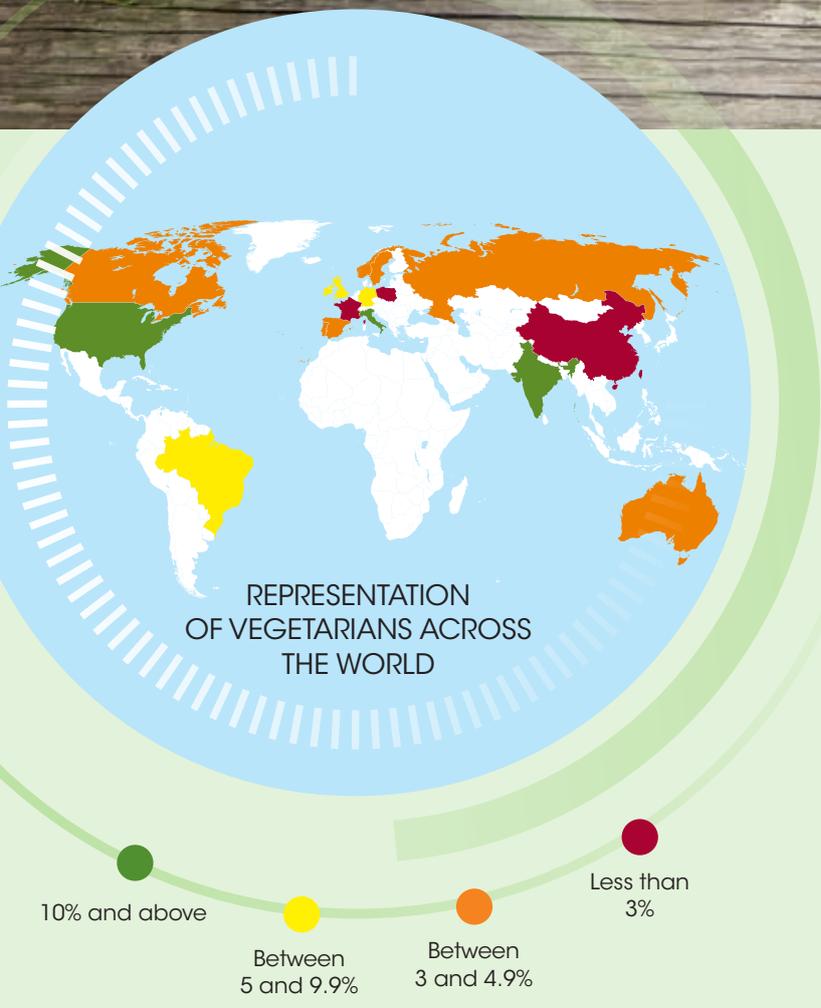




VEGAN
wines





The Origins of Veganism

Veganism is a movement that began in the United Kingdom around 70 years ago, initiated by Donald Watson and inspired by several great thinkers like Voltaire and De Vinci. It consists of refusing to exploit animals in any way.

Stricter than vegetarians, who do not eat meat, in addition to not consuming food that comes from animals, vegans do not consume any products that have caused suffering to an animal.

Reliable data on vegan populations is rare. However, statistics estimate that the population of vegans in the USA (the largest in the world) has doubled since 2009 and is close to 2.5%.

And wine does not escape that rule. Above and beyond the allergenic potential of some animal proteins like casein, egg albumin and isinglass, some wine drinkers lead a vegan lifestyle. They aim to eliminate the use of any animals in wine-growing and wine-making.

Many vegan logos can now be found on bottles of wine (first logo on wine in France in 2014).

“Veganism is a doctrine according to which humans should live without exploiting animals.”



Developing alternatives to animal-based fining agents

1 Plant proteins as alternatives to gelatins

Aware of this evolution in consumer trends, the company Martin Vialatte has been working on the development of non-animal fining agents for over 15 years. Indeed, in 1997, the outbreak of Creutzfeld-Jacob's disease was already calling the use of these products into question. The development of these new fining agents is clearly in keeping with the vegan philosophy of some consumers. The first efforts to replace gelatin as a fining agent by plant-based proteins were made in 1997. At that time, around 15 proteins from various plant origins were sampled (rice, wheat, corn, soy, lupin, potato, pea etc.) then tested in laboratories to determine their affinities for polyphenols and their influence on the organoleptic characteristics of wines.

Some were discarded due to risks relating to GMOs or allergens, while others were judged to be ineffective.

At the end of the laboratory testing process and the 3 years of industrial testing in wine cellars, pea proteins were selected.

Martin Vialatte also referred the project to the OIV, so that in 2005 the fining of musts and wines with pea proteins was adopted as a new oenological practice.

The ProVgreen range was created after this authorization, and today brings together 4 specialties composed uniquely of pea proteins: ProVgreen Pure Must for the clarification of musts, ProVgreen Pure Wine for the fining of wines, ProVgreen Flot for the clarification of musts by flotation and ProVgreen L170, a liquid version of pea proteins for the clarification and fining of musts and wines.

This range has been recognized and honored on several occasions (VINITECH 2006, INTERVITIS 2010).

2 Replacing products of animal origin and allergens

In 2008, the R&D department at Martin Vialatte initiated the replacement of products made using casein, egg albumin and isinglass with formulations based on plant proteins. In addition to being unsuitable for vegan wines, these animal products are also potentially allergenic for consumers.

Numerous tests carried out in laboratories and wine cellars have allowed alternatives to these products of animal origin and allergens to be developed.

3 Chitin derivatives: new tools for winemaking

For several years, chitin derivatives have been available for treating musts and wines. Chitin is a polysaccharide that is widespread in nature and mainly used in the agro-food, cosmetics and health industries.

Chitin is mainly produced from crustacean shells, but only chitin of fungal origin is authorized for use in wine-making. Its principal derivatives are chitosan and chitin-glucan. These compounds have several properties:

- Clarification of musts and wines
- Improvement to the organoleptic characteristics of wines
- Reduction of micro-organism populations, in particular *Brettanomyces*
- Reduction in Ochratoxin A concentration.

Today, Martin Vialatte has two chitin-derived formulations that are non-allergenic and not of animal origin: KTS Control, a specific chitosan-based formulation for the elimination of unwanted micro-organisms, in particular *Brettanomyces*, and KTS Clear, a specific chitin-glucan-based formulation for eliminating unpleasant tastes (reduction, ethyl phenols) and for clarifying and fining wines.



MARTIN VIALATTE SOLUTIONS

There is no official charter specifying the permitted practices or oenological products for making vegan wines.

But some key principles are recognized by most vegans. First, the producer must not use animals to cultivate the vines.

Then, the oenological products used must not be of animal origin. Finally, whenever possible,

it is preferable that vegan wines are made from organic grapes.

The Martin Vialatte range today offers several products that are compatible with a vegan lifestyle. These formulations have a mode of action and an impact on the musts and wines similar to fining agents of animal origin, and are important tools for makers of vegan wines.

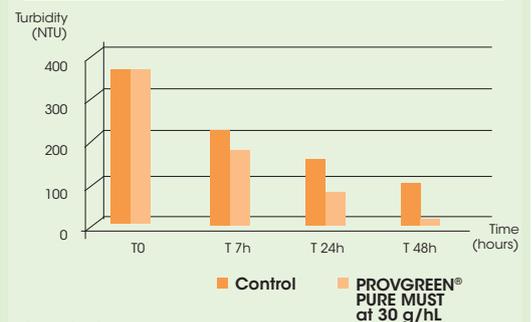


ProVGreen Pure Must

Pea proteins selected for the clarification and treatment of musts against oxidation

- Rapid flocculation of suspended particles in must
- Removes oxidized or oxidizable phenolic compounds from must
- Ensures well compacted must deposits
- Contributes to aromatic freshness and to the preservation of a young tint in white and rosé wines

Comparison of deposit compacting with PROVGREEN® PURE MUST on Chardonnay musts



Conclusions

At equivalent doses, PROVGREEN® PURE MUST display identical results. For fining with products based on plant-proteins, winemakers can choose between products in powder and liquid form.

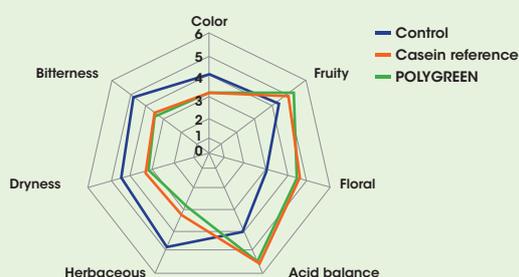


PolyGreen

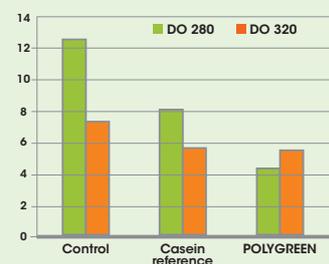
Casein-free compound based on selected pea proteins for the preventive and curative treatment of musts and wines against oxidation

- Removal of oxidized and oxidizable polyphenols
- Revitalization of color and aromatic expression
- Reduction of astringency and removal of bitterness
- Stabilization of SO₂ through the removal of binding factors

Organoleptic profiles of control wine and treated wines



Effect of different Chardonnay must treatments on DO280 and DO320 of corresponding wines



Products for making “vegan” wines

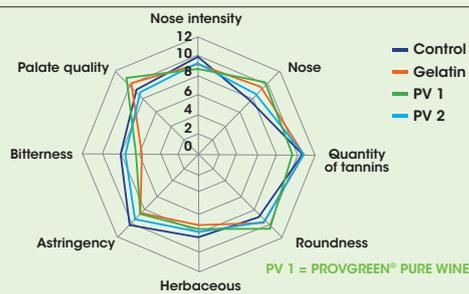


ProVGreen Pure Wine

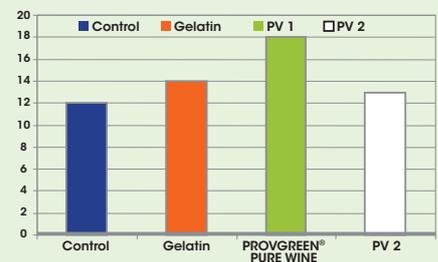
Selected pea proteins for fining and maturing wines

- Rapid flocculation with suspended particles in the wine
- Improved organoleptic characteristics of the wine: elimination of aggressive tannins and bitterness with greater suppleness and roundness on the palate
- Better aromatic expression of the wine, enhancing the fruity notes
- Ensures well compacted must deposits, more so than an animal-based fining treatment
- Good preparation of wines for pre-bottling filtration
- Better organoleptic result than gelatin and potato proteins

Improvement of organoleptic characteristics Tasting results for a Cabernet fined with PROVGREEN® PURE WINE



Tasters' preferences



KTS Control (controls indigenous microorganisms)

Specific formulation based on chitosan

- Removal of undesirable microorganisms
- Significant decrease in *Brettanomyces* yeasts
- Fast acting

MICROORGANISMS	DOSES AND IMPACT
<i>Brettanomyces</i>	3-15 g/hL - Elimination
<i>Zygosaccharomyces</i>	> 2,5 g/hL Population decrease
<i>Lactobacillus</i>	5 à 18 g/hL - Elimination
<i>Pediococcus</i>	> 10 g/hL Population decrease
<i>Oenococcus</i>	5-10 g/hL Malolactic fermentation delayed
<i>Saccharomyces c.</i>	Little effect



KTS Clear

Specific formulation based on chitin-glucan

- Removal of undesirable molecules, including unpleasant tastes, which may form in wines due to the development of alteration-causing microorganisms
- Clarification and fining of wines as an alternative to fining agents of animal origin
- Rapid result in 48 hours

TYPE OF WINE	CONTROL	WINE TREATED AT DOSE OF 10 g/hL OF KTS CLEAR
Burgundy Pinot noir	Significant reduction	Elimination of reduction and perception of fruity notes
Alsace Pinot noir	Strong reduction (H ₂ S, cabbage) on the nose and palate	Removal of reduction and dryness on a gummy palate
Languedoc Chardonnay	Mousiness	Elimination of defect and improved freshness and fruitiness
Alsace Muscat	Lacks cleanliness on the nose and loss of aromatic intensity	Very clear aromatic improvement and distinctive character of the grape recovered

A protocol Aromatic white



	STAGE	PRODUCT	DOSE (g/hL)	COMPOSITION	PROPERTIES
HARVEST	Sulfiting	BAKTOL P	10 g/hL	Effervescent potassium metabisulfite	Grape temperature < 20°C to limit maceration and oxidation
	HARVEST RECEPTION DIRECT PRESSING			T° < 20 °C to preserve flavors. Otherwise, use a harvest heat exchanger.	
	Controlling microorganisms	KTS CONTROL	5 g/hL	Chitosan	Allows indigenous microorganisms to be controlled, avoids excessive sulfiting
COLD STATIC SETTLING		Passage au froid	8-12°C		Ester production Specific enzymes for the rapid clarification of pectin-rich musts
	Enzyming	VIAZYM CLARIF +	100 to 150 NTU 1-2 mL/hL	Pectinases	
	Fining (poured)	PROVGREEN PURE MUST or PROVGREEN L170	10-25 cL/hL	Pea proteins	Affects oxidized polyphenols, good compacting of must deposits Helps protein stability
	Fining (pressed)	POLYGREEN	40-80 g/hL	Compound based on pea proteins	Affects color, bitterness and astringency
	Racking	NEO CRISPY	20 g/hL	Yeast derivatives	Reducing antioxidant compounds (GSH, peptides): avoids changes to tint and protects flavors, freshness. To be added quickly, as soon as the settling process ends
AF	Yeasting	SO.DELIGHT	20 g/hL		Yeast with transferase activity (ester production) gives very aromatic wines T° AF =14°C / 16°C mid AF / 20°C where d<1010
	Nutrition	NUTRICELL FULLAROM	20 g/hL	Yeast derivatives, amino acids	Control of AF, amplified ester production and improved volume on the palate. To be added during yeast inoculation
	Tannin addition density -15 points	SUBLIWHITE	5-10 g/hL	Condensed tannins, gallotannins	Antioxidant, reinforces floral character and citrus notes
	Oxygenation density 20	O ₂	8 mg/L	O ₂	Sterol biosynthesis, increased yeast viability. Option of doubling dose if PA is high
	Nutrition at mid-AF End AF / d<1000	NUTRICELL FINISH	20 g/hL Full vats	Compound based on yeast derivatives	Difficult AF: detoxification of conditions, prevents stopping and reactivating AF Avoids oxidation of wines
END AF	Racking D+3	SO ₂	Active SO ₂ = 0,6 mg/L 1 x / per week	Potassium metabisulfite	
FINING		PROVGREEN PURE WINE	5- 10 g/hL	Pea proteins	Effective clarification of wine, good compacting of lees
		KTS CLEAR	10-20 g/hL	Compound based on chitin-glucan	Clarifies and improves organoleptic cleanness

A protocol Red, traditional maceration



	STAGE	PRODUCT	DOSE (g/hL)	COMPOSITION	PROPERTIES	
VAT FILLING	Vat inertion	CO ₂	Tapis gaz 40 cm 3 à 5 g/hL	CO ₂ (g)	Protection against oxidation	
	Sulfiting	BAKTOL P		K Metabisulfite	Controls indigenous microorganisms	
	Enzyming	VIAZYM EXTRACT	2 mL/hL	Pectinases and cellulases	Deterioration of cell walls to extract polyphenols, polysaccharides and aromas	
	Homogenization	Remontage	Volume cuve			
	Addition of tannins if vatting < 8 days	SIMILIOAK	0,2-0,4 g/L			Stabilization of color Improved volume, freshness and vanilla notes Tannin coating
		or SIMILIOAK TOASTED	0,3-0,4 g/L			Insufficient maturity. Protection of color and aroma, toasted notes, sweetness, erases vegetable character
	Yeast derivatives	NEO SWEET	20 g/hL	Compound based on yeast derivatives, rich in polysaccharides	Coating of hard tannins and increased volume on the palate	
Cold soak at D0		T° < 15°C / 3 j		Extraction of anthocyanins, tannins and aromas		
AF	Yeasting (D+2 if cold soak)	VIALATTE FERM R96	20 g/hL	Active dry yeast	Develops complex, spicy berry aromas T° AF = 25°C then < 25°C when d < 1020	
	Nutrition density 30 pts -> mid-AF	NUTRICELL MIDFERM	20 g/hL	Compound based on mineral nitrogen and yeast derivatives	Ensures the proper conducting of the end of the AF, oxygenates after addition to reinforce cell walls Prevents AF stoppages and reactivates AF	
	Tannin add density 15 pts	SUBLIRED	10 g/hL		Protects oxygen, increased mid-palate and reinforced berry aromas	
	Extraction (d > 1000)	d > 1040 pumping over d < 1040 pumping over Or punching down of cap before mid-AF	1 vol / d in 2 doses + O ₂ 0.5 vol / d in two doses (O ₂)	Proanthocyanidic tannins	Limits extraction to conserve freshness, fruit and color Avoids acetic souring	
	μoxygenation	O ₂	1 - 4 weeks	O ₂ (g)	To be managed based on the target product and wine structure	
	Devatting	Aeration	20-60 mL/L/month		Separation of lees and free-run/press wines Possible additional racking (+ 48h) Racking of press wines to avoid herbaceous tastes	
FINING	Inoculation (optional)	REFLEX MALO 360	Kit dose/hL	<i>Oenococcus oeni</i>	Works in difficult conditions (low pH, high ABV). Guarantees optimum fermentation and organoleptic results	
	μoxygenation	O ₂	1-3 mL/L/month	O ₂ (g)	Depending on taste	
		PROVGREEN PURE WINE	5-15 g/hL	Pea proteins	Flocculation of suspended particles, eliminates aggressiveness of tannins, brings roundness and suppleness	



SAS SOFRALAB - 79, av. A.A. Thévenet - CS 11031 - 51530 MAGENTA - France - Phone: + 33 3 26 51 29 30 - Fax: + 33 3 26 51 87 60

