Integrated Cranberry Crop Management for Wisconsin

Cranberry

Crop Management Newsletter

Volume XVIII
Number 9
Sept. 20, 2005

Contents:

FALL TO WINTER CRANBERRY HARDINESS

Protecting cranberry plants and fruit from freezing temperatures is a concern throughout the year. As temperatures fall as winter approaches growers need to pay particular attention to temperatures. However, as fruit mature, ripen and color develops their inherent hardiness increases.

Dr. Palta's lab at UW-Madison has researched the hardiness of cranberry fruit in the late summer and fall. They determined the lowest survival temperature (LST) for fruit at various stages of development. Their results are shown below.

Development stage	LST°F
Green (<0.5")	32
Green (>0.5")	30.2
Green-full size	26.6
<25% red	26.6
25-50% red	26.6
>75% red	26.6

These results suggest that cranberry fruit can tolerate temperatures approaching 27°F before significant injury occurs. 28°F is the typical critical temperature for other crops such as apples.

Once fruit are harvested the need to frost protect vines continues. From harvest through early December the ability of cranberry buds to withstand cold injury increases. Buds may withstand temperatures as low as -12°F in early December, but only 11°F in September. After the sprinklers are out of the beds it may still be necessary to watch frost and protect as necessary.

HARVEST PREPARATIONS

With the harvest season approaching many jobs are being done to prepare for the culmination of the 1998 season. Harvest is a hectic, yet an exciting time of year. Because so much activity takes place in a short period of time it is essential that careful planning precedes harvest.

Consider including equipment safety and training in your harvest preparations. Perhaps the first step is to take a look at the equipment you will be using for harvest. Make sure any original guards or shields are in place and functional. See if any additional guards or shields are needed. If guards or shields are not practical make the danger obvious by surrounding it with bright paint and a warning label. If people don't need

to be working near moving parts then put up a temporary barrier such as cones and tape to keep people out. Make sure employees have appropriate personal protective equipment as dictated by their work (safety glasses, gloves, hearing protection).

Where safety is concerned prevention is far preferred to recovery. Seasonal employees come onto the marsh for harvest and they may not be completely familiar with your operation and equipment so some training for the work they will be doing is essential. It is not a safe assumption that seasonal workers (or others) know about equipment safety, even if they grew up on a farm. Begin by demonstrating exactly what it is you want them to do (and not to do?). Make sure they know how to properly run any equipment they will operate and to point out any potential hazards with the equipment. If they'll be working around equipment they won't be operating make sure they know the hazards of that equipment as well. Make sure to ask questions to ascertain if they understand the instruction you have given them. You'll want to observe periodically to make sure appropriate procedures are being followed or have one of your supervisors do this task and then get a report back. Be aware of close calls as this indicates the need for equipment modification or more training.

Document the training that is given. Documentation could be as simple as a grid with employee names on the left side and training topics above each column. Have the employee initial for each training topic they receive. Perhaps most important, you must set a good example. If you do unsafe things your employees may well follow your example.

Teryl Roper, UW-Madison, Extension Horticulturist

No one is useless in this world who lightens the burden of it to anyone else.

Charles Dickens

DORMANCY

Growers and researchers alike consider cranberry dormancy. We use the term "dormant" frequently. This article will define dormancy in its various manifestations and attempt to explain what regulates dormancy and will describe how plants can and cannot be managed for dormancy.

Plants grow at different rates during different seasons. When the weather is unfavorable they limit their growth or cease to grow completely. This adaptation allows plants to grow from season to season and to survive drought or cold weather. Annual plants survive hostile weather by producing seed just before the onset of unfavorable weather. Although living, seed have a low respiration rate and can survive heat, drought, or cold and then germinate and grow once the weather is again favorable.

Perennial plants (like cranberry) have to take a different approach. Perennial plants have dormant buds that can survive through inclement weather and grow during the next period of favorable weather.

Dormancy is usually divided into three sub categories and these divisions have been given different names by different authors. I'll not name them in this article.

The first phase of bud dormancy begins in late summer to early fall when growth stops and terminal buds form. The weather at this time is usually satisfactory for normal growth, but it is thought that a combination of environmental cues (daylength, temperatures, spectral quality of light) and internal cues (levels of different plant hormones) trigger the cessation of growth. The onset of this first stage of dormancy can be delayed with heavy applications of nitrogen fertilizer, pruning, or other invigorating practices. At this stage of dormancy, uprights that are collected and rooted will not produce normal growth and

flowering. In cranberry, one sign of the onset of dormancy is the vines taking on the characteristic red coloration.

The second stage of dormancy occurs as the temperatures become colder in the late fall and through the winter. This dormancy is induced primarily through cold winter temperatures although some internal cues may also be functioning. The rate of respiration (oxygen use) plummets until the plants seem barely alive. Individual tissues are compartmentalized to prevent any ice formation (that is usually deadly to cells) from spreading from one tissue to another. During the second stage of dormancy plants are most hardy (least sensitive to frigid temperatures).

During the second stage of dormancy plants accumulate “chill hours”. This is commonly expressed as the number of hours below 40°F required to have normal growth and flowering in uprights. Cranberries require about 650 hours of chilling before normal growth can resume in the spring. However, this chilling must be followed by warm temperatures and long days. Interestingly, gibberellic acid (a plant hormone) could substitute for chilling. This mechanism prevents cranberries from resuming growth in the fall or too early in the spring before temperatures are sufficiently warm. This also prevents cranberries from being grown in subtropical to tropical regions, even if the soil and water conditions were acceptable.

The third stage of dormancy occurs in the spring after an appropriate number of chill hours have been received. The third stage of dormancy is characterized by plant growth being limited solely by external factors i.e. air and soil temperatures. Once temperatures are warm enough plant growth will resume normally.

Since a cranberry bed is composed of a population of uprights not all uprights in the population would be at the exact same stage of dormancy as all others. This is especially true during the transition periods between the stages of dormancy. Further, an upright can be deeply or lightly dormant within each stage.

The practical aspect of this discussion is that uprights become dormant slowly over time and that within a bed individual uprights are also becoming dormant at different rates. We know from research at the University of Wisconsin and the University of Massachusetts that cranberry buds and vines become more hardy as winter approaches. Before the winter flood is applied it is critical to watch the temperatures as the vines are probably not fully dormant and can be injured by low temperatures. We probably saw some late fall injury last fall as we had some cold snaps after harvest but before the winter flood was applied.

Research has shown that vine temperature under the ice stays pretty much constant at 28°F, regardless of the air temperature above the ice. Once cranberries are encased in ice it is unlikely for winter injury to occur. Not only are the vines protected, but they are at their hardiest stage and their rate of respiration (oxygen use) should be negligible. At 28°F vines should accumulate chill units quickly and be ready for the resumption of warmer weather in the spring.

In the spring once the winter flood is removed cranberry vines are kept dormant only by unfavorable temperatures. One the weather warms there should be no internal factors keeping the vines dormant. During this same period of time the vines lose their hardiness and once again frost protection becomes important. One sign of the loss of hardiness and dormancy is the loss of the red color and the vines once again take on a green cast.

Research to understand bud dormancy of perennial plants is difficult because so many

factors are potentially involved. It is almost impossible to control for all of them. Research to understand the effect of unusual winter weather (very cold, very warm) is also difficult because it is impossible to predict months ahead what sort of winter will be coming and it is also difficult to provide some sort of stable control that will allow for making comparisons.

Teryl R. Roper, UW-Madison, Extension Horticulturist

SPILL PREPAREDNESS

With harvest approaching now is the time to prevent oil spills and to have a plan for dealing with any mishaps that might occur. Except for crankcase oil in engines, all lubricants on harvesters should be food grade oils that are approved by the Food and Drug Administration. These are designated as H-1. Food grade oils have a residue tolerance of 10 ppm, non-food grade oil and fuel have a zero tolerance.

Have a spill kit handy to the harvest and cleaning operations. Make sure your spill kit contains: floating booms to contain the spill, absorbent materials to sop up the spill, worker protection supplies such as gloves and coveralls to protect workers, and containers to receive the spent absorbents and booms. Make sure you have a plan to deal with spills and that your employees and supervisors each know what their responsibilities are within the plan.

Inspect your crankcase housings for oil residues and evidence of leaks and clean them, and if necessary, install a pan to collect leaks. Inspect all hydraulic hoses, connections and power units for cracks, leaks and weak spots and replace those that may not survive the harvest season.