Pomology Notes – E-Newsletter
July, 2015

University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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Early Harvest Heads Up

When prune fruit show first color it's roughly 30 days to harvest. First color was showing in an early maturing area of Live Oak about July 1, so harvest should be early this year -- earlier than any time since 2004. This means that many important practices, including irrigation shut off, brown rot management and harvester maintenance/orchard prep will need to be done earlier than usual to avoid last minute scrambling as fruit softens later this month.

Preharvest irrigation water shut off

Properly timed irrigation cut off helps reduce 1) bark damage from shakers, 2) fruit dry-away ratio, and 3) premature fruit drop. Test fruit pressures weekly once fruit show "first color" and use that information to estimate harvest date and time preharvest irrigation cut-off. Fruit pressure drops 1-2 pounds/week, with hot weather slowing fruit softening and cool weather accelerating softening.

How long before harvest should irrigation be cut-off? UC research and experience shows that healthy prune trees can sustain water cut off for up to six weeks before actual harvest. Grower experience should determine when irrigation water is cut off in a specific orchard. Here are some points to consider:

- Wet orchards show the most premature fruit drop when predawn temperatures drop to around 50^{o}F.
- Flood irrigation increases orchard humidity, which can increase the risk of brown rot infection; the closer to harvest the higher the risk of brown rot. Earlier irrigation shut off may help reduce brown rot infection or spread of infection in some orchards.
- *Cytospora* disease cankers grow faster in water stressed trees compared to well-irrigated trees. Keep this in mind when planning irrigation cut off timing in older blocks with *cytospora* canker present. Longer cut off timing may be more beneficial in younger, stronger orchards.
- Potassium (K) moves more slowly in dry vs wet soil. If the crop is large and early irrigation cut off is planned, consider a K foliar spray as the soil gets drier during the cut off period to help the tree avoid leaf burn and other K deficiency symptoms.

Two shakes this harvest? Proceed with caution.

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter-Yuba Counties

It's a big crop with some sunburn, skin cracks and other fruit damage in many orchards. I have heard at least a couple of growers talk about double shaking – going through the orchard twice about 10-14 days apart. The first shake is supposed to be a light shake, removing only damaged and early maturing fruit that would otherwise be lost to fruit drop while leaving the remaining crop to increase sugar concentration and value. Fruit from the second shake is supposed to have a better dry away and, perhaps, P-1 report than if harvest was done with the traditional single shake. The goal is better delivered yield per acre and net increase in income.

This idea seems sound, and I know experienced growers have tried it with at least some success. However, double shaking should be approached carefully. The only written report I can find on the subject (http://ucanr.edu/repositoryfiles/1995-109.pdf-78983.pdf) shows that double shaking grossed $125 less per acre than a single shake -- before the added cost of an extra harvester pass was added in to the total cost. In this case study, the crop was very large (4.6 dry ton/acre) with a high dry away. See the fruit quality details below in the table. The first and second shakes started when average fruit pressure was 6.0 and 2.7 lbs, respectively, compared to 4.2 lbs. in the part of the orchard where one-shake was done. In this instance, the first shake removed too much immature fruit (57% of total crop) producing high dry away and very small fruit (10% undersize). Only 43% of the total crop was left in the trees to benefit from the extra time in the tree before the second shake.

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Case study results comparing double vs single harvest in a mature prune block in Fresno County, 1995. Average production was 4.6 dry ton/acre. From a research report by Steve Sibbett, retired UCCE Farm Advisor, Tulare County.

Shake timing	Harvest date	Starting fruit pressure (lbs)	Starting % fruit sugar	% crop removed	Fruit Dry Away Ratio	% Undersized Fruit
One shake	Aug 22	4.2	18.9	100	4.0	4.4
First shake of double shake	Aug 11	6.0	15.6	**57**	**4.7**	**9.8**
Second shake of double shake	Aug 25	2.7	19.5	43	3.3	5.5

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Based on these results, if double shaking is planned, it should be carefully managed to make sure only mature fruit is removed with the first harvest – or at least the removal of immature fruit is limited. Harvester operators must be coached to use only a light shake the first time through the orchard, and the harvest process carefully monitored so the operators don't drift back to the familiar hard shake used for single-pass harvesting.

Fruit Brown Rot Management at Harvest

Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter-Yuba Counties

Nurturing a valuable prune crop from bloom til harvest only to watch late fruit brown rot infection lower returns is like losing in the last minute after leading the whole game. To avoid this outcome and deliver the most profitable crop possible, understand the brown rot risk in an orchard and know how to select and use fungicides, where needed, and harvest timing to protect the crop.

Local and regional conditions influence fruit brown rot risk. Warm, moist/wet weather as fruit "sugars up" before harvest increases regional infection risk. Clustered fruit, more common in large crop years like this one, are more vulnerable to infection than exposed fruit. Fruit damaged by insect feeding, split fruit, etc. are much more vulnerable to brown rot infection than intact fruit. Orchards with high moisture microclimate due to flood irrigation and/or nearby flooded rice fields have higher fruit brown rot risk than those on drip irrigation away from flooded fields.

Effective fungicides properly timed (usually 1-2 weeks preharvest) and applied, can significantly reduce fruit brown rot infection. Click HERE for most current, free UC info on fungicide efficacy and timing. However, reducing fungicide damage doesn't always mean that brown rot will be eliminated. It is important to recognize that **the most effective, properly applied fungicide(s) do not eliminate brown rot infection in clustered, damaged fruit**. See the table below for more information on effective materials under what conditions. Bottom line: Use the best material for the job, but don't expect miracles under high pressure.

Select materials control control brown rot and manage disease organism resistance to fungicides. One fungicide applied 1-2 weeks ahead of planned harvest should be sufficient. But if you treated for fruit brown rot earlier in the year, use a different material preharvest. If you can't rotate between fungicide classes, rotate between active ingredients in a group. For example, in you have to use Group 3 fungicides on damaged, clustered fruit, rotate from Tilt® to Tebucon® or Tebucon® to Quash®. **Repeated use of the same active ingredient will increase resistance risk. Repeated use of the same active ingredient when the disease is present in the orchard will increase resistance risk the fastest.** Always tank mix two effective active ingredients once brown rot is found in the orchard. Think this cost too much? Imagine the cost of brown rot control if Tilt® or Elite® don't work!

Done right, a preharvest spray for brown rot control is the most challenging spray job in prune production. It is very important to use best spray coverage practices at this time. Drive slow, every row, to allow enough time for air from the sprayer fan to carry the pesticide throughout the tree. To figure out the proper sprayer speed (just slow enough to get the job done right), pick a windless time of the day and tie colored surveyors tape in the tree top interiors of the tallest trees in an orchard. Have someone drive the sprayer down the row at operating speed and pressure with the nozzles shut off, just the fan working. Watch the flagging. Does the fan air gently move the flagging from dead hang to parallel to the ground?

If so, that speed is OK for good coverage. If it doesn't move at all or only rustles very gently as the sprayer drives by, slow down and try it again until you find the speed OK for good coverage. If the tape stands straight out from the tree away from the sprayer, you are driving too fast and/or using too much air. Slow down until speed OK for good coverage is reached; where the flagging moves gently out parallel to the ground away from the sprayer as it passes. Shut off nozzles not pointed at the canopy.

Recent research by Dr. Jim Adaskaveg, UC Professor of Plant Pathology, supported by the California Dried Plum Board, has identified additional best practices for fungicide management of fruit brown rot infections. Excellent spray coverage on the fruit delivers the best brown rot control possible. A poor spray job will not get the job done and you will be out the cost of application plus helping along resistance. The following spray practices have been identified in Dr. Adaskaveg's research:

- Add 1-2 gallons of 415 spray oil per 100 gallons of spray solution (1-2% oil) unless the fungicide label specifically states not to use with oil (for an example, check the Merivon® label). The oil cuts the waxy bloom on the fruit, allowing the fungicide to stay on the target. Nothing else tested works as well. For example, effective fungicide plus 1.5% oil delivered 40-60% better brown rot control vs the same fungicide with 20 oz silicon/modified veg oil surfactant per 100 gallons of spray. [The oil changes the look of fresh fruit, but the dried fruit appearance is not changed.]

- Higher spray volumes deliver better fungicide coverage and brown rot control. For example, 160 gallons per acre (gpa) fungicide spray volume delivered as much as 20% better brown rot control vs 80 gpa using the same fungicide in both sprays.

Finally, not all markets will accept all fungicides labeled for use on prunes in California. Always check with your packer to make sure fungicides you plan to use are not on their "do not use" list. Not all packers use the same list. **Always read and follow the label.**

Brown rot infections spread with time. If warm, humid weather is forecast and clustered fruit are infected with brown rot, consider early harvest to stop the problem from getting worse. The worst thing you can do is to wait for sugar to come up in a block with a growing brown rot problem. Early irrigation cutoff may also help keep humidity down and prep an orchard for early harvest.

In conclusion, not all orchards need a preharvest fungicide. Effective fruit brown rot sprays are expensive in time, labor, fuel and material. Cheaper "insurance" sprays are often worth very little and might risk more in resistance development than is gained in disease management. Early harvest, unless needed to reduce brown rot spead, will cost growers in increased dry away and reduced fruit size. Growers should check orchard brown rot history, the weather forecast, and individual orchard conditions before making management decisions about fruit brown rot.

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Examples of fruit brown rot control efficacy by different fungicides on wounded and unwounded prune fruit at harvest. Data interpreted from 2014 research report by Dr. Adaskaveg available at: http://ucanr.edu/repositoryfiles/2014-48-155717.pdf

Fungicide (FRAC Group)	Efficacy on unwounded fruit	Efficacy on wounded fruit
Tilt®/Break® (3)	Excellent	Good
Elite®/Tebuzol® (3)	Excellent	Good
Quash® (3)	Excellent	Good
Quadris-Top® (3/11)	Excellent	Moderate
Merivon® (7/11)	Excellent	Poor to none
Fontelis® (7)	Excellent	Poor to none
Ph-D®/Oso® (19)	Excellent	Poor to none

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