



FOCUS ON FLAVORS: THOMAS HENICK-KLING REFLECTS ON 19 YEARS OF ENOLOGY RESEARCH & EXTENSION

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Thomas Henick-Kling moved to Australia in January 2007 to take a new position as Director of the National Wine and Grape Industry Centre at Charles Sturt University in Wagga Wagga, New South Wales. His research and extension program in enology has had an enormous influence on the wine industry in New York and the USA. While growers know that winemaking is important, most don't have an understanding of the technology involved, and how it has changed since 1987 when Thomas started his program. I asked Thomas to explain what technologies winemakers have adopted and how these technologies have influenced wine quality.



What was the starting point for your program?

The overall goal was to focus on varieties, growing and winemaking practices that will produce unique wines of exceptional quality that fit our climate, justify a higher price, and bring a decent return to growers and wineries. It's clear that New York can't compete in the low price, bulk wine market like California, Australia or South America. We needed to focus on varieties and styles

that fit our unique cool climate. There were some wines with outstanding quality that showed that potential 20 years ago when I came. Riesling and Cayuga White, for example. Pinot Noir was another one. My colleague in viticulture, Dr Bob Pool had started a variety and clonal evaluation trial before I came to Cornell.

Screening varieties and clones with Bob Pool and Bruce Reisch has been a major, ongoing task. What role did the winemaking part have in evaluating these varieties and clones?

As I mentioned, Bob Pool had started a Pinot Noir

clonal trial. Our evaluations of these clones identified clones PN Mariafeld, 113, 115, and clone 'V' that produced outstanding flavors in our climate and were well adapted to commercial production in the Finger Lakes. We also have a good group of Chardonnay clones from Bob's Chardonnay trial. Lemberger, which Bob had planted in with the Pinot Noir, had interesting characteristics that fit well in New York. It starts ripening earlier than other reds, producing very attractive berry, plum and earthy flavors, a full body and very good color, and it doesn't hold on to the 'green' flavors like Cabernet Sauvignon and Cabernet Franc. It hangs longer than some other varieties and makes excellent, full-bodied wines. It also is a very good blender with Pinot Noir, Cabernet Franc and Cabernet Sauvignon. Even if it's underripe, it makes lighter, but still pleasant wines. Several wineries have planted Lemberger and are making varietal wines or using it as a blending tool.

In collaboration with Bruce Reisch, I set the goals of the grape breeding program to focus on expanding the range of flavors beyond what was available from the existing hybrids. We already had Cayuga White, with favorable vineyard characteristics, and very attractive flavors from barely ripe to 17-18° Brix. Cayuga fits into a variety of styles, from dry to sweet, and is also a very good blender with other varieties. We knew we didn't need something similar, so the breeding objectives were to look for other hybrids with similar vineyard characteristics (disease tolerance, winter hardiness) that could produce different flavor profiles. We looked for Gewürztraminer-like, Muscat-type, and Chardonnay-type flavors. The program has released varieties with these flavors - Traminette, Valvin Muscat, and Chardonel. In our grape variety evaluations we conducted trials to find out what winemaking techniques would allow the wines to express these flavors.

With the red grape varieties, I realized we needed to change the winemaking practices used to screen new selections. Red wines used to be made in very small lots, with standard SO₂ and yeast additions and no temperature control. The wines often came

out thin and green, with poor flavor expression. We started using larger volumes, temperature control, different yeasts and malolactic fermentation. Once we changed techniques, we found red selections in the breeding program that had nice tannins and mouthfeel. NY73.0136.17 and NY70.0808.10 [Recently released Noiret and Corot Noir] had been here and tested, but never selected because the winemaking techniques didn't express the flavors and tannin textures. Their tannins and mouthfeel, along with nice berry and plum flavors make them superior, and quite different from current red hybrids planted in the Finger Lakes.

These new Cornell varieties give wineries in the Finger Lakes a wide range of flavors to work with - ones that weren't previously available to them. They make a nice addition to the premium *vinifera* wines, and allow wineries to make lower-priced wines with different flavors.

Now that we have these varieties, the next step is to produce ones with much greater disease resistance. During our collaboration I encouraged Bruce Reisch to establish a 'no-spray' block to find highly disease-resistant selections with similar wine qualities.

How has winemaking changed? What are the key practices and technologies that have been adopted by winemakers?

We focused on winemaking techniques to express the diverse flavors. Two key ones are malolactic fermentation and heat treatment for red wine fermentations. Small wineries often fermented reds in one-ton grape bins with no temperature control, and many didn't use malolactic fermentation. The result was often thin, pale red wines, lacking flavor, and texture. *Saccharomyces* yeast doesn't grow well at 10° C (50° F), and this gives a chance for other microorganisms to grow and impart off flavors. By warming the must to 20-25 ° C (70-75°F), winemakers could ensure that *Saccharomyces* yeast predominated, and avoid growth of spoilage micro-organisms. Malolactic fermenta-

tion, used with both reds and some whites such as Chardonnay, lowers the wine acidity and improves mouthfeel. We have worked for many years with yeast and malolactic starter cultures manufacturers to improve the selection and functionality of yeast and bacteria starter cultures for wine. Winemakers now have access to appropriate starter cultures and techniques to monitor and use malolactic fermentation to produce better wines.

Another area where we did a lot of work was in using different yeast and malolactic starter cultures to enhance certain wine flavors. We first did small scale trials in our experimental winery to see if they would result in different wine flavors. They did, and we moved on to cooperative trials in wineries with commercial sized lots. Winemakers adopted these quickly, and I feel that NY winemakers are perhaps more knowledgeable about which strains to use under certain conditions than are winemakers elsewhere.

We also did a lot of work with yeast nutrients. We did extensive surveys across NY that showed that the content of yeast available nitrogen (YAN) was low. This lack of nitrogen results in stressed yeast that produce reduced sulfur off-odors and stuck fermentations. As winemakers added yeast nutrients (Diammonium phosphate or DAP and other nutrients such as Fermaid and Yeast Superfood), the incidence of reduced sulfur (stinky wines) went down dramatically, and there were fewer stuck fermentations.

The only common problem causing stuck fermentations that remains is the imbalance of glucose/fructose towards the end of fermentation. *Saccharomyces* yeast prefer glucose to fructose. In some cases they deplete the glucose so fast that only fructose (a different form of sugar) remains, and fermentation stops. When winemakers have tried to restart and failed, they send us a sample to analyze, and it's almost always the glucose problem. I learned from my colleague and long time collaborator, Dr Jürg Gaffner [Swiss Federal Re-

search Institute, Wädenswil] that adding glucose can restart these stuck fermentations. There is also a newly selected yeast strain of *Zygosaccharomyces* that can ferment fructose and can restart these fermentations.

Atypical aging (ATA) of white wines is another major area where we have identified a problem and have started to do something about it. It is very important that we have been able to show [through a vineyard trial] that drought stress is a problem in NY State. I just retasted 2001 wines from our ATA trial, and after four years there are still consistent differences between the irrigated and non-irrigated blocks, and those we treated with ascorbic acid or not. The 'irrigated' wines still had more flavor ripeness, and those treated with ascorbic acid are holding up- even after four years. The ones which had no ascorbic acid added are not. There is still more work to be done, but we have a better handle on it, and should be able to produce more consistent wines from year to year - particularly in those drought years.

The New York Wine Analytical Laboratory that Ben Gavitt manages is a service your program started in 1988. How did this influence your overall program?

We started this service because many small wineries didn't have the capacity to do even routine wine analysis needed for winemaking. We process about 460 samples each year. Most are sent to us when winemakers realize they have a problem - it would be better if samples were sent earlier, before problems become apparent. That way corrections could be made earlier for better wine quality. This service is valuable to us, because it gives the program a good idea of what problems are out there. We learn from it, and it gives us information for research projects and extension advice. The winemakers that send in samples get the numbers, and they also get a lot of advice.

What will you be doing in Australia?

I will be responsible for strengthening the research program at the National Wine and Grape Industry Centre. Charles Sturt University has an undergraduate program of 600 students. Faculty are primarily involved in teaching these students, but there is also a State-run research unit there. With new funding, the University will be hiring 10 to 15 people to add to their research capacity, both in Viticulture and Enology reaching a number of about 30 scientists. I'll be involved in overall research planning, hiring, facilities planning at the Centre, a link in industry relations, communication with funding agencies, and long term strategic planning with the Australian wine industry.

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