Summary 32

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Title: **"Developing highly coloured grape selections for cool climates"**

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This is an update on ongoing grapevine breeding work that seeks to develop high-color varieties mostly for cold regions. It is also a study of the anthocyanin composition of the promising varieties most recently developed.

• The Niagara Peninsula of Ontario (Canada) is a well-known viticultural area. Because of the very cold winters, cultivars are needed that will meet all of the following requisites: 1) withstand harsh climatic conditions, 2) resist pest pressures (both powdery and downy mildews, black rot, botrytis, and phylloxera), 3) have adequate color, and 4) do not impart unpleasant flavors (such as the "foxy" note (methylanthranilate) conferred by the *V. labrusca* parentage).

• In the past, many genetic grape varieties of value today were selected from open-pollinated material (sort of nature's breeding program). But today, all breeding work is performed by removing the pollen sacs of the grape hermaphrodite flowers (this is called emasculation), and applying previously selected pollen from desirable parents. Paper bags are then used to cover the pollinated clusters for the duration of the season to avoid further uncontrolled pollinations. Seeds are then extracted in the fall, dried, and planted. After vines have grown for one season in the nursery, they are planted in the vineyard the following spring. Eventually, the vines have grown enough for researchers to evaluate each selection by taking notes on vigor, winter injury, disease susceptibility, crop yields, and fruit quality. A long process!

• Let's look at a historical review of some breeding results using the above method. In 1961, *Veport* became the first cultivar named for its color properties (it was then used to make port). Even though it was adequate for port, the flavor was too "foxy" for table wines. So the vigorous American hybrid *Lomanto* was crossed with one of the most promising French hybrids (*Chelois*), and **Vincent** -with good color and non-labrusca flavor- was born. Another French hybrid (*Colobel*) was also being used for color, but the vines were too weak. So *Colobel* was crossed with *Lomanto,* and **Vintinto** was selected from the family of seedlings as having exceptionally high color. Finally, there was at the time a seedling of unknown parentage, **Bright's 12,** that also looked promising as it was a "tenturier" cultivar (red flesh). If one looked at the parentage of these crosses (provided by the authors in a table), one would notice a gradual reduction in the use of *V. labrusca* in a effort to improve flavor profiles, and a gradual increase in parents such as *V. rupestris, V. champinii,* and *B. berlandieri*).

• The 3 winning candidates, **Vincent, Vintinto,** and **Bright's 12**, were included in the current anthocyanin study by the authors, along with many other selections. As a reference, the authors also studied black currant and elderberry juices (we are talking color here!).

• The authors measured **total anthocyanins** by HPLC (high pressure liquid chromatography), and **total phenols** by the Folin-Ciocalteu method. After pressing the fruit, they subjected the juice to 63°C for 30 minutes (the authors don't mention it but this is probably done to mimic commercial juice pasteurization). Then they measured juice color by calculating **tri-stimulus values**, and **absorbance at 535 nm**. Finally, they calculated the presence of **monoglucosides or diglucosides** forms of anthocyanins (HPLC). This is important because many hybrids have diglucoside forms of anthocyanins, whereas *V. vinifera* varieties have only monoglucoside forms. The presence of diglucosides has become a tool to tell whether a wine has any proportion of hybrids, and many countries reject wine that reads diglucoside-test positive.

• **Results.** *Vintinto* showed the largest concentration of anthocyanins, topping the list of the 16 selections compared (603 mg/100g expressed as cyanidin 3-galactoside). For reference, Cabernet Sauvignon had 97 mg/100g. *Bright's 12* and *Vincent* also had high concentrations. Three new selections (called *family V6511*) also showed exceptionally high anthocyanins, topping the list after Vintinto. (In case you are wondering, blackcurrant and elderberry juices had around 300 mg/100g). A more detailed look at the anthocyanin quality showed that both Vintinto and Bright's 12 (unknown parents) shared with *V. vinifera* the trait of lacking diglucosides. Vincent, on the other hand, had mostly monoglucosides but also some diglucosides. This is in agreement with their parentage (Vincent is 20% v. labrusca, whereas Vintinto is only 6%).

In conclusion, the authors believe that the exceptional high anthocyanin content of *Vintinto* and *Bright's 12* presents an opportunity to exploit these selections either as natural colorants for the food industry, or as coloring cultivars for the wine industry. This might be of interest to those exploring highly-colored components in their wine blends. Even if growing conditions in a hot region were to reduce the anthocyanin level up to 6-fold, to pick a random amount, the levels in Vintinto wines would still exceed those in Cabernet Sauvignon!

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