

CHAPTER SEVEN

Polysaccharides

PLANT POLYSACCHARIDES:

Gum Arabic

What are the properties of Gum Arabic in wine?

Gum Arabic is an excellent stabilizer to avoid iron/copper casse, the precipitation of coloring matters, and microcrystals of tartar. It also brings roundness and reduces the astringency of red wines.

Arabinol: slows down aggregation of crystals of tartrates and diminishes the perception of astringent and bitter tannins. It can be used on whites and reds in case of need to improve viscosity and sweetness. When added to sparkling wines, Arabinol improves the finesse of the perlage. In young red wines and rosé, it also improves color stability.

Dosage: 50-200mL/hL or 550-2200 ppm.

Packaging: 10 or 25 kg pails and 230 kg drums.

Arabinol HC: is a solution of about 33.5% gum Arabic, mostly composed of polysaccharides rich in D-galactose, which contributes to the softness and sweetness of the mid-palate in the wines treated. The characteristics of this premium gum Arabic are higher softening and stabilizing power.

Dosage: 30-150mL/hL or 350-1700 ppm.

Packaging: 1 kg bottles and 25 kg pails.

Arabinol Super Rouge: is a solution of gum Arabic Senegal with a high content of L-Arabinose (above 45%) and L-Rhamnose (above 18%): these are monosaccharides with a noticeable sweetening and softening power, making it ideal for red wines, including those with a high tannin content to which it gives a pleasant sensation of body and volume. The action of Arabinol Super Rouge is highlighted not only on the palate, but also in the color, as its addition enables the stabilization of the chromatic component that in young wines, or in some specific varieties, would tend to precipitate over time.

Dosage: 20 to 150 g/hL.

1000 ppm will bring 4 ppm of SO₂ to the wine.

Packaging: 25 kg net drums.



Arabinol

Arabinol Arôme: blend of different Arabic gums, Arabinol Arôme is formulated to retain fresh and fruity characteristics in wine and to preserve all the aromatics naturally present in the bouquet of red, white and rosé wines.

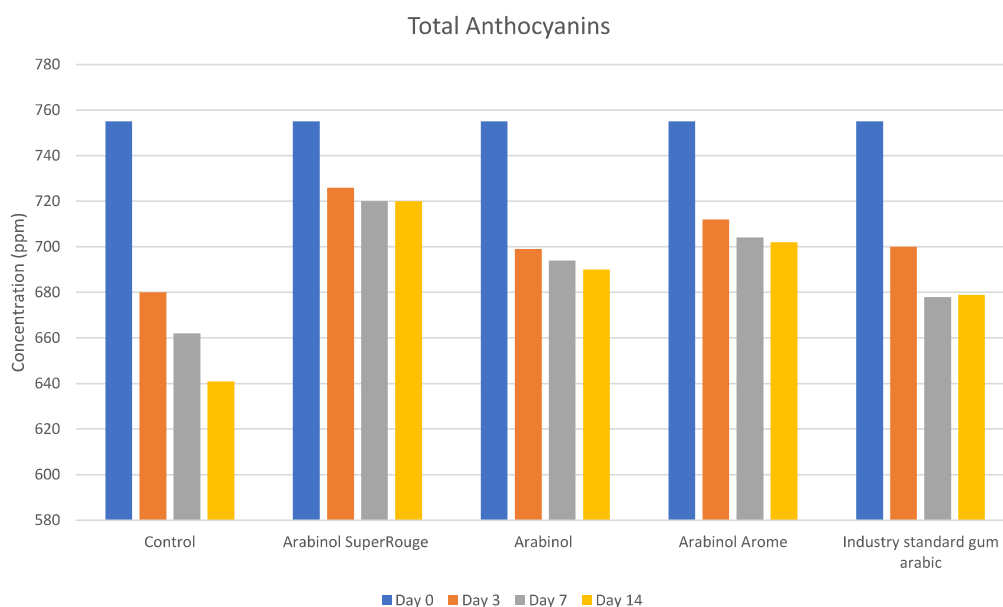
Dosage: 50-200mL/hL or 550-2200 ppm.

Packaging: 10 and 25 kg pails



Utilization: dilute 1:10 in wine to improve homogenization. Best timing for addition is after ML and before bottling. It is suitable for wines that undergo membrane filtration. Do not add right before clarification because treating wines with polysaccharides before bentonite and fining agents can slow down their settling. It is suggested to carry out a filterability test before submitting the wine to a membrane or crossflow filtration.

Shelf life and storage: once opened, it should be used within 30 days. If a container is left open for a longer time, add 1000 ppm of SO₂ to extend life span.




In order to evaluate color stability the test measured the coloring matter before and after resting for 14 days at +4°C to simulate and accelerate the loss of color over time.

| | $\Delta\mu\text{s}$ | Result |
|--------------------------------------|---------------------|--------------------------|
| Chianti Control | 85,5 | instable |
| Chianti+100g/hL Arabinol Super Rouge | 55,3 | Stable/Slightly instable |
| Chianti+100g/hL Arabinol Arome | 46,7 | Stable |
| Chianti+100g/hL Arabinol | 40,3 | Stabile |
| Chianti+100g/hL Arabinol HC | 38,7 | Stabile |

Evaluation of tartaric stability measuring changes in conductivity. Test duration: 4 minutes.


| | VMAX | Filtrability Index | Results |
|----------------------|------|--------------------|---------|
| Red wine control | 6000 | 3 | = |
| Arabinol HC | 4084 | 5 | ++ |
| Arabinol | 3813 | 6 | ++ |
| Arabinol Arome | 3019 | 14 | - |
| Arabinol Super Rouge | 2820 | 16 | - |

Filterability is expressed as VMAX and filterability index as a result of the filtration test. The sample passes through a 3.9 cm² (25 mm diameter) membrane of 0.65µm porosity, under a constant pressure of 2bar. VMAX<4000 and IF>10 = slow.

 **Arabinol Bio D:** is an instantly soluble, refined and micro-granulated gum Arabic, produced in accordance with organic regulations. The molecule dimensions of Arabinol Bio D, larger than 500 Kd, facilitate the stabilizing action of the gum Arabic in wines, interacting with the tactile sensations of the taste. Arabinol Bio D wraps up tartaric crystals and keeps them soluble. Thanks to the dimensions of its molecule, it is more easily filterable if compared to similar commercial preparations. It does not contain SO₂ or other preservatives.

Dosage: 100 – 300 ppm.

Packaging: product available upon request in 1 or 20 kg bags.

 **Arabinol Bio L:** is an instantly soluble, refined and micro-granulated gum Arabic, produced in accordance with organic regulations. Arabinol Bio L is a natural polysaccharide used to increase the softness and the velvety taste of wines. It does not contain SO₂ nor any other preservative. It displays a protective action towards the molecules responsible for the color, which are kept stable during time, facilitating the processes of natural evolution.

Dosage: 100 – 300 ppm.

Packaging: product available upon request in 1 or 20 kg bags.

Utilization: must be slowly dissolved in water or wine; the solution should be kept slightly stirred for a better solubilization. No clarification must be carried out after the addition. Being an organic product, the solution must be utilized just after its preparation.

Shelf life and storage: Store in a cool dry place for maximum 2 years.

YEAST POLYSACCHARIDES

Elevage Glu: is a yeast derivative with a high percentage of antioxidant tripeptide glutathione. It can be used to improve mid-palate, but this product is especially geared for protecting from oxidation and to reduce the need for SO₂. For best results and to give time to the GSH to dissolve, add Elevage Glu 24 hours before the antioxidant effect is desired.

Dosage: 120-300 ppm.

Packaging: 500 gram packets and 5Kg bags.

Batonnage Plus Elevage: is made from yeast cells that are rich in peptides, mannoproteins, and antioxidant amino-acids. It increases the positive effect of the sur-lie, making wines more viscous and harmonious. Its utilization at the end of the alcoholic fermentation ensures the prolongation of the antioxidizing action carried out by SO₂. At the same time, the activity of Batonnage Plus Élevage prevents the formation of mercaptans and enhances the bouquet of the varietal. In wines treated with Batonnage Plus Élevage, color appears to be more stable and less subject to browning and pinking.

Dosage: 100-300 ppm.

Packaging: 5 Kg bags

Batonnage Plus Structure: an auto lysate yeast blended with "mocha" ellagic tannins. After years of experience, we can claim that this product fixes most aromatic faults in red wines and especially the green notes attributed to methoxypyrazines. It is a yeast preparation combined with highly toasted ellagic tannins that masks the vegetal notes and promotes fruity and chocolate-like aromas.

Dosage: 100-300 ppm.

Packaging: 5 Kg bags

Batonnage Plus Texture: polysaccharide based, autolyzed yeast product, rich in mannoproteins. It gives a sweet and viscous texture to red, white, and rosé wines. It brings a sweet texture due to the large size of the molecules that it releases, molecules which exceed 100 Kilo Dalton. When added to fermenting musts, it improves the structure and helps with color stabilization in red wines. It also has strong antioxidant properties.

Dosage: 100-400 ppm.

Packaging: 20 Kg bags

Super-mann: is a pure mannoprotein that, thanks to its high colloidal power, improves tartaric stabilization. Thanks to its specific tactile sensation, Super-mann greatly contributes to softening the wine and smoothing the roughness deriving from an excess of acidity or tannins. In red wines, thanks to the high colloidal power, it interacts with polyphenols making the color more stable.



Dosage: White wines: 100 – 250 ppm.

Red wines: 100 - 400 ppm. TTB works with 400 ppm max to be used pre bottling.

Utilization: Re-hydrate in warm water (95°F/35°C) or wine, for 1/2 h before mixing. Then dilute 1:10 in wine and add directly to the tank or barrel. Once homogenized it does not need further stirring. Some particles derived from the yeast cells are not completely soluble, so a good racking or filtration are needed before bottling. Wait at least two weeks before sterile filtration.

Shelf life and storage: store at room temperature and low humidity for two years.



CHAPTER EIGHT

**Stabilizers &
Fining Agents**

| Product | Description | Active ingredients | | | | | | | |
|-------------------|---|--------------------|---------|---------------|-------------------|------|------------|---------------------|-----------|
| | | Bentonite | Gelatin | Plant protein | Yeast derivatives | PVPP | Silica gel | Potassium Caseinate | Cellulose |
| Catalasi vega | Allergen free complex clarifier for the clarification and stabilization of wines and musts | • | | • | | • | • | | |
| Catalasi | Antioxidasic clarifier for wines | • | • | | | | | • | |
| Catalasi AF Plus | Clarifier and stabilizer for white wines | • | • | | | • | • | | |
| Microcel AF | Active adsorbing clarifier for musts and wines | • | | | | • | | | • |
| Microcel | Active adsorbing clarifier for musts and wines | • | | | | | | • | • |
| Spindasol W | 30% silica sol for clarification of must and wines | | | | | | • | | |
| Polygel BH | PVPP based stabilizer | | | | | • | • | | |
| Free4fenol | Adjuvant based on activated carbons | | | | | | | | |
| Decoran Gran | Activated carbon pellets with high adsorbing action. | | | | | | | | |
| Carbosil | Liquid active carbon clarifier | • | | | | | • | | |
| Gelsol | Gelatinic colloid for musts, wines and distillates. Ideal for an associated treatment with silica sol | | • | | | | | | |
| Vege | Vegetable proteins for the clarification of musts and wines | | | • | | | | | |
| Cremor stop extra | Highly esterified metatartaric acid | | | | | | | | |
| New-Cel | Stabilizer of tartaric precipitation | | | | | | | | |
| Crystalflash | Facilitates tartrates stabilization shortening cold-holding time | • | | | | | | | • |
| Bentogran | Activated NA bentonite | • | | | | | | | |
| Steryl | Protect wine headspace from aerobic spoilage | | | | | | | | |
| Microcid | Antimicrobial and antioxidant stabilizer | | | | | | | | |
| Sulfigrain | KMS in easy self dissolving pellets | | | | | | | | |
| Aromax B4 | anti-oxidation and antiseptic agent | | | | | | | | |
| Desulfin | Sulfide remover for musts and wines | | | | | | | | |
| Riduxhigh | antioxidant stabilizer for bottling | | | | | | | | |
| Deacid | Complex disacidifier for musts and wines | | | | | | | | |
| Anti4phenol | Absorbs volatile phenols | | | | • | | | | |
| Antibrett 2.0 | Eliminates Brettanomyces yeasts and the absorbs volatile phenols | | | | • | | | | |
| Chitocel | Eliminates Brettanomyces yeasts and spoilage bacteria | | | | | | | | |

| | | | | | Removal Activity | | | | | | | Other activities |
|---------------|----------|-----|---------------|--|------------------|-------|--------|---------|--------|-------------|---------------|----------------------------|
| Active Carbon | Chitosan | S02 | Ascorbic acid | Other | Phenolics | Color | Solids | Protein | Faults | Antioxidant | Antimicrobial | |
| | | | | | • | | • | • | • | | | |
| | | | • | | • | | • | • | • | • | | |
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| | | | | | • | | • | | | | | |
| | | | | Metatartaric acid | | | | | | | | Stabilization of tartrates |
| | | • | • | Carboxymethyl Cellulose (CMC), citric acid | | | | | | | | Stabilization of tartrates |
| | | | | Acid and neutral potassium tartrate, Potassium bicarbonate | | | | | | | | Precipitation of tartrates |
| | | | | | | | | • | | | | |
| | | | | Allyl isothiocyanate | | | | | | | • | |
| | | • | • | Potassium Sorbate, Citric acid | | | | | | • | • | |
| | | • | | Potassium bi-carbonate | | | | | | • | | |
| | | • | • | Perlite | | | | | | • | • | |
| | | • | | Citric acid, Copper sulfate | | | | | • | | | |
| | | • | • | Citric acid, Metatartaric acid. | | | | | | • | | |
| | | | | Potassium bicarbonate | | | | | | | | pH adjustment |
| | | | | Beta-glucanase | | | | | • | | | |
| | • | | | Beta-glucanase | | | | | • | | • | |
| | • | | | | | | | | | | • | |

MUST PROTECTION:



Aromax B4: ascorbic acid and potassium metabisulfite immobilized on an inert substrate for easy dispersion on grapes and juice and protection during machine harvesting or grapes transportation. It optimizes anti-oxidation and antiseptic protection. The perlite used to immobilize the ascorbic acid and the potassium metabisulfite floats, only releasing the components when they are wetted by the juice. This way, it forms a protective layer on the wetted surface of broken berries, juice in the gondolas, or holding tanks.

Utilization: Disperse the powder on the bins, boxes, trucks, and conveyers, or at any stage that needs antioxidant protection for the juice. Use at 0.5-1 kg per ton. (1 kg per ton will release 54 ppm of SO₂ and 60-70 ppm ascorbic).

Shelf life and storage: 2 years stored at room temperature in a non-humid environment.

Packaging: 5kg bags.

TARTRATES STABILIZATION:

Cremor Stop Extra 40*: Cremor Stop Extra 40 is an extremely pure metatartaric acid with a very high esterification index 38-40%.

It is recommended to add Cremor Stop Extra 40 always after the addition of organic and inorganic clarifiers, de-acidifying products, decolorizing, or deodorizing carbons. A filtration carried out 12-24 hours after the addition of Cremor Stop Extra 40 eliminates the possible occurrence of opalescence, caused by the high esterification index and by the presence of proteic substances in the wine.

Utilization: dissolve the product in cold water at about 1:5. Avoid using hot water and always make a fresh solution every time. Add to the wine by pumping over or through a Venturi pipe. Do not use in wines rich in calcium or stored in concrete tanks. An addition of 55 ml/hL of Arabinol makes Cremor Stop 40 even more stable in time.

Dosage: 10 -15 g/hL (1lb/1000 Gal)

Shelf life and storage: sealed containers will last for 2 years stored at room temperature in a non-humid environment. Temperature should not fall under 5°C/41°F.

Packaging: 1kg packets

***Not legal for U.S. commercial wineries.**

Crystalflash: potassium bicarbonate, tartaric acid and neutral potassium tartrate, plus bentonite, for optimized tartrates seeding and settling. It accelerates the crystallization of tartrates by facilitating the nucleation process.

Thanks to its balanced and exclusive formulation, Crystalflash eliminates the occurrence of oxidative phenomena in the wines during cold stabilization. Also, Crystalflash shortens the cold holding time in a tank to a much shorter period, usually between 3 and 5 days.

Dosage: 20-40 ppm.

Shelf-life and storage: 4 years stored at room temperature in a non-humid environment.

Packaging: 1 kg packets.

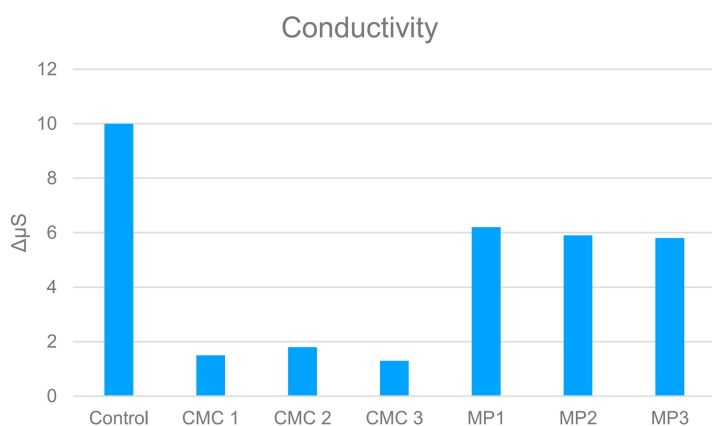
New-Cel: CMC based New-Cel is a colloidal protector that wraps the tartrates' crystal structure with a protective film and deforms it making tartrates' growth impossible. Studies (Malherbe & O'Kennedy, 2008) demonstrated an accrual in savings when using this technology instead of the traditional cold stabilization, with CMC treatment costing 8-10 cents/gallon while traditional "chilling" energy costing about four times more. New-Cel has been developed by AEB on the basis of the observation that the most effective wine stabilization occurs when the CMC polymer contains a ratio between the number of carboxylated groups and glucose units equal to 1. This process is extremely efficient in forming a chemical barrier between the crystals of potassium bitartrate, thus preventing their enlargement. CMC is negatively charged so it will bind molecules like proteins (but also unstable color in reds). If the wine is perfectly protein/color stable, there will be no problem, but if is borderline, CMC will cause haze that needs to be filtered. We recommend checking protein stability after CMC addition on a sample and make sure protein haze doesn't develop. It can be used in sparkling wines by adding it a few days before the riddling agents or in the liqueur d'expédition at the dégorgement. CMC is approved in the U.S. under 27 CFR 24.250.

Utilization: Directly dissolve the solution into the wine 48 hours before bottling or before any filtration stage. Wines must be brought at 64°F-16°C for 8 hours for CMC to dissolve. Wines must be protein stable and with turbidity <1NTU. In reds, CMC may interact with unstable color, thus making it precipitate. Stabilize the color with tannins, MOX, Arabinol, prior to CMC addition in red wines.

Dosage: 1000-1500 ppm. TTB limit = The amount used must not exceed 0.8% of the wine.

Shelf life and storage: 1 year at room temperature in a non-humid environment.

Packaging: 1 kg bottles and 25 kg pales.



A comparative trial on available techniques to achieve cold stability was performed by AEB, in collaboration with Cal Poly Wine & Viticulture Institute, on a Chardonnay from Santa Lucia Highlands. According to the conductivity tests, the control measured a 10.9% difference in conductivity, 6.9% above the threshold for cold stability. The results for the New-Cel additions showed successful stabilization of all wine samples with the lowest percentage difference of 1.4% and an average of 1.8% difference. The results for the manno-protein products used as tartrate stabilizers, showed that the wines were not fully cold stable as the lowest percentage difference was 5.8% and an average of 6% difference between all three repetitions made with mannoproteins.

In red wines CMC may interact with unstable color, thus making it precipitates. This unstable color would most likely be lost anyways in a traditional stabilization. However, because of this issue, many believe that CMC cannot be used for stabilizing red wines. An experiment was carried out to achieve tartaric stability of red wines (Veneto region) using New-Cel, trying to avoid color instability.

Sample A (Amarone della Valpolicella):

- $\Delta\mu\text{S}$ 81,0: unstable – Refrigerator: unstable

After dosing 2000 ppm New-Cel:

- $\Delta\mu\text{S}$ 44,3 stable – Refrigerator: stable
- Color $\Delta\text{IC} = 0,15$ Complete filtration of the wine at room temperature to check the possible presence of precipitate resulted in no precipitate.

Sample B (Ripasso della Valpolicella):

- $\Delta\mu\text{S}$ 80,8 unstable – Refrigerator: unstable

After dosing 2000 ppm New-Cel:

- $\Delta\mu\text{S}$ 45,2 stable – Refrigerator: stable
- Color $\Delta\text{IC} = \sim 0,1$ - Complete filtration of the wine at room temperature to check the possible presence of precipitate resulted in no precipitate.

Sample C (Bardolino):

- $\Delta\mu\text{S}$ 92,8 unstable – Refrigerator: unstable

After dosing 2500 ppm New-Cel:

- $\Delta\mu\text{S}$ 49,3 stable/at the limit – Refrigerator: stable
- Color $\Delta\text{IC} = 1,1$ unstable.

Even if the tartaric stability has been reached, with both methods there is a color precipitation, evident both visually and numerically. Protein stability tests showed that the wine was also protein unstable. The winemaker proceeded with a clarification of the sample with 300 ppm of Bentogran (bentonite) & 10 ml/hL of Gelsol, which stabilized the wine for proteins and phenolics.

Subsequently, the winemaker tried again the addition of 250 g/Hl of New-Cel:

- $\Delta\mu\text{S}$ 49,5 stable/at the limit – Refrigerator: stable
- Color $\Delta\text{IC} = \sim 0,1$ stable

REDOX ADJUSTMENT:

Desulfin: stabilized liquid copper sulfate to remove H₂S and reductive odors. If wines show a bouquet that seems to be too “closed” or affected by reductive odors, try to add a drop of Desulfin in the glass. If the wine changes positively, the wine is most likely reduced by H₂S or mercaptans and can be treated with an adequate addition of Desulfin.

If the problem is mercaptans, do not aerate. Mercaptans can be removed to some extent with appropriate copper sulfate additions (about twice the one needed for H₂S removal). The reaction forms an insoluble Cu-mercaptide salt that can be filtered out of the wine.

If the problem is DMDS or DEDS, we need to convert them back to mercaptans with 500 ppm of ascorbic. This can take up to 60 days. Desulfin can be used after the conversion is complete.

Utilization: preliminary H₂S tests should be conducted. Add Desulfin directly to the affected product and recirculate in an open environment.

Keep in mind that, according to TTB, the quantity of copper in the finished wine must not exceed 1 part per million (1 mg/L). 21 CFR 184.1261 (GRAS). The addition of 10 mL/hL of Desulfin provides 0.25 ppm of copper. Consequently, the max addition rate of Desulfin is 40 ml/Hl (assuming that there is no copper in the wine already).

Bench trialing Desulfin: add an average drop size (0.05 ml) into 1 liter equals to a Desulfin addition of 5 ml/hL or 1/8 of the legal limit.

Average dosage: 10ml/hL.

Shelf life and storage: Sealed containers will last for 2 years stored at room temperature in a non-humid environment. Temperature should not fall under 41°F/5°C.

Packaging: 1 kg bottles

| Sulfur compound | | Odor | Treatment |
|------------------|------------------|-----------------------|---|
| H ₂ S | | Rotten Eggs | Desulfur |
| Mercaptans | Methyl Mercaptan | Rotten Cabbage | Desulfur or Taniquer/Taniblan |
| | Ethyl Mercaptan | Burnt Match | Desulfur or Taniquer/Taniblan |
| Disulfides | DMDS | Cooked cabbage, onion | Ascorbic Acid (5g/hL) + Desulfur or Taniquer/Taniblan |
| | DEDS | Burnt rubber, garlic | Ascorbic Acid (5g/hL) + Desulfur or Taniquer/Taniblan |

Sulfur compounds, faults, and recommended treatment.

Riduxhigh: antioxidant stabilizer to be used at bottling. It improves shelf life of white, reds and rosé wines. The vigorous anti-oxidizing action of Riduxhigh, drastically lowers the redox potential in just 24 hours and keeps it constant in time. The results are an improved wine color and bouquet stability, along with enhancement of its organoleptic characteristics. It interrupts the chain reaction responsible for the formation of oxidized radicals and instantly re-establishes a stable oxygen-free environment, maintaining constant levels of SO₂. It also prevents the occurrence of ferric casse by keeping iron in a stable and soluble form. It contains 15% of ascorbic acid, a strong antioxidant that can quickly reduce oxygen. This reaction is known to produce a strong oxidant, H₂O₂, which is the reason why winemakers are afraid to use it. However, the oxidative species produced by the reaction between oxygen and ascorbic acid will react quickly with SO₂. The SO₂ present in Riduxhigh, other than controlling the microbial environment, will optimize the efficiency of this product as an antioxidant.

Dosage: white and rosé wines: from 100 to 250 ppm. Red wines: from 100 to 200 ppm. 100 ppm of Riduxhigh increase the SO₂ by 17 ppm.

Dissolve in 10 parts of wine and add before micro filtering or bottling.

Shelf life and storage: 3 years if stored in a cool dry place, away from direct sunlight and heat.

Packaging: 1 kg packets.

VOLATILE PHENOLS TREATMENTS:

Smoke and Brett Characters Removal

Antibrett 2.0: is an innovative product based on yeast hulls, β -glucanase enzyme, and fungal Chitosan. Its components are particularly suited to inhibiting the action against Brettanomyces yeasts; they also have high adsorbing properties against 4-ethylphenol and 4-ethylguaiacol, i.e., compounds giving wines unpleasant smells of horse sweat, medicine, and patch. The production system used to obtain these hulls is aimed at degrading only the yeast cell wall -especially chitin -, safeguarding the structure of the cytoplasmic membrane, which has a high specific adsorbing capacity. Antibrett 2.0 inhibits the production of vinyl-reductase thanks to the antimicrobial action obtained from the synergy of Chitosan and β -glucanase enzyme. Vinyl-reductase participates in the transformation of the cinnamic acids naturally present in wines, in the corresponding ethyl derivatives, responsible for smells attributable to Brettanomyces.

Utilization and dosage: dissolve 400-800 ppm in 10 parts of wine or demineralized water and add to the mass making sure it is well homogenized. Wait at least two weeks before assessing results. Filter at least 2 weeks after addition before bottling.

Shelf life and storage: Antibrett 2.0 is stable at room temperature for at least two years.

Packaging: 500g can.

Anti4phenol: it cures smoke taint and Brettanomyces taint. These are two defects that are very hard to fine without using special equipment. The major indicator compounds associated with both these types of taint belong to the group called volatile phenols. In the case of Brettanomyces, the responsible compounds are 4-ethylphenol and 4-ethyl guaiacol; and in the case of smoke taint, guaiacol and 4-methylguaiacol. These molecules are similar. AEB has found a natural fining agent that can diminish (and in certain cases eliminate) the problems caused by these compounds.

Anti4phenol may be used as a preventive tool in contaminated barrels. It guarantees the inhibition of vinyl-reductase which is responsible for the transformation of naturally occurring cinnamic acids into the corresponding ethyl derivatives. Although it can be used to cure wines that already show taint problems, results may vary. Bench trials are always recommended before treating a full batch. Independent trials have shown that

Anti4phenol always reduces at least 20% of the total volatile phenols in the wine, thus reclaiming wines spoiled by Brettanomyces and smoke-taint contamination.

Utilization and dosage: dissolve 400-800 ppm in 10 parts of wine or demineralized water and add to the mass making sure it is well homogenized. Wait at least two weeks before assessing results. Filter at least 2 weeks after addition before bottling.

Shelf life and storage: Anti4phenol is stable at room temperature for at least two years.

Packaging: 500g can or 5 kg bag.

Free4fenol: is composed by a blend of active carbons. The specific activation process determines a very low adsorption of the anthocyanidins. This activation process is aimed at avoiding the adsorption of the molecules with the highest molecular weight. Free4fenol is known to adsorb organic compounds including undesirable contaminants, such as the volatile phenols and phenolic glycosides associated with smoke taint. Smoke-affected juices (especially white and rosé styles) can be effectively treated with Free4fenol prior to fermentation to reduce the intensity of smoke characters in the wines made from treated juices. In respect to carbon fining of the wine, it is recommended that evaluations of carbon treatments be performed on small volumes of wine to determine sensory impacts before treating larger quantities of wine.

Utilization: dissolve in must, wine, or water at a ratio 1:10 and add to the mass by pumping over. At the end of the absorption of the coloring matter, proceed with the removal by filtration or sedimentation-clarification.

Dosage: 50-1000 ppm depending on the decolorization to be obtained.

Shelf life and storage: 4 years stored at room temperature in a non-humid environment.

Packaging: 20 kg bags.



HOW TO AMELIORATE SMOKE TAIN T DURING WINEMAKING

Over the past two decades, wildfires have increasingly exposed vineyards and grapes to smoke in different parts of the world. Smoke taint (undesirable sensory characters, such as smoky, burnt, ashy, or medicinal) is caused by volatile phenolic compounds, which can be present in the must in their free form or bundled together to form glycosides. During fermentation (and over time in barrel or bottle), these glycosides can break apart, releasing the volatile phenols into the must or wine. This increases the perception of smoky flavor. Several techniques and products can be employed in the winery to minimize the sensory impact of undesirable smoke-derived aromas, flavors, and compounds in wine.

1. Minimize contact with the skins.

- Hand pick fruit, exclude leaf material, maintain integrity of harvested fruit, keep fruit cool (50 °F/10°C), whole bunch press and separate press fractions, minimize fermentation time on skins.



2. Increase wine complexity using aromatic yeast.

- Fermol Arome Plus, Fermol Red Fruit, Fermol PB2023
- Increase yeast aromas productions: Fermoplus DAP FREE, Fermoplus Tropical, Fermoplus Floral. 200-400 ppm at the beginning of fermentation

3. Consider addition of tannins to balance the shortened skin contact.

- Tanéthyl Effe to stabilize the color from the beginning.
- Protan Peel to add skin tannins.
- Ellagitan Fruit Reserve to reduce intensity of smoke characteristics through increased wine complexity.

4. Conduct trials with fining agents.

- Anti4phenol
- Free4fenol

These techniques may help reduce the extraction and expression of smoke taint compounds, but they are unlikely to eliminate the problem completely. We therefore recommend to market for quick sale to avoid smoke-related characteristics in the bottle as the wine ages.

PROTECTION FROM WILD YEAST AND BACTERIA

Microcid: due to its potassium sorbate content, it helps prevent re-fermentation of wines containing residual sugars. Microcid inhibits bacterial alterations by stabilizing free SO₂. It thus inhibits the activity of lactic bacteria that metabolize sorbic acid. As a result, it prevents the formation of an anomalous odor, reminiscent of geraniums, which can be derived from the usage of straight sorbate. Due to its reducing components (KMS and citric acid), it also helps to prevent oxidation and hinders increased volatile acidity.

Utilization: dissolve in about 10 parts of warm water and add uniformly to the clarified and filtered mass. 500 ppm of Microcid increases total SO₂ by 30 ppm and 270 ppm of sorbate.

Dosage: 250 – 500 ppm.

Shelf life and storage: 2 years stored at room temperature in a non-humid environment.

Packaging: 1 kg packets

Steryl*: prevents formation of films on the surface wine that is in contact with air. It comes in the form of tablets consisting of an inert pure-paraffin support in which allyl-isosulphocyanate, a natural form of mustard oil, has been dissolved. Mustard oil is a volatile substance with high antiseptic properties, especially against aerobic microorganisms. Steryl anti-flor tablets are made with the most up to date techniques using fully automated systems which guarantee consistent quality. The microorganisms responsible for the formation of white film on the surface of wines stored in partially full containers belong to the specie *Pichia*, *Hansenula*, and *Candida*; they are yeasts with a prevalently oxidative metabolism and almost free from fermentative activity. In addition to the white film and oxidation, a loss of alcoholic content takes place as well as the formation of acetaldehyde, which gives a vinegary smell to the contaminated wines. By floating on the surface of the liquid, Steryl tablets slowly release the allyl-isosulphocyanate, which sterilizes the air above it. As a result, the development of the film is inhibited together with other oxidation related bacterial and enzymatic surface alterations. ML bacteria as well as wine flavor in general are not affected.

Dosing: use one or two tablets of the adequate size and replace it every 15 days.

Shelf life and storage: Packaging in blister packs of aluminum and plastic laminate ensures unlimited preservation and maintains the efficiency of the product.

Packaging: Steryl tablets are contained inside practical packs and commercialized in three different packaging sizes, for casks, barrels, and tanks of variable dimensions. Steryl Vasche (for tanks) N. 50 tablets in 50 x 1 tablet sachets; Steryl Fusti (for amphoras and large barrels) N. 80 tablets in 40 x 2 tablet sachets; Steryl Demijohns (for small containers) 600 tablets in 50 x 12 tablet sachets

***Not legal for US commercial wineries.**

Sulfigrain: potassium metabisulfite ($K_2S_2O_5$) in pellets, easy to dissolve. It allows a must or a wine to be sulfited quickly and precisely, without having to manually mix in the product barrel by barrel. It is the perfect SO_2 dose to add to a 55 gallons barrel. Due to its formulation, the use of Sulfigrain limits the amount of SO_2 lost to the atmosphere.

Composition and Features: potassium metabisulphite 75%, potassium bi-carbonate 25%. When in contact with must or wine, the effervescence of the particles of Sulfigrain ensures a natural and complete diffusion of the SO_2 in the tank or barrel. Sulfigrain does not undergo ionized treatment and is a non-GMO product. Sulfigrain is in conformity with the standards of the International Oenological Codex.

Utilization: disperse the pellets of Sulfigrain on the surface of the must or the wine to be treated.

Dosage: 1 dose contains 5 grams of pure SO_2 .

Shelf life and storage: preserve only in its original sealed packing of origin, safe from light sources, in a clean place, dry and free from odors.

Packaging: Box of 25 doses.

Chitocel: is a product based on Chitosan, a natural polysaccharide of fungal origin (derived from *Aspergillus niger*), biodegradable, and non-allergenic. It ensures the reduction and, in some cases, the elimination of the unwanted microbial population in wine. Chitocel is active against acetic and lactic bacteria, yeasts in general, and *Brettanomyces bruxellensis* specifically. Its action is mostly “physical” as there seems to be an electrostatic interaction between the membranes of the microorganisms and Chitocel. This interaction induces a strong disturbance in the permeability of the membrane of the *Brettanomyces*. This ultimately ends up forming a large floccule and can be eliminated by racking or filtration. It is still possible to detect live cells of *Brettanomyces* after the treatment with Chitocel, but these cells are for the most part critically damaged and incapable of reproducing or forming volatile phenols (false positives).



Thanks to the synergy with yeast hulls (deodorizing media), Chitocel reduces the content of 4-ethylguaiacol, 4-ethylphenol, and contaminants such as ochratoxin A. Also, the use of Chitocel allows winemakers to reduce the content of heavy metals such as iron, lead, cadmium, copper, thus preventing the formation of ferric casse and copper casse.

Approved as acceptable in good commercial practice in the US under TTB § 24.250

Utilization: dilute 1:10 in must or wine and add to the mass making sure to homogenize well. Leave it in the media for at least 10 days before filtering or racking.

Dosage: 120-180 ppm. TTB limit for this product is 200 ppm.

Packaging: 250 grams.



Discover Chitocel, a product based on natural chitosan. Scan to learn more.

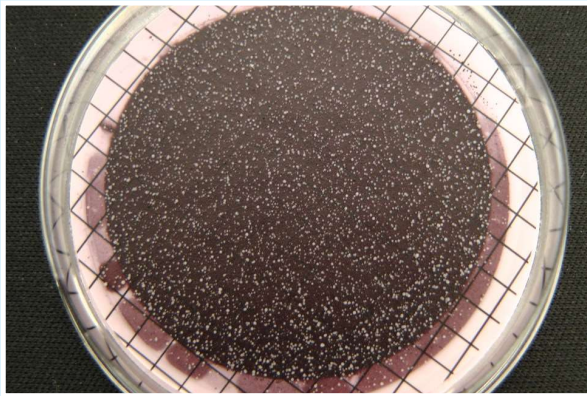


Fig. 1: Untreated wine

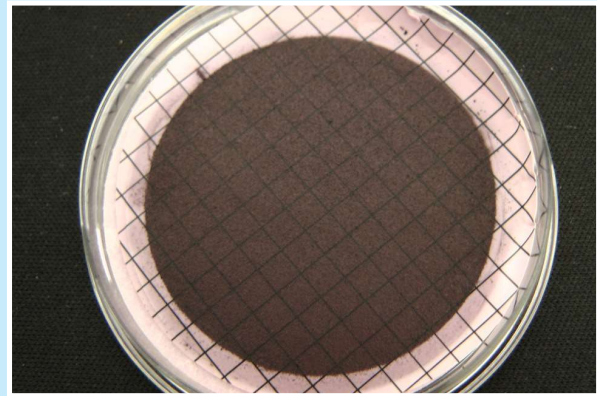


Fig. 2: Wine treated with Chitocel

LABORATORY TRIAL WITH CHITOCCEL:

1. Application to a heavily contaminated wine with *Brettanomyces bruxellensis*:

- Matrix: wine strongly contaminated with *Brettanomyces bruxellensis* with an evident olfactory imprint.
- Chitocel dosage: 50 ppm. Contact time: 10 days. Temperature: 77°F/25°C.

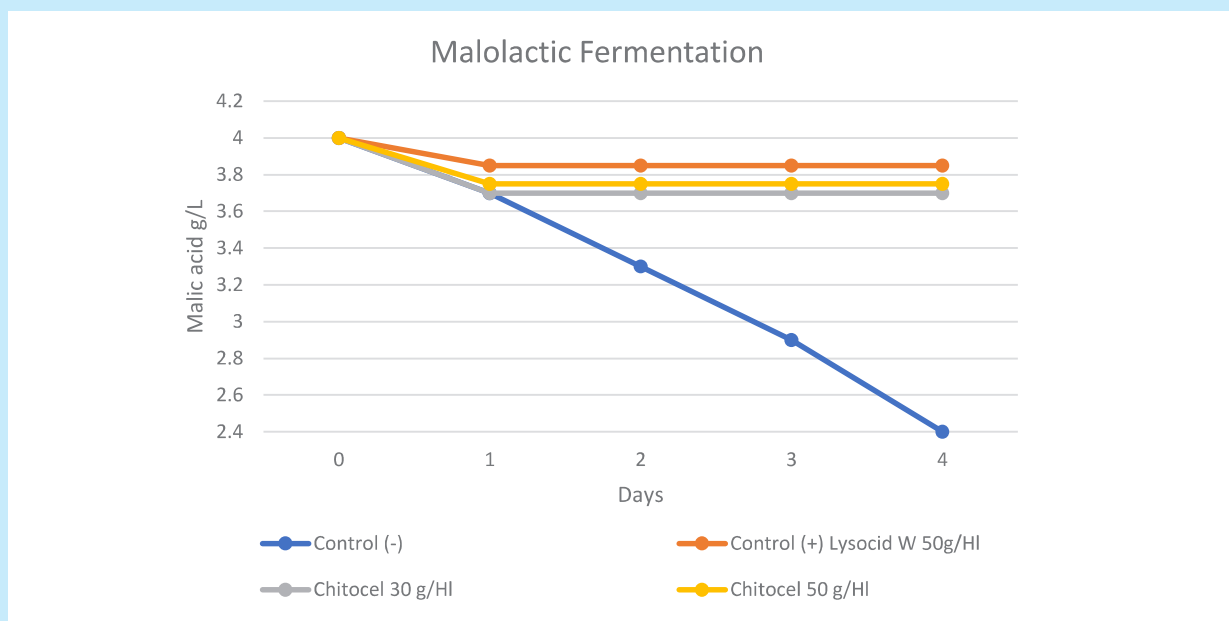
Notes: daily shaking.

- Method of analysis: sterile filtration on a cellulose acetate membrane with 0.2µm pores. Plates incubation at 86°F/30°C for 3 days on specific medium for *Brettanomyces* counts.
- Results: Cell count untreated sample = 3×10^3 CFU/l. Cell count treated sample = N/D

2. Application of Chitocel to a wine inoculated with a population of lactic bacteria:

- Matrix: wine heavily contaminated with *Oenococcus oeni* (105 cells/mL).
- Treatments: Chitocel dosages of 300 ppm and 500 ppm. Negative control: no treatment. Positive control: dosage of 500 ppm of Lysozyme. Contact time: 5 days. Temperature: 77°F/25°C.
- Method of analysis: Malolactic fermentation was measured first by malic acid consumption and second by lactic acid production. The total cell count was made on MRS plates.

- Results: Microbial metabolism is particularly vigorous in the untreated sample, which produced 1.5 g/L of lactic acid. Both Chitocel treatments showed instead a substantial inhibition toward the conversion of malic acid to lactic acid, with comparable results to those obtained with Lysozyme. Chitosan application is therefore significantly efficient in red wine condition where the interactions between phenolic compounds and lysozyme could occur, thus preventing the risk of color loss that these interactions might engender (Bartowsky et al. 2004).



Chitocel (300 and 500 ppm) and Lysozyme (500 ppm) effects on Malolactic fermentation (Malic acid).

TRADITIONAL FINING OF MUSTS AND WINES:

Bentogran: is a pharmaceutical grade Na-bentonite for protein removal with low impact on wine aromatics.

Bentogran is used at rates of addition that are up to 50% less than regular Na-bentonites. It presents very compact sediment, thus minimizing the lees. Compact sediment and lower dosage rates will result in decreased wine loss.

Bentogran is granulated and does not contain fine powders which are hazardous to the respiratory system. Bentogran is soluble-calcium free, soluble-sodium free, soluble-phosphates free, soluble-metals free, and arsenate-free. It is free from dust, sand,

and organic matters.

Utilization: before usage, rehydrate Bentogran for 20 minutes in 15-20 parts of cold or warm water -warm water is more effective and faster than cold water. Bentogran can increase by 20 folds due to its high swelling capacity. To match this potential, it needs to be re-hydrated in a larger volume of water compared to other bentonites. Try not to use wine or hard water when re-hydrating Bentogran.

Dosage: 120-500 ppm.

Shelf life and storage: 4 years stored at room temperature in a non-humid environment.

Packaging: 1kg packs and 25 kg bags

Highlights: sodium bentonite has enhanced protein binding capabilities over calcium bentonites and helps with a more homogeneous clarification.

Carbosil: is a liquid clarifier based on silica and decolorizing carbon. It guarantees a quick and efficient color removal in both musts and wines. Carbosil is hydrated and in liquid form, so the product is safe and practical to use. It is highly recommended on musts of Pinot Grigio or those obtained from over-ripe grapes. It will yield a clear must/wine, with no trace of carbon and with a compact sediment.

Utilization: It may be used in cold settling along with Gelsol for must clarification or added during fermentation to reduce color. Mix Carbosil in must/wine using a Venturi or by pumping over. Dose the product either diluted 1:1 with water or full strength. For solids and color fining: in musts, add Carbosil before adding gelatin. In wines, do the opposite: wait at least 1/2 hour after the clarifier (albumin, gelatin, casein) is fully homogenized, and then add Carbosil and mix.

Dosage: It always depends on the wine or must to be treated. Trials are recommended. As a rule of thumb, if used in combination with gelatin, Carbosil needs to be added at 5 to 10 times the amount of Gelsol used. When used as color remover during fermentation, rates of addition are between 250-600 ppm.

Shelf life and storage: Sealed containers will last for 2 years stored at room temperature in a non-humid environment. Do not store below 40°F/5°C.

Packaging: 25 kg pails.

Catalasi: ideal to cure oxidized wines or to add "freshness" to fermenting musts. It also helps preventing "pinking" when used during fermentation. It contains a balanced

amount of Bentonite, caseinate, gelatin, L-ascorbic acid, and potassium metabisulfite. It partially cures or prevents darkening of white wines, the occurrence of “brick” hues in rosé, and yellow hues in red wines. The potassium caseinate present in Catalasi highlights original aromas and color, reducing the level of polyphenols and oxidized polymerized components. It also contains a strong antioxidant (vitamin C) and a calibrated dose of SO₂ important to neutralize eventual peroxides produced by the oxidation of vitamin C.

Dosage: 200-500 ppm. 100 ppm of Catalasi, yield 5ppm of SO₂

Shelf life and storage: 2 years stored at room temperature in a non-humid environment.

Packaging: 1kg pack and 20 kg bags

Catalasi AF Plus: a mix of clarifiers (Bentonite, isinglass, pork/fish gelatine, PVPP, and silica gel) that selectively removes green and bitter catechins from red rosé and white wines and cures light off flavors. The variety of agents that formulate Catalasi AF Plus will result in a balanced fining process, without the classic albumin and caseinate allergenic agents. It can be used in reds and whites for removal of bitterness and odd flavors deriving from reductive phenolics. Ideal also for the fermentation of Pinot Grigio or for white and rosé wines with high phenolics more generally.

Dosage: 200-500 ppm.

Packaging: 1kg packet and 20 kg bags.

Highlights: PVPP is a nonallergenic, synthetic agent that has a high affinity to bind short and bitter polyphenolic compounds, such as catechin, epicatechin, and quercetin, similarly to caseine and albumine. It reduces unwanted flavors, bitterness, and astringency, and removes oxidized polyphenols, thus improving the color.

Catalasi Vega: is a new clarifier for the cleaning and stabilization of musts and wines. The presence of vegetable proteins, PVPP, silica and activated Bentonite, guarantees the cleaning and stabilization of the treated products with just one operation. Catalasi Vega is active towards the oxidized phenolic substances, giving the wine brown colors and bitter taste scents. It also improves protein stabilization and brightness thanks to the perfect removal of the finest turbidity particles. The treated wines are therefore fresher and franker; they fully express the varietal character and are stable over time.

Dosage: musts, from 500 to 1000 ppm. White, red and rosé wines: 200-600 ppm. Use 1000-1500 ppm to reduce strong oxidative conditions and to prevent pinking.

Packaging: 10 kg net bags.

Utilization: Dissolve the dose in cold water at the ratio 1:15, vigorously mix the solution and then quickly add to the wine with Venturi or pump.

Shelf life and storage: 2 years stored at room temperature in a non-humid environment.

HOW TO AVOID PINKING

Pinking is caused by the oxidation of leucoanthocyanidins (not colored) to a cyanidin (colored). Reductive conditions throughout vinification and aging prevent the occurrence of the phenomena. Higher dosages of clarifying agents such as gelatin, pea and potato proteins, or more generally all those agents acting on phenol compounds, might reduce the overall amount of leucoanthocyanins.

As pinking's occurrence cannot be predicted,

antioxidant compounds should be used as a safeguard against the oxidation of the precursors and the consequent emergence of the pink color.



- 1.** Maintain the reductive state of grapes: at arrival use 100-600 ppm or 100 kg of grapes of Gallovin.
- 2.** Optimization of clarification: During clarification add 1500-100 ppm of Catalasi AF Plus.
- 3.** Maintain the reductive state of wine during storage:
 - Elevage Glu 200 ppm
 - Gallovin 50-200 ppm.

Deacid: is a formulation of potassium bicarbonate and neutral potassium tartrate salts, both highly soluble, able to induce a decrease in the total acidity with neutralization reactions and a subsequent complete and quick precipitation of the salts. The wine acid profile is thus modulated and the aromatic structure is not damaged.

The total acidity diminishes, and the pH will rise proportionally to the quantity of product applied. Deacid contributes to equilibrate full body expression in all wines, eliminating green and aggressive notes, keeping the right freshness in whites, and rounding excessively acid notes in red wines.

Utilization: add directly to the must or wine, little by little, by pumping over in order to avoid an excessive localized (but temporary) deacidification of a small amount of product. If used in solution, dissolve it in water. Pay attention to the development of CO₂ and the consequent increase in wine volume.

Dosage: 1300 ppm are required to lower the total acidity of 1 g/L (i.e. 1‰ in tartaric acid and 0,72‰ in sulfuric acid). Note: for higher additions, we recommend a preliminary laboratory trial.

Shelf life and storage: 2 years stored at room temperature in a non-humid environment.

Packaging: 5 and 25 kg bags

Decoran Gran: is an activated decolorizing carbon in mini pellets with high adsorbing action. It is ideal to remove excess color and reduce the level of polyphenols and catechins. This specifically activated decolorizing carbon can be utilized on both musts and wines with excellent results. Thanks to its form, Decoran Gran eliminates the problem of powder dispersion in the environment, helps to avoid waste and eliminates discomfort for operators. These characteristics make it extremely easy to handle and to use, making cellar operations far more efficient. Thanks to a specific surface area of more than 1000 m²/g and a particle diameter from 10 to 100 Ångström, it ensures high decolorizing activity in musts, especially when treating higher molecular weight constituents such as polyphenols. It is chemically inert and has low transferable heavy metals.



Utilization: dissolve Decoran Gran in must, wine or water at a ratio 1:10 and add to the mass by pumping over. At the end of the absorption of the coloring matter, proceed with the removal through filtration or sedimentation-clarification.

Dosage: 50-1000 ppm depending on the decolorization to be obtained.

Shelf life and storage: 4 years stored at room temperature in a non-humid environment.

Packaging: 15 kg bags.

Gelsol: a liquid gelatin produced by a process of irreversible hydrolyzation. It helps maintain a constantly stable liquid product. The clarifying effect achieved through instantaneous flocculation results in the formation of large, heavy macro-coagula. Sediments are compact and easily filtered out. It is used alone or in conjunction with Spindasol in order to clarify white musts both in cold settling and flotation.

In reds, it helps the wines to be softer and less susceptible to oxidation, Gelsol in fact removes small and condensed tannins which are responsible for most of the bitterness-astringency in wines. Gelsol has little affinity with anthocyanins; therefore, it is ideal for red wines as it does not cause any loss of color intensity.

Is a liquid gelatin prepared enzymatically without the use of heat. This difference makes Gelsol more active if compared with dry products where the use of high temperatures denatures proteins making them less efficient.

Gelsol never becomes solid; not only does this characteristic make it more efficient, but it also prevents re-condensation and the formation of "footballs" or "pyramids" inside the tank.

Utilization: Dilute in 1 to 3 parts of water before adding it to the wine, must, or flotation equipment. In musts, add Spindasol or Carbosil before adding Gelsol. In wines, wait at least ½ hour after Gelsol is fully homogenized, and then add Carbosil or Spindasol and mix.

Dosage: it depends on the wine or must to be treated. Trials are recommended. Density equal to 1.2 g/ml. For must clarification in combination with Spindasol, do trials starting from 60ppm of Gelsol and compact with 5 to 10 times the weight of Spindasol or Carbosil (specific weight of 1.15 g/ml).

For both rosè and red wines fining trials, start from 30 ppm of Gelsol. Dosages of Spindasol for settling are only 3-4 times the amount of Gelsol used.

Must clarification (with Spindasol): begin trials at 5 ml/hL of Gelsol and settle with Spindasol at 5-10 X the weight of Gelsol.

Shelf life and storage: sealed containers will last for 2 years stored at room temperature in a non-humid environment. Do not store below 40°F/5°C.

Packaging: 10 and 25 kg pail

Microcel: to be added to white musts when they start fermenting, it diminishes the concentration of phenolics and proteins in the finished wines. It is also ideal to minimize the damage in wines derived from botrytized or moldy grape musts.

The main philosophy of the Microcel product is that modern winemaking usually prefers a preventive approach instead of a curative one. Using Microcel in fermentation of wine and rosé wines, winemakers stop oxidation at its onset. Also, a significant amount of proteins is taken out early on, before the risk of affecting the “finished” bouquet with heavy bentonite treatments.

Microcel is composed of Potassium Caseinate, active cellulose fibers, and micronized pharmaceutical bentonite. During fermentation, Microcel absorbs the proanthocyanidins and monomeric catechins, which cause oxidation in wines. The color of treated wines becomes more appealing with greenish hues in white wines or more defined pink hues in the case of rosé wines. Musts treated with Microcel produce more complex wines, which longer retain their individual characteristics.

Dosage: 200-500 ppm.

Packaging: 10 and 25 kg bags.

Microcel AF: is the allergenic free version of the Microcel described above. The potassium is replaced by pure PVPP. The mix also includes bentonite and activated celluloses with a high adsorbing power. Thanks to the activity of PVPP, Microcel AF adsorbs catechins, preserving the product from oxidation risks and thus eliminating those yellow, orange, and reductive smells.

Dosage: 200-500 ppm.

Shelf life and storage: 3 years stored at room temperature in a non-humid environment.

Packaging: 10 kg bags

Utilization: dissolve the dose of Microcel/Microcel AF in about 5-10 parts of cold water, wait approximately 15 minutes, add to mass quickly and with turbulence.

Shelf life and storage: 3 years stored at room temperature in a non-humid environment.

Spindasol W: liquid silica for extra compaction of settling agents or carbon fining. When used in must, lees are heavier than when using just bentonite and the settling is much faster and compact. Also, silica is a mineral and does not adsorb aromatic molecules nor color. Because of its negative charge, it can be used in conjunction with gelatin, casein, and albumin in order to achieve a more compact sediment, thus minimizing the lees. Using Spindasol to help settle the fining agents always improves the yield and reduces work.

Utilization: Mix Spindasol in must/wine using a Venturi or by pumping over. Dose the product either diluted 1:1 with water or at full strength. In musts, add Spindasol before adding Gelsol. This way gelatin will be neutralized on the silica and will interfere much less with the phenolics. To smooth out phenolics in finished wines, wait at least ½ hour after the proteic clarifier (albumin, gelatin, casein) has reacted in the media, and then add Spindasol to settle.

Dosage: it depends on the wine or must to be treated. Trials are recommended. Generally, Spindasol needs to be added at 5 to 10 times the amount of the protein-based clarifier used. As a generic settling agent use 500 to 1000 ppm (1 liter is about 1.15 kg).

Shelf life and storage: sealed containers will last for 2 years stored at room temperature in a non-humid environment. Do not store below 40°F/5°C.

Packaging: 25 kg pail, 240 kg barrel.

Quickgel AF: allergenic free clarifier for red musts and wines, with no significant impact on color. Extremely effective and quick, it is the best choice when winemakers need to clarify cloudy juices or wines in a very short time. It enables to obtain bright and softer wines with extremely compact lees. Thanks to the presence of specific quantities of bentonite, pork and fish gelatin, Quickgel AF helps ensure that wines and juices are fined even with a high level of turbidity and polysaccharides.

Quickgel AF forms a very compact "net" of flocculants, which gives the wines brightness, and makes it easier to filter them. The sediment left at the bottom of the tank will be very compact making it for an easy and clean raking. Filtration can be carried out 48 hours after addition without any problems in filtration flow rates.

Utilization: dissolve Quickgel AF in ten parts of cold water and let it rehydrate for 20-30 minutes. Add the slurry to the tank, homogenizing with a pump over. Wait 48 hours before racking and filtering.

Dosage: 300-900 ppm.

Shelf life and Storage: 2 years stored at room temperature in a non-humid environment.

Packaging: 500 gram and 10 kg packets.

Ve-Gel: clarification product based on vegetable proteins. Its high reactivity towards bentonite and silica enables to obtain a quick clarification with compact deposits. In must cold settling, Ve-gel enables to obtain not only a better technological result, but also more favorable parameters. The clarification achieved has lower NTUs than the ones obtained with common vegetable proteins, the deposit is more compact, and the clarification is carried out significantly faster. Thanks to its reactivity, Ve-Gel can be successfully utilized during flotation, alone or in association with bentonite. Ve-Gel has a low reactivity towards the coloring matter and can be used in red wines with virtually no color loss.

Usage: dissolve Ve-Gel in water at a ratio 1:15 and add it in-line.

Dosage: 100-500 ppm.

Shelf life and storage: store in a cool dry place, away from direct sunlight and heat.

Packaging: 1 kg packs and 20 kg bags.