

Low Chilling in 2013-2014 Causes Fruit Tree Problems

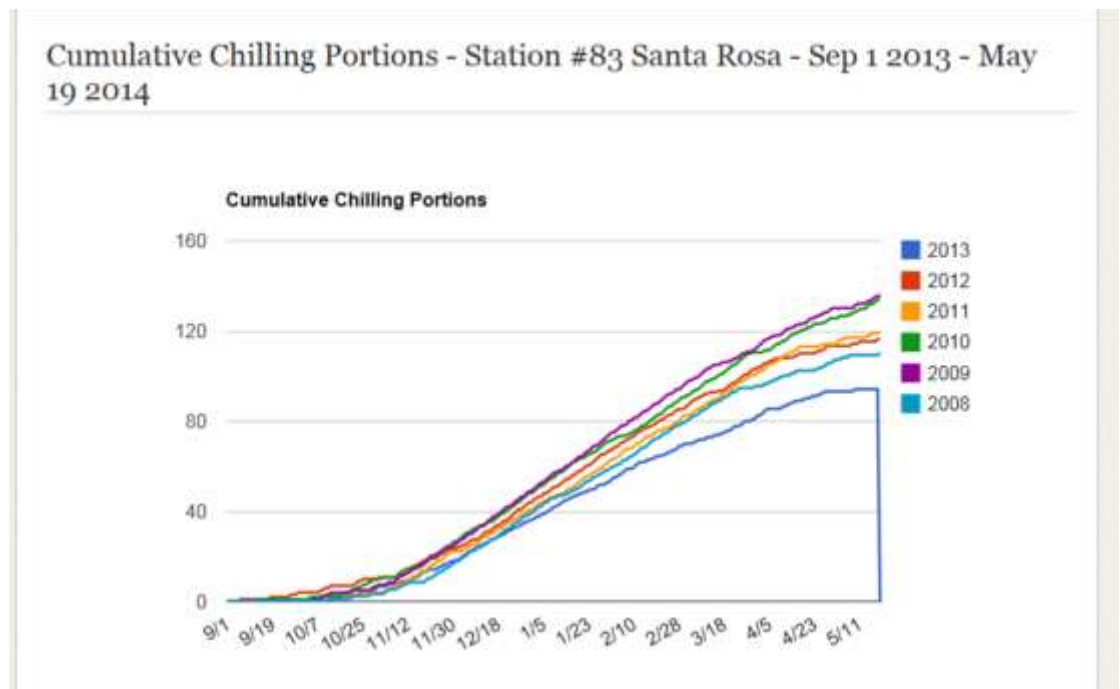
Paul Vossen

This spring as our fruit trees began to leaf out and grow most of us noticed that they were not flowering and growing properly. That is because they did not receive enough hours of chilling. Cool weather and short days in autumn cause most fruit trees, berries, and vines to lose their leaves and go into a state of dormancy, which protects them from winter freezes. Subtropical plants like citrus and olives do not lose their leaves, but they still have a short dormant or resting period. While dormant, trees will not begin to grow normally until they have received enough hours of cold temperature, below 45°F. This is called chilling. Chilling breaks down internal inhibitors and helps fruit and flower buds develop properly. A lack of adequate chilling can result in weakened trees, poor bud break, bud drop, spread-out bloom, poorly developed flowers, and even a complete lack of flowers depending on the type of fruit tree.

The number of chilling hours (below 45°F) required by fruit trees varies from about 100 for figs to over 1,000 for apples. It also varies by variety within each species. It is even more complicated than that. Using the old system of measurement, which just adds up the number of hours of temperatures below 45°F (November 2013 through February 2014) we had 1,339 hours in Santa Rosa. This is slightly above normal, as the historical average is about 1,200 per year with a range of 950 to 2,012 hours. Consequently, we would not expect to have seen any abnormal growth this spring, but we did. This occurred because not all chilling hours are equally effective and because chilling hours accumulated at night can be cancelled by warm daytime temperatures.

To make the chilling system more accurate and useful, several University of California and other fruit tree researchers around the world have been testing another chilling measurement model that places more emphasis on temperature portions between about 35°F and 55°F, which are more effective in breaking dormancy than colder temperatures. It also takes into effect the negation of chilling hours when temperatures

exceed about 60°F. This is because warm sunny days above 60°F, of which we had many this last fall and winter, reverses the portion of chilling obtained when it was cold at night. This system is much more accurate as can be seen in the following chart of chilling portions over the last five years. It shows that 2013-2014 was the lowest in chilling hours.





Some varieties of olives that need more chilling have only vegetative buds instead of flowers (photo Paul Vossen).



Bartlett pear flowering early on the cooler north side of the tree and later on the warmer south side (Photo Alberto Ramos)