p><b>HARVEST AND GRAPE TRANSPORT</b></p>	<p>Rigorously sort, in the vineyard or on processing in the winery. Protect from oxidation and microbial contamination as soon as possible when picking to limit browning.</p> <ul style="list-style-type: none"> <li>- <b>40-60 ppm of SO<sub>2</sub></b></li> <li>- Add <b>180-220g/ton</b> of <b>Pro Tanin R</b>, sprinkled on the grapes at harvest to protect from oxidation and prevent the loss of phenolic compounds.</li> <li>- <b>Excellence B-Nature</b> at <b>50 g/ton</b>, sprinkle directly on grapes, as soon as possible after picking to prevent any microbial contamination and spoilage.</li> </ul> <p>In case of high contamination levels, thermovinification can be an option, please see our specific protocol.</p>
<p><b>MACERATION</b></p>	<p>Limit the use of extraction enzymes. Avoid cold soaking and extended macerations.</p>
<p><b>ALCOHOLIC FERMENTATION</b></p>	<p>Powdery Mildew contamination leads to nitrogen deficiencies which needs to be compensated to prevent stuck fermentation. It is essential rehydrate yeast with <b>OenoStim</b> at <b>30 g/hL</b> to reinforce yeast activity, increase aromatic production and ensure yeast health and resistance along the fermentation.</p> <ul style="list-style-type: none"> <li>- Yeast: <b>Excellence DS</b> at <b>20 g/hL</b> to produce fresh, fruity, spicy and elegant profile with smooth structure</li> <li>- <b>OptiEsters</b> at <b>15 g/hL</b> to promote the production of ethylesters and enhance fresh, fruity and floral characters.</li> </ul> <p>1 DAY AFTER INOCULATION</p> <ul style="list-style-type: none"> <li>- At day 1, fine and clarify the juice to remove any off-aromas, undesirable phenolic compounds, signs of oxidation and toxins that will inhibit fermentation. Proceed to a delestage (drain all must) protected from oxygen. Add <b>Polymix Natur'</b> at 40-60 g/hL into the drained juice. Rack the 'cleaned' juice back on the top the grapes.</li> <li>- Ensure good yeast nutrition and limit off-flavors production with <b>Optiflore O®</b> at <b>40 g/hL</b> (complete organic nutrient based on inactivated yeast). Optiflore O also helps detoxifying the must for better fermentations.</li> <li>- <b>120 g/ton</b> of <b>Softan Vinification</b> to encourage the stabilization of anthocyanins via co-pigmentation and condensation, protect anthocyanins and fill mid palate.</li> </ul> <p>AT 18 BRIX</p> <ul style="list-style-type: none"> <li>- Add <b>20-30 g/hL</b> of <b>OptiFerm</b> (ammonium salts and vitamin B1) at 1/3 of fermentation.</li> <li>- <b>150 g/ton</b> of <b>Natur'Soft</b> to stabilize color, fill mid palate and increase wine length and volume.</li> </ul>
<p><b>PRESSING</b></p>	<p>Press early when phenolic compounds extraction is sufficient (decide with tasting).</p> <ul style="list-style-type: none"> <li>- Add <b>Oenozym Clar</b> at 4 ml/hL to improve settling and clarification. Rack gross lees.</li> <li>- Add <b>Vinitan Advance</b> at 5 g/hL to improve wine phenolic balance, increase antioxidant resistance and stabilize color.</li> </ul>
<p><b>MLF</b></p>	<p>Add <b>Oeno1</b> at <b>1g/hL</b> once AF is completed</p>
<p><b>AGEING</b></p>	<p>Once AF and MLF completed: rack off gross lees after fermentation using inert gas.</p> <ul style="list-style-type: none"> <li>- Add SO<sub>2</sub> 3-4 g/hL + <b>KillBrett</b> at <b>4 g/hL</b> to stabilize wine from oxidation and microbial contamination</li> <li>- Rebalance the redox potential and natural oxidation resistance of the wine by using <b>Aroma Protect</b> at 20 g/hL. It will maintain wine freshness, protect from oxidation, lower redox potential, and limit SO<sub>2</sub> loss during ageing.</li> <li>- Use <b>Tan&amp;Sense Volume</b> at <b>1 g/hL</b> (pure untoasted oak tannins) every racking to protect from oxidation, regulate redox potential and scavenge oxygen radicals. It will also give some roundness to wine.</li> </ul>