



## Terroir and precision viticulture: Are they compatible?

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The authors question the utility of the concept of “terroir”, and its compatibility with Precision Viticulture.

- We know that, within a single vineyard, yields can vary by as much as 10-fold. This, in turn, is believed to affect fruit quality. In the past, growers and winemakers have had to treat this variation as “noise” and manage the blocks as if they were uniform. But today, Precision Viticulture allows us to quantify this variability, to locate it precisely, and to react to it.
- The authors asked themselves the following question: “Does the wine from a vineyard reflect a) the terroir from that particular vineyard, b) the terroir from that particular region (Malborough), or c) the terroir from that country (New Zealand)? If the answer is the former (the particular vineyard), is the wine reflecting a) the gravel soil that prevails in this particular vineyard, b) the silty areas that dissect it, or c) both? When talking about a particular vineyard’s terroir, is it sensible to ignore the differences within the vineyard?” In this paper, the authors compare 2 contrasting vineyards to try to gain some insight into these very tough questions.
- Let’s call our study sites Vineyard A (Shiraz, own roots, South Australia), and Vineyard B (Cabernet Sauvignon, own roots, North-West Victoria). The soil in **Vineyard A** (10.6 acres) is a mix of red and black sandy clay loams (the black predominates in a deep hollow in the center, while the red predominates in the rest of the block). Mean, maximum and minimum temperatures are 28°C and 12°C (82°F and 54°F), and annual rainfall is 500 mm (20 in). In contrast, **Vineyard B** (20.2 acres) has a “duplex” soil: a sandy topsoil (20-70 cm) and a calcareous clay subsoil. Maximum and minimum mean temperatures are 32°C and 16°C (90°F and 70°F), and annual rainfall is only 290 mm (11.5 in). (We can think of Vineyard B as a typical warm, dry-region vineyard where irrigation is necessary. Vineyard A, in contrast, uses irrigation to complement annual rainfall).
- For each vineyard, the authors collected: 1) a **Plant Cell Density index** (a ratio of reflected infrared to red light), which is a measure of vine vigor; 2) a **yield map** (using a mechanical harvester retrofitted with a global positioning system). Additionally, the authors collected a number of 3) **“on-foot” vine measurements** (yield, cluster number, berry weight, Brix, pH, TA, juice color, juice phenolics). The vine sampling strategy used was different for both vineyards. Whereas for Vineyard A the sampling was based on “soil zones” (black or red color of the soil), for Vineyard B the sampling was based on “vigor/yield zones” (plant cell density map and yield map). Finally, 4) the authors harvested fruit at 24 °Brix from each vineyard to perform **small-scale winemaking** (50 kg in triplicate).
- **Results. Vineyard A.** Vines in the deep hollow of this vineyard (black soil that remained moist longer and acted as a natural drainage) had higher vigor and higher yields. They also showed greater bunch and berry weights. As for the fruit composition, it had the lowest maturity, compared to the rest of the block, and significantly lower levels of color and phenolics. The winemaker’s assessment of the fruit immediately before harvest was that the quality in this hollow was sufficiently lower than the remainder of the block to warrant a separate harvest destined for a lower bottle price point (\$14 vs. \$24.50 for the remainder of the block).

- **Vineyard B.** The authors observed similar differences here as for Vineyard A regarding vine performance and fruit quality between low- and high-yielding zones. The authors also used a trained panel to perform descriptive sensory analysis of the wines originating from both yield zones. The wine from the low-yielding, low-vigor zone -on higher ground with shallower, sandier soils- were perceived as having greater color, greater overall aroma, and greater pepper, spice, and tobacco flavors. The wine from the high-vigor zone –deeper, more clayey soil portion-, was characterized as having a more earthy aroma, and a weaker aftertaste.
- In 2004, the authors planted a cover crop (lucerne) in the hollow portion of Vineyard A , to see if it was able to “pump out” some of the excess moisture. No benefit was observed in 2004 or 2005. However, the 2006 yield map did show that the lucerne had produced a significant benefit in the areas where it was planted. This map also showed that the high yield/high vigor zone had shrunk considerably compared to its 2004 size. This result is particularly interesting to the authors because it suggests that at least some components of terroir (in this case, soil moisture) may be manageable.
- The authors summarize their results like this: “Overall, the terroir of both vineyards is spatially variable, and this variability is matched by variations in the wines produced from different zones within them”. And add: “It is ironic that in Old-World countries where great importance is attached to terroir, its impacts have, in the main, only been considered at regional scales]. As a consequence, few cause-and-effect relationships between soil/land and wine characteristics have been established”. (...) “Vineyards producing wines that are deemed characteristic of a region, may in fact be capable of producing quite contrasting wines” [my emphasis]. This is quite a thought-provoking, yet easy-to-read paper.

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