



## The Essence of Wine

Wow! Photosynthesis. Have you considered it recently while taking a breath or enjoying a glass of wine? Sugar is important to wine growers. It seems that around harvest time all we talk about is brix. While it is only one constituent of the maturity quotient, it is a vital one because alcohol gives wine texture and balance. But you probably haven't thought about how plants manufacture sugar since your high school biology class. It is truly one of the miracles of the natural world and a process that is so essential to what we do, it deserves our appreciation and respect. A new book called *Eating the Sun: How Plants Power the Planet*, by Oliver Morton, takes a close look at photosynthesis and how nature and human activity have collided resulting in climate change. I read a review of the book in *Onearth*, the magazine of the Natural Resources Defense Council and thought you might enjoy revisiting the wonder of photosynthesis. It will change the way you look at leaves and taste sugary grape juice forever.

Occasionally we read books that change the way we see the everyday world. A terrifying mind-bender is Cormac McCarthy's *The Road*. It's set in a post-apocalyptic world and the author does not eulogize culture as much as he does nature and the result is a profound sense of the fragility of trees and rivers and fish and our connection to the breath of life that starts with those things. The center of the novel is really about chloroplasts. By taking sunlight and carbon dioxide and making food and oxygen, these wonder machines inside plant cells enable the breath of life and all things we hold dear, from blue sky to the ocean breeze to "almost all the metabolisms on earth." Our future as a species (and certainly as wine growers) depends on photosynthesis and the delicate atmosphere it creates. It all comes back to carbon. The miracle of plants is that they can take this element out of inorganic stuff and make something organic with it: sugars, which provide the fuel that drives every life process on earth. To create this chemical energy, plants need carbon dioxide and hydrogen, which they get by splitting water into its elemental parts using energy from the sun. The waste product, luckily for us, is oxygen. Scientists knew this by the turn of the twentieth century, but then didn't really know how it worked.

It wasn't until the advent of particle physics that scientists could peer inside the photosynthetic process using radioactive isotopes. A big breakthrough came from a better understanding of photons – the energy particles that escape from the sun as the result of fusion reactions. Eight minutes after a photon leaves the sun it bumps into a green chlorophyll pigment inside a leaf. There it turns into usable energy by igniting an electron-transfer chain that splits water and creates sugar and oxygen. Through this process, replicated billions of times every day in billions of plants around the world, the earth breathes. Over 2.4 billion years, this process created the atmosphere that envelopes our planet today. Those clever little chlorophyll molecules don't just capture the sun's energy, they also concentrate it. In fact, they are far more efficient – 100,000 times for efficient – at using energy than the sun is at making it.

- Excerpted from *Let's Do What Plants Do* by Florence Williams. *Onearth*. Winter, 2009

If you are interested in learning more about how plants and in particular grapevines work, consider enrolling in the Oregon State University distance viticulture class offered by Dr. Patty Skinkis beginning in January. See OSU in this e-newsletter.

An excellent reference resource on grapevine physiology is *The Biology of the Grapevine*, by Michael Mullins. Cambridge University Press. 1996.

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December, 2008