

RED WINE Managing Green Characters

WHICH COMPOUNDS ARE RESPONSIBLE FOR GREEN NOTES IN WINE?

Most compounds that cause unwanted green notes in wine are synthetized by grapes and concentrated in the skins. These belong to two groups:

Methoxypyrazines: Responsible for herbaceous, green bell pepper, asparagus, pea and earthy aromas. Sensitive to heat, methoxypyrazines concentration can be lowered by thermo-treatment or/and high temperature fermentation.

C6 Compounds: Characterized by unpleasant green aromas such as tomato leaf and cut grass. Present in unripe grapes, these compounds can also be formed from unsaturated fatty acids though an enzymatic cascade.

HOW TO REDUCE GREEN CHARACTERS IN WINE?

- 1. Good **anti-oxidant protection** is necessary to limit the formation of more C6 compounds by enzymatic oxidation of lipids
- 2. Limit skin contact to reduce extraction of off-aromas: avoid cold soak and extended maceration, press early and promote a fast fermentation
- 3. Compensate for the short skin contact with fast extraction of polyphenols using specific extraction enzymes
- 4. Eliminate some green compounds with heat: thermo-vinification or high temperature fermentation
- 5. Proper yeast nutrition strategy:
 - Nutriferm Arom Plus provides essential nutrients for proper yeast development and aromatic precursors at inoculation
 - **Nutriferm Advance** to help yeast with resistance to stress and reduce production of H₂S (add at 1/3 sugar depletion)
- 6. Promote color intensity and stability by promoting condensation and co-pigmentation reactions
- 7. Balance wine mouthfeel with mannoproteins and fermentation tannins
- 8. Mask some green notes during fermentation:
 - o Use of oak alternatives
 - Use of sulfur donor compounds (such as yeast derivatives rich in sulfur containing aminoacids and peptides) to promote the conversion of C6 compounds into thiol precursors



PROTOCOL

STAGE	OBJECTIVE	ENARTIS RECOMMENDATIONS	DOSE
Harvest/ Vineyard	Antioxidant	<u>AST</u> is a blend of ascorbic acid, gallic tannins and SO_2 for complete antioxidant protection. 100ppm of AST = 28 ppm SO_2 .	
Crush	Extraction Enzyme	<u>EnartisZym Color Plus</u> : Pectinase, cellulase, hemicellulase and protease activity. Improves polyphenol extraction, reduces instable proteins, improves filterability and pressing yield and helps color stability.	20-40 g/ton
	Tannins	<u>EnartisTan Fermcolor</u> protects polyphenols from oxidation, contributes to color stability and improves wine structure and aromatic complexity.	200 g/ton
Recommended analysis: Brix, pH, TA, YAN, Malic Acid, Microscan, pH and Acid Management Panel Reduce cold soak and skin contact to limit extraction of vegetal characters. Acid adjustments, brix adjustments.			
Inoculation	Nutrients	At inoculation, adjust YAN>150 ppm with complex nutrient. <u>Nutriferm Arom Plus</u> provides essential nutrients for the proper yeast development: amino acids, vitamins and mineral salts and aromatic precursors to enhance fermentation aromas.	300 g/ton
	Yeast	EnartisFerm ES488: S.cerevisiae with β-lyase activities. Increases varietal aroma expression, reduces green characters and promotes red fruit and spice notes. EnartisFerm D20: S.cerevisiae ferments at high temperatures, promotes polyphenol extraction and respects terroir characters.	200 g/ton
	Polysaccharides	EnartisPro Blanco : Yeast cell wall polysaccharides rich in sulfur-containing peptides. Acts in synergy with EnartisFerm ES488 to transform C6 compounds into thiolic compounds. Promotes varietal aroma production, reduces green characters and balances mid-palate.	400 g/ton
Fermentation temperature: 25-30°C (77-86°F) with ES488; 32-35°C (90-95°F) with D20			
1/3 Fermentation	Yeast Nutrients	Nutriferm Advance : Organic and inorganic nitrogen, yeast cell walls rich in sterols, fatty acids and cellulose. Helps yeast with stress resistance, detoxifies wine, ensures complete fermentation and reduces production of H ₂ S.	300-500 g/ton
	Oxygen	Enartis MicroOx or pump-over.	10 mg/L
	Tannins	Enartis Tan Red Fruit: Condensed tannin extracted from red fruit trees. Rich in precursors which enhance fruitiness and mask green character.	100-200 g/ton
Recommended analysis: Alcohol, Residual Sugar, pH, TA, Malic Acid, Microscan Press early and rack from heavy fermentation lees toward the end of the fermentation			
Malolactic Fermentation	ML Nutrient	Osmobacti: Regulator of osmotic pressure and activator of ML fermentation. Increases survival rate of ML bacteria and helps them adapt to difficult conditions.	2 g/hL
	ML Bacteria	<u>EnartisML Silver</u> : Oenococcus oeni strain which ensures complete ML fermentation and enhances red fruit characteristics to aid in masking green notes.	
	Polysaccharides	Enartis Surli One : Contributes to protein, tartrate and polyphenol stability. Enhances volume and aromatic complexity.	20 g/hL
Recommended analysis: Alcohol, Residual Sugar, pH, TA, Malic Acid, Microscan Rack from lees + add 5 g/hL EnartisStab Micro M + SO 2			

The above is achieved to the best of our knowledge and experience. The industrial application of the advice provided does not imply any responsibility on the part of our company.