Institute for Continental Climate Viticulture & Enology

College of Agriculture, Food and Natural Resources

Enology News & Notes

Introducing . . .

Dear Wine Industry Friends,

By way of introduction, I am the Enology Extension Associate with the ICCVE (Institute for Continental Climate Viticulture and Enology); my name is Michael Leonardelli. I was born and raised in St. Louis, and have spent the last 18 years in North Carolina. I recall fondly our day trips during the 1980's and early 1990's to Augusta and Hermann, as Missouri's wine industry was in its early post-prohibition growth phase. As wine enthusiasts, my wife and I investigated North Carolina's wine industry, only to find few wineries - all geographically diverse (muscadines at the coast, one vinifera/American hybrid winery in the piedmont, and one in Asheville that to this day imports most of its winemaking grapes from California.)

Suddenly, in the late 90's, the NC wine industry began to exponentially expand; Golden Leaf (tobacco settlement) funding was available to convert tobacco fields into… vineyards! In 2010, both Missouri and North Carolina had roughly the same number of commercial wineries, but Missouri began its rebirth in the 1960's, while NC's comeback started in the late 1990's. As a wise instructor once said to me, to start a successful winery, one needs not only boatloads of cash, but also – instantly – 30 years of hindsight. If such hindsight - essentially the result of critically-evaluated trial and error - were available, then a new winery could save itself much grief and stress.

Missouri has been accumulating its 30 years of hindsight (indeed, it's never ending) and does not attempt to grow pinot noir on former tobacco fields. Very importantly, Missouri has made a commitment to its wine industry by establishing the Missouri Wine and Grape Board that funds the ICCVE as a resource to further improve the quality of Missouri grapes and wines. Having entered graduate school at NCSU (MS in Food Science, with Brettanomyces, the wine spoilage yeast, as thesis topic), I was attracted to my position by Missouri's long-term financial commitment to its wine industry. I am very happy to return to the Midwest, and to serve as your Enology Extension Associate through the ICCVE.

One of my goals is to establish and maintain relationships with each and every winery in Missouri. My methods include winery visits, conducting workshops, responding to your emails and voice mails…and authoring *Enology News and Notes*. Each mailing will include technical content. I realize that some of you are large, well established, and may personally read scientific journals. Others - indeed most - wear multiple hats within their operations, are continually refining the basics, and benefit most from content that one may readily use, even if the content initially appears redundant. If you learn as I do, you know that redundancy is good: as you revisit a topic, you understand it to a greater depth than you previously did.

I look forward to meeting you, if not at the upcoming Missouri Wine and Grape Conference in St. Charles (February 4-7), then at your winery during my visits.

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Wine Faults

As the saying goes, "the nose knows." Below and on the following pages is a spreadsheet that organizes by categorical source, the chemical compounds that generate unpleasant aromas in wine.

The objective here is to train your nose to recognize the various faults. There are two versions listed – the "kitchen version" and the "lab standards." If you are new to olfactory analysis, I suggest you use the kitchen version. Use the ratios listed on the spreadsheet, e.g. ½ teaspoon of vinegar to ½ cup of wine. If you easily detect the acetic acid, then try ¼ teaspoon in ½ cup of wine, 1/8 teaspoon in ½ cup of wine, etc., to familiarize yourself with the wine fault identification at lower concentrations.

If you are experienced with this type of analysis and have access to the chemicals listed, then I suggest a "calibration" of your nose with the standards, as listed.

Category	***Oxidation***	***Oxidation***	***Oxidation***	***Sulfur***	***Sulfur***
Chemical compound	ethyl acetate	acetic acid	acetaldehyde	sulfur dioxide	hydrogen sulfide
Kitchen Version: Add this amount	2-6 drops nail polish remover	1/2 tsp vinegar	2 tsp sherry	strike 1 wooden match, blow out, and drop head into wine	characteristic smell of hard-boiled egg yolks
to this Wine volume	1/2 cup	1/2 cup	1/2 cup	1 ounce	aromatic only
Lab Standards: Add this amount	1 drop	1 drop glacial acetic acid	4 mg	0.5 mL of 5% SO2 solution (5 grams KMS in 100 mL H2O	40-50µg = 50 ppb)
to this Wine volume	50 mL	50 mL	100 mL	100 mL	1000 mL
Typical off-odor associations	turpentine, paint remover, nail-polish remover	brake fluid, model-airplane glue, gasoline, vinegar	cool, wet, closed, moldy, freshly-painted room, shellac, dirty shower, musty/mildew	tide pools, exposed mud flats, matches, cigarette ashes, working in a darkroom	rotten eggs
Note:	g = grams, mg = milligrams, µg = micrograms, ng = nanograms			ppm = parts per million, ppb = parts per billion, ppt = parts per trillion	threshold: 3 - 50 ppb
Source; Recommended Reading:	The University Wine Course, pub: The Wine Appreciation Guild	The University Wine Course, pub: The Wine Appreciation Guild	The University Wine Course, pub: The Wine Appreciation Guild	The University Wine Course, pub: The Wine Appreciation Guild	Wikipedia

Wine Faults, cont.

Category	*Lactic Acid Bacteria*	*Lactic Acid Bacteria*	*Lactic Acid Bacteria*
Chemical compound	hexadienol (2,4-hexadien-1-ol)	2-ethoxyhexa-3,5-diene (an ether)	Diacetyl
Kitchen Version: Add this amount	geranium leaves	geranium leaves	microwaved "buttered" pop-corn
to this Wine volume	aromatic only	aromatic only	aromatic only
Lab Standards: Add this amount	20-100 mg	100 ng = 0.1 µg = 0.0001mg	5g
to this Wine volume	1000 mL	1000 mL	1000 mL
Typical off-odor associations	The final compound has an odor reminiscent of geranium leaves with a reported sensory threhold of 100 µg/L	crushed gernaium leaves, with threshold of 100 ng/L (ppt)	intensely buttery, or butter-scotchy
Note:	"a result of sorbic acid decomposition, i.e. the reduction of sorbic acid to sorbyl alcohol; threshold = 0.1 mg/L, or (100µg/L)"	ppm = parts per million, ppb = parts per billion, ppt = parts per trillion	threshold: 0.2 mg/L in whites; 2.8 mg/L in reds, per Swiegers (*)
Source; Recommended Reading:	(*) Swiegers, Bartowsky,Henschke & Pretorius, Australian Journal of Grape and Wine Research, "Yeast and bacterial modulation of wine aroma and flavour", pp. 139-173 (Vol 11, #2, July 2005)	Fugelsang: Wine Microbiology; Springer Press	Wikipedia

Wine Faults, cont.

Category	*Environmental*	*"Brett"*	*"Brett"*	*"Brett"*	*"Brett"*
Chemical compound	methoxypyrazine: 3-isobutyl-2-methoxypyrazine ("IBMP")	4-EP 4-ethylphenol)	4-EG (4-ethylguiacol)	4-ethyl cate-chol	isovaleric acid, aka 3-Methylbutanoic acid
Kitchen Ver-sion: Add this amount	green pepper	bandaids	intense cloves	sweat	rancid cheese
to this Wine volume	aromatic only	aromatic only	aromatic only	aromatic only	aromatic only
Lab Stand-ards: Add this amount	50 ng = 0.05 µg	0.23 mg	0.047 mg		0.75 mg
to this Wine volume	1000mL	1000mL	1000mL		1000mL
Typical off-odor associa-tions	bitter herbaceous, green bell pepper, rancid peanut butter, cat urine	band-aid, burnt plastic	smoky, spicy, clove	sweaty, horsey	rancid, cheesy, vomit
Note:	Fruit concentrations range from 0 to as much as 35 ng/L; detection level is low, 1-2ng/L. Presence increases perception of tannin inten-sity and astringency, thus magnifying sense of acidity, causing perception of fruiti-ness to decrease.			Note: 5g costs $300; cost pro-hibitive at this time.	
Source; Rec-ommended Reading:	American Journal of Enolo-gy and Viticulture, 2004, Vol 55 # 3, p. 276				Nykänen & Suoma-lainen: Aroma of beer, wine, and dis-tilled alcoholic bev-erages, p. 325

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