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Phenolic content and antioxidant activities of white and purple juices manufactured with organically- or conventionally-produced grapes

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• This article is almost more a medical study than a winemaking one. Its originality consists of looking into something few have done before - the health properties of grapes, not wines. As we know, fruits and vegetables are a good source of antioxidants, such as ascorbic acid (vitamin C) and polyphenols. Grapes are particularly rich in polyphenols, and grape *juice* has been reported to prevent 1) platelet aggregation, 2) oxidation of DNA and LDL (low-density lipoproteins), and 3) coronary disease and atherosclerosis. On the other hand, there is great consumer concern about developing healthy eating habits, and many consumers are paying attention to the ways food is grown (conventionally or organically) and prepared.

• The current authors decided to investigate the link between the health properties of grapes and the way grapes are grown by measuring the **antioxidant capacity** and **polyphenol content** of juices from grapes grown either *conventionally* or *organically*.

• The grapes examined included the varieties *Niagara* (white) and *Bordo* (red). "Organic juices" from these varieties were obtained from one cooperative, and "conventional juices" were obtained from another, both located in Brazil. (The authors do not offer details about the organic practices, other than mentioning that pesticides were not used.) The extraction of the juice was slightly different depending on whether the grape was red or white. For the reds, the juice was heat-extracted using all parts of the berry, whereas for the white variety, the skin was removed before extraction. The juices were either extracted commercially or on a small pilot scale. After extraction, the juice was pasteurized (85°C) and bottled.

• The authors then measured *total phenols* (Folin-Ciocalteau colorimetric method), *antioxidant capacity in vitro* (radical scavenging activity) and *actioxidant capacity ex vivo* (inhibition of lipid peroxidation) of the various juices. *[Ex vivo refers to experiments done on living tissues but outside of the living organism. Instead, the organism's internal environment is mimicked as close as possible]*. The authors also measured other parameters often measured in medical studies.

• **Results.**
1) Organic juices presented higher **total phenols** than conventional juices;
2) Organic juices presented higher **resveratrol**, and higher **anthocyanin** content, than conventional juices;
3) Organic juices presented higher **ascorbic acid** than the corresponding conventional juices (with the exception of 1 in 4 juices compared);
4) There were no differences in ***in vitro* antioxidant activities** among the juices. All showed higher activities than a standard catechin solution. This activity was positively correlated with total phenol content and with anthocyanin content.
5) With the exception of one juice out of 6, all juices showed good **ex vivo antioxidant activities**. But the highest activity was that of a conventional juice, conventionally-grown Bordo grape extracted at small scale.

6) When the authors measured the activity of two enzymes related to antioxidant capacity (superoxide dismutase-like activity and catalase-like activity), an organic juice, Bordo, pilot extraction, showed the highest activity of the former, and a conventional juice, Niagara, commercial extraction, presented the highest activity of the latter.

I was rather shocked after reading these results. They are presented in a serious publication (Food and Chemical Toxicology) and one can't help wondering, "What is it in the organic practice that is causing all of these differences?" Here is the authors' explanation: "As pesticides are not used, plants are more susceptible to the action of phytopathogens, and this causes the plant to produce higher amounts of phenolic compounds as a means to defend itself". In summary, this study shows that grape juices elaborated from *V. labrusca* are a good antioxidant source, and that, if the grapes are grown organically, they are an even better antioxidant source (higher resveratrol, anthocyanins, and tannins). The implication for growers and winemakers? These differences in juices are likely to be passed to the resultant wines.

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