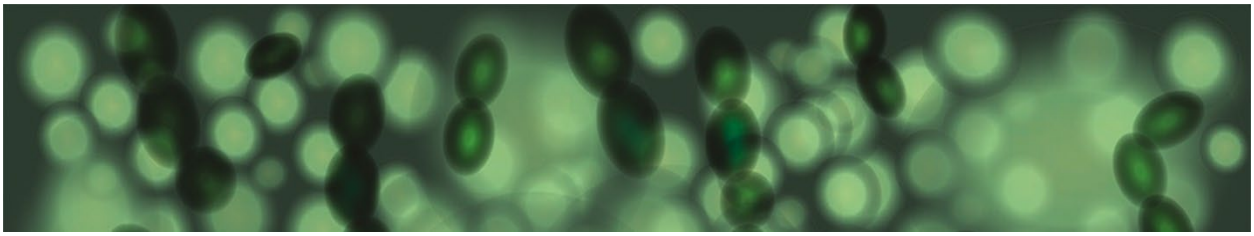

LACTOENOS™ – your insurance policy against biogenic amines

Biogenic amines… the oft cited cause of headaches, and wine-related illness. But where exactly do they come from, what do they do, and how can you adapt your winemaking practices to ensure that your wines remain as free of histamine, tyrosine, or (heaven forbid) putrescine as possible? Read on.

Origin in wine

Biogenic amine formation requires three components:

- Amino acid precursors
- Lactic acid bacteria [LAB] with the genes coding for decarboxylation enzymes
- Favorable conditions – pH, temperature, no/low SO_2

In short, they are the products of lactic acid bacteria interacting with amino acids, and wine presents a very favorable environment. LAB produce specific enzymes to decarboxylate the amino acids, which are then converted to biogenic amines. There are many biogenic amines, but the two most culpable in negative health effects are histamine and tyrosine, both of which can be produced in wine.

Effects of ingestion

Though biogenic amines play a part of certain important biological processes, relatively low concentrations can induce strong reactions – allergic response, abdominal cramps and diarrhea, swelling, seizures, and rapid heart rate to name a few. The body begins to mount a response to histamine at 25-50 mg, and a dose of over 70 mg histamine is considered poisonous. What's more, alcohol decreases the efficiency of your body's own protective enzymes and makes these amines more permeable to gut membranes. Red wines tend to have higher levels of biogenic amines, owing to malolactic fermentation [MLF] and higher pH.

Not all biogenic amines are bad, though. Tryptophan is the precursor to both tryptamine and serotonin, the former often credited here in the US for drowsiness after the Thanksgiving meal, and the latter being an important neurotransmitter.

Practical recommendations to keep your biogenic amines low

Knowing what you're working with is the first step in controlling production of biogenic amines. If you suspect you've got high loads based on fruit quality, sending off a sample to ETS for Scorpions analysis or running in-house testing will give you a good sense of the effort you'll need to put towards management.

Sanitation and SO2 are our stalwart partners in controlling not only biogenic amine production, but also many of the other challenges that winemakers face daily. Adding sulfur at the appropriate times, and maintaining your sanitation regime are the first steps.

Lowering the pH of your must, if it is high, can go a long way towards controlling biogenic amine production.

Since the main culprit in wine is lactic acid bacteria, what can we do? Quite a lot!

First of all, every **LAFFORT® LACTOENOS™** bacteria lacks the genes necessary to produce the enzymes responsible for the creation of biogenic amines. Before we'll even consider a bacteria, it has to clear this bar: **no biogenic amine production**. Check out the chart below to determine which **LACTOENOS™** strain is best-suited to your particular needs.

SPECIFIC STRAIN CHARACTERISTICS

● Red ● White ● Rosé		LACTOENOS® B7	LACTOENOS® BERRY	LACTOENOS® 450	LACTOENOS® B16
INOCULATION METHOD		*Direct*		*PreAc*	STARTER
SENSORY PROFILE		Aromatic complexity	Fruit freshness	Neutral, respect for fruit character	Neutral
WINE TYPE		●●●	●●●	●●●	Sparkling low pH
PHYSICO-CHEMICAL PARAMETERS	ALCOHOL (% Vol)	≤ 16	≤ 16	≤ 16	≤ 14
	pH	≥ 3.2	≥ 3.2	≥ 3.2	≥ 2.9
	TOTAL SO_2 (mg/L)	≤ 60			
	TEMPERATURE	≥ 16°C (≥ 61°F)			
TIME OF INOCULATION	CO-INOCULATION*	√			
	SEQUENTIAL	√			

Of course, you may have LAB tagging along from the vineyard with your grapes, or lurking in your cellar. Co-inoculation with a **LACTOENOS™** product will allow our amine-free bacteria to gain a strong foothold in your must or juice to outcompete the nastier strains that do produce biogenic amines. The added benefit of finishing MLF earlier will mean that you can sulfur your finished wines sooner, and breathe a sigh of relief knowing that you're protected from further microbial growth.

LYSOZYM is effective against gram-positive bacteria, including LAB. Keep in mind that *Oenococcus oeni* is also gram-positive, and if remaining vegan is a concern, **LYSOZYM** is not for you.

If you find yourself with high LAB loads in your finished wine, filtration can be an effective means of reducing the bacterial population that's causing biogenic amine production. Check post-filtration to ensure that you've eliminated or significantly reduced your bacterial load.

Unfortunately, chitosan is effective against some, but not all, *Pediococcus* and *Lactobacillus* strains. It has a regrettably devastating effect on *Oenococcus oeni* with over 80% of strains negatively affected by its presence, so use only after MLF completion. It does have its place in winemaking, though, as it can be quite effective against *Brettanomyces.* Keep **OENOBRETT™** in mind should you need a tool in this particular fight!

Conclusions

In the hustle and bustle of harvest, biogenic amine production is rarely front of mind. However, the steps you take during this time can be meaningful to your customers, whether they understand the science behind it or not. We're in the business of bringing pleasure to our customers, and a bottle free of headaches is part of the enjoyment.

LAFFORT

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