



# your Lake County HORTICULTURAL NOTES

OCTOBER-NOVEMBER 1994

## Part II

**!!! MARK CALENDARS !!!**

**December 8**

**WINEGRAPE CANOPY MANAGEMENT**

Clear Lake Grange, Finley

Registration form in Oct.-Nov. Part I HORT NOTES

or contact us or LCWGC at 263-0911

**December 15**

**ANNUAL RESTRICTED USE PERMIT EXAM**

Clear Lake Grange, Finley

contact Agriculture Department at 263-2271

### **OAK ROOT FUNGUS DISEASE IN PEARS**

The August 1990 Hort Notes contained these comments:

*"... a widening circle of dying Bartlett pears on Winter Nelis rootstock was diagnosed with oak root fungus (ORF). Trees had previously been replanted, signifying a historical ORF "hot spot". Though limbs and young trees had died in recent years, the circle widened in 1990 and several larger trees collapsed. In this case, the combination of successive dry years - again, the "stress factor" - and late spring rains may have aggravated the ORF. Why?*

*Needed as they were, the rains **may** have promoted ORF by saturating the soil at an inappropriate time of year when trees were starting to actively transpire. Oaks tolerate the presence of ORF very well, as long as winters are wet and summers are dry. Irrigation during the active growing season ultimately weakens and kills them.*



*Pears, though extremely resistant to ORF, are **not immune**. Winter Nelis is considered "moderately resistant" in the presence of ORF under reasonable soil moisture conditions. The pathogen **plus** saturated soil in late spring **plus** active spring growth **plus** possible stress due to successive dry years set the stage for more apparent symptoms and collapse in 1990."*

In 1990, I **knew** about ORF - caused by the fungus *Armillaria melea* - in two orchards. During the 1994 season, five growers requested diagnosis in a total of eight blocks. Seven have been confirmed by visual examination or lab diagnosis. This was surprising because of all deciduous fruit crops, pears are considered the least susceptible to ORF and are often the crop of last resort in ORF sites.

What is going on here? Why is there a sudden mini-explosion of ORF infections, especially in orchards well over 30 years old? More significantly, how will it be controlled? Unfortunately, the answers to these questions are complex and elusive, but an understanding of factors affecting disease biology may assist in future control success. Following are some thoughts on what may be occurring.

## **I. The Local Situation**

In Lake County, orchards affected by ORF are in Big Valley, Scotts Valley and Upper Lake. (Incidentally, there are also spots showing up in the Delta region). Varieties include Bartlett, Starkrimson and Bosc. Known affected rootstocks are Betulaefolia, OHxF 97, Bartlett seedling, Winter Nelis and domestic French. Sites are mainly along creeks or in old creek beds on well-drained, sandy loam or in gravelly areas in clay loam soils. Affected site size ranges from several trees to several acres, generally in one or more circular areas. Rate of spread seems to hasten as tree vigor increases, perhaps due to more and denser interconnecting roots in closer spaced young blocks. Tree age ranges from replants (3 to 5 years old) to well over 30 years old.

Grower practices vary, with notable similarities. In all cases except one orchard on drip, irrigation is by solid-set, undertree sprinklers. In all but one case, sprinklers are also the main frost protection method. All orchards tend to be high yielding, well-managed blocks, although overall health varies.

Fungal signs are often easily seen just below the soil line around the crown area. In only a few cases has the crown and upper roots looked "clean" and the fungus found deeper down in the roots. Most growers reported seeing symptoms, i.e. tree vigor decline, small leaves, chlorotic leaves, or mid-summer collapse, in the last two to four years, although some sites have been chronic, with the pace of decline increasing recently. It seems to take from one to four years for a tree to die.

## **II. The Disease Triangle**

### **A. Inoculum Sources**

**Hosts** - Possible local native woody hosts are numerous. They include oak, willow, cottonwood and black walnut. Resistant hosts may harbor low levels of ORF, but as long as growing conditions are favorable to the host they remain disease-free. Thus, in nature, inoculum levels generally stay at stable, low levels.

Once native woody hosts are cleared, leaving old roots, cultivated hosts become vulnerable to infection if conditions are conducive to disease. Susceptible cultivated hosts which may have preceded pears in Lake County are almond, apricot, French prune and walnut. Since inoculum can survive for some undefined but long period in buried woody tissue, there is likely to be an unlimited amount of potential inoculum in Lake County soils.

As stated above, pears are considered among the least susceptible deciduous fruit crops. Historically, oriental pears (*Pyrus ussuriensis*) are listed as the most susceptible. French pear, Bartlett rooted cuttings, Old Home x Farmingdale (all *Pyrus communis*), *P. betulaefolia* and *P. calleryana* are listed as "immune or highly resistant". Winter Nelis and Old Home (also *P. communis*) are listed as "moderately resistant" (Raabe, 1979). The question then arises, what are the limits to resistance and have they been exceeded in recent years?

**Site** - Although there are conflicting views, most literature places ORF predominantly in well-drained, lighter soils associated with existing or old water courses, alluvial fans and flood plains. These are typical riparian habitats in which oaks and other above-mentioned native species grow. This matches most of the occurrences in Lake County.

#### B. Pathogen Variability

Just as there are many hosts, there are many strains of ORF, with varying virulence. Since most pear species are considered "moderately" to "highly" resistant to ORF, it may be possible that there is one or more extremely virulent strains attacking "normally" resistant rootstocks. Research is needed to learn this. Of more immediate concern, and what growers have more possibility of controlling, is **environment**.

#### C. Environmental Conditions

As noted in the August 1990 Hort Notes article, oaks tolerate ORF very well as long as winters are wet and summers are dry, and that pears, although highly resistant, are not necessarily immune under unreasonable conditions. Old orchards may have survived just fine for many years in its presence. However, if for some reason conditions become more favorable to the fungus, the amount of inoculum could increase. Coincidentally, these same conditions could predispose the trees to infection. This is what has likely occurred in recent years - in part due to INCREASED IRRIGATION.

While ORF survives underground in old host tissue, it **thrives** under constant moisture. In recent years, pear growers have provided exactly that. Although there is no data, it is unquestionable that growers are irrigating more for many reasons: to catch up after long, dry winters, frost protection, compensation during summer heat spells and to increase

yield and fruit size. Undertree sprinklers have made it possible to irrigate **frequently**, thus keeping the crown and root zone moist from April through September - exactly the active period of the fungus. This is almost impossible with flood and furrow, which forces deep but infrequent irrigations that allow the root zone to dry out between irrigations and necessitates wind and heat frost protection.

Over the past seven years of winter drought and summer heat, a changing scenario can be envisioned:

#### SCENARIO 1 - The Way it Was

ORF inoculum exists at low levels for many years. Orchards are disked so most roots are located well below the crown. Irrigation is by flood or furrow so is infrequent and leaves the top 12-18" dry between irrigations. Frost protection is by heat and wind. Yields are relatively low and fruit size is small. Tree spacing is wide so roots are less likely to inconnect. "Resistant" pears survive just fine for many years.

#### SCENARIO 2 - The Way It Is

In the recent past, orchards have been inter- or replanted. Due to lack of experience with ORF, previous crop roots are probably left in the soil prior to planting. New technology beckons; solid-set sprinklers allow for non-tillage so the root zone moves up toward the crown. This necessitates more frequent irrigations and trees respond with higher yields and bigger fruit. Frost protection may add another 8-12" of water to already rain-soaked soil. In the past few drought years, winters are dry with major rainfall occurring in the spring. To catch up, irrigations may begin earlier and go on longer to attain ever bigger yields and fruit size. The top three feet of soil may be almost saturated from April through September.

The result? ORF responds to increased, consistent moisture during its active growth period from April to September. Simultaneously, non-tillage, closer spacings and more water increase both numbers and density of roots which in turn increases root-to-root contact between trees. Under heavy inoculum pressure, normally "resistant" pears are now "sitting ducks". Some researchers feel that if trees are stressed due to long-term winter drought and poor aeration due to saturated spring conditions, they may be even more prone to attack.

Of course, the above is a completely hypothetical "educated guess", developed from personal observations, as well as those of growers, pest control advisors and other research/extension personnel. It seems nobody really **knows** the answer(s).

The changes in the orchard environment have been gradual and subtle. More than anything, it may be that increased ORF is a symptom - or symbol - of how hard trees are now farmed to achieve maximum production of large fruit. In short, the envelope is being pushed.

### III. Diagnosing Oak Root Fungus

Symptoms appear rapidly or slowly, depending on inoculum amount, strain virulence, host susceptibility and aggravating conditions. They include poor terminal growth, yellow foliage, premature leaf drop, branch dieback and ultimate tree death. Sudden wilt and collapse may occur during the summer as crop load and water stress increases.

Because ORF moves from tree to tree via root contact, the infection pattern is generally a slowly widening circle(s), with the initially infected tree(s) at the center. It can also move down rows in high density orchards.

To diagnose, one need usually only dig below the soil line (where it is moist) and cut just below the bark of the crown and main roots. The main sign is a creamy white fan-shaped mycelial plaque. The wood is often "punky" because the lignin is destroyed. Short, dark, shoestring-like rhizomorphs **may** be seen along the roots (I have only seen them once). If no plaque is seen, digging with a backhoe may reveal infected roots deeper down - this is often the initial infection point. Infected wood smells like mushrooms.

In the fall and early winter, clumps of honey-colored mushrooms **may** sprout around dead trees (edible by the way, but this is **not** the crop we want to be growing).

Photos of ORF-infected trees are in the references listed on page 7.

### IV. Oak Root Fungus Control Options

Control is difficult, erratic and often temporary. Since "plant a resistant rootstock" is currently futile advice locally, the only feasible control is host removal followed by fumigation, replanting and perhaps most importantly, *modifying cultural practices to reduce chance of reinfection, i.e. change irrigation practices to allow for intermittent drying periods in the crown and upper root zone.*

There are several options, depending upon site size and economic limitations - NONE ARE GUARANTEED. For permit and other regulatory requirements associated with methods discussed below, check with the Department of Agriculture and remember, **FOLLOW LABEL INSTRUCTIONS EXACTLY:**

#### 1) METHYL BROMIDE (MBr) FUMIGATION

Large sites (very expensive, about \$1300/acre)

- After harvest, remove all infected tissue **and at least** one unaffected tree around the entire perimeter of the diseased site, preferably with a backhoe. This includes **roots down to 1/2" diameter** through the root zone (do your best). All material should then be burned.
- In the spring, plant a deep-rooted cover crop, e.g. sudan grass, mustard or safflower to dry the soil profile as deep as possible.

- In the fall, rip several ways, then disk the **warm** (>55°F) and **dry** soil. Contact a commercial fumigation company to come and inject MBr (400 lbs. per acre), **tarped**. Keep the tarp on at least two weeks.
- Wait at least 30 days before replanting to avoid phytotoxicity to new trees.

#### Small or individual tree sites (about \$6-10/tree)

- Stop irrigating infected trees as soon as symptoms are seen
- In the fall, backhoe out the tree(s) and adjacent non-symptom trees on all four sides, including **all roots down to 1/2"**. Remove these from the orchard and burn.
- Remove soil from the replant site, making sure to break hardpans and mix layers. Dry the soil out (tarp if it rains). While the soil is **warm** and **dry**, fumigate using 1 lb. MBr cannisters. Cover the site with plastic tarp immediately. Leave it on as above.
- Wait at least 30 days to replant.

Growers often resist losing a growing season, choosing to pull the trees in late summer, fall-fumigate and replant in spring. This is less often successful due to higher soil moisture at fumigation time. One grower shut the water off during the growing season, using the trees as a "cover crop" before fall-fumigating. Regardless of procedure, the **KEY** to deep fumigation is **VERY DRY SOIL**, allowing maximum gas penetration and dispersal to kill inoculum buried in woody tissue.

Fumigation is never guaranteed, especially for ORF, as the fungus may be deeply buried in gas-impenetrable roots. Like any pesticide, control is finite as long as inoculum exists, and since MBr will not kill 100% of the fungus, expect to retreat the worst spots later. Also, heavier soils are more difficult to dry and open up to the gas, making control in clays more problematic.

**Finally, long-term control will likely fail if post-fumigation cultural practices remain conducive to ORF growth and spread.**

#### 2) PRE-PLANT DRENCHING WITH METAM SODIUM (VAPAM®)

Unlike MBr, metam sodium is applied as a liquid drench into moist soil in the fall or spring. It moves with water into the root zone, killing the ORF (as well as other pathogens, nematodes and certain weed seeds). The label recommends 2 quarts per 100 ft. square for ORF control. Data from Washington State suggests good control, but there is no local data. This may be a good alternative for individual replant sites or where early fall rains preclude optimal MBr treatment.

## V. Future Control Possibilities

The future availability of MBr is uncertain. Recently, new efforts have begun to find environmentally-acceptable, yet economic alternatives. Chemicals being tested in other crops, e.g. almonds and strawberries, include chloropicrin, Enzone® (which becomes carbon bisulfide underground) and metam sodium.

In addition, there are potential biological controls. One is *Trichoderma spp.*, antagonistic fungi which often recolonize fumigated sites, keeping ORF at bay. Another is the incorporation of cruciferous plants such as broccoli and mustard which upon decay, release compounds similar to those in metam sodium.

Working with UC researchers, we hope to test some of these alternative chemicals and biological controls in Lake County and to compare control on different rootstocks. This, however, is long-term research, producing answers in three to five years at the soonest.

An even longer term and **expensive** research need is to look at the interaction of irrigation, soil type and rootstock. As with most research these days, this will only be done if industry is willing to finance it. ORF, though apparently increasing on many permanent crops in California, is considered a chronic problem limited to certain sites, rather than an acute, widespread pest such as codling moth or fireblight. Ironically, very little attention is likely to be paid until economic losses are drastic.

Until research provides answers, growers should follow recommended procedures and pay close attention to cultural practices which exacerbate the problem. If ORF is suspected, contact me for positive diagnosis and assistance in control decision-making.

For more information, consult: (available at our office)

### **Diseases of Temperate Zone Fruit and Nut Crops**

UCDANR Publication #3345      \$55.00

### **IPM for Apples and Pears**

UCDANR Publication #3340      \$30.00

### **Resistance or Susceptibility of Certain Plants to *Armillaria Root Rot***

UC Publication #2591      \$1.75

Thanks to Roger Duncan, UCCE Sacramento County and Carla Thomas, UCD Plant Pathology, for their suggestions and comments on this article.

## ***WALNUT PEST UPDATE***

**Frosted Scale** - In late July, I informally surveyed seven Upper Lake blocks with known scale infestations. Below is a table of my findings:

| ORCHARD AND FROSTED<br>SCALE TREATMENT | FROSTED<br>SCALE | WALNUT<br>APHID             |
|----------------------------------------|------------------|-----------------------------|
| <u>Supracide</u>                       |                  |                             |
| A                                      | none             | yes                         |
| B                                      | none             | yes                         |
| C                                      | none             | yes<br>(no parasites)       |
| <u>diazinon/oil</u>                    |                  |                             |
| D                                      | reduced          | no                          |
| <u>oil only</u>                        |                  |                             |
| E                                      | some             | yes<br>(some parasitized)   |
| <u>none</u>                            |                  |                             |
| F                                      | heavy            | no                          |
| G                                      | heavy            | yes<br>(highly parasitized) |

Supracide, while giving excellent scale control, appeared to release walnut and dusky-veined aphid from biological control. However, later in the summer, growers observed higher than normal walnut aphid levels in many orchards, perhaps indicating reduced *Trioxys pallidus* wasp activity.

Yolo County Farm Advisor Wilbur Reil suggests that if growers use Supracide, they may want to treat part of the block with a less disruptive material, e.g. diazinon and/or oil to allow preservation and rapid recolonization of *Trioxys*.

Overall, frosted scale persists and in untreated orchards, there is noticeable dieback of young wood. Affected blocks should probably be (re)treated next winter, especially if dry conditions also cause winter injury. Also, pruning is recommended in cases of extensive dieback of young wood.

**Walnut Husk Fly** - The flight began in earnest around August 10, with some areas peaking around August 30. However, there was another wave of flies about the third week of September, but this was inconsistent. First damage in a heavy-pressure orchard was noted on August 10, but the main part occurred from the two main flights. For most orchards, it thus appears initial optimal spray timing was in mid-August with one or two more sprays needed to cover until the end of September.

**Codling moth** - Word is probably out so there is no reason to "hold back" information. For the first time that I am aware of, codling moth (CM) has infested several walnut blocks on Pitney Lane in Upper Lake. As of this writing, nuts have been sampled from under the trees of six varieties in three orchards. Damage ranged from .5% in Hartley to 11% in Payne and varied by location. Franquettes have yet to be sampled. Next spring we will trap both known infested and adjacent blocks. At this point, it is futile to speculate the source of infestation, but it seems to be associated with the high number of



early variety (i.e. Payne, Tehema, Vina, Pedro) orchards along Pitney Lane. Contact me if you suspect CM in your orchard. We will report new information as it is learned and will discuss CM at the 1995 walnut meeting.

**Walnut blight** - 1994 was another heavy blight year in **all** varieties. If spring rains persist in 1995, the level of inoculum build up in some orchards may warrant at least one copper application. One grower who did spray this year appeared to have benefitted. One danger of excessive blight is the increased possibility of navel orangeworm infestation, especially if there is also sunburn. If sunburn was a big problem this year, consider a good pruning to ensure adequate canopy.

For more information on these and other pests, consult (available at our office):

**IPM Guidelines for Walnuts**

41 pages      \$2.50

**IPM for Walnuts, 2nd edition**

UCDANR Publication #3270      \$25.00

***THE IMPORTANCE OF CLEAN GRAPE STOCK***

In the rush to convert vineyards to the latest potentially profitable new variety, obtaining scion stock may be difficult - demand exceeds supply. Growers have reported 2-3 year nursery waits for some of the "new" Rhone and Italian varieties/clones. This may make it tempting to obtain wood from any available source, despite warnings of potential long-term disease problems. In the past several years, growers have been cautioned extensively about the dangers of utilizing both non-certified rootstock **and** scion wood.

If you are in the process of searching out wood, contact me for copies of the following:

**Foundation Plant Materials Service (FPMS) Publications**

- 1) informational leaflet
  - grapevine registration and certification program
  - national grapevine importation program
  - general program description
- 2) periodic newsletter with updates on testing procedures
- 3) registered variety/selection list  
NOVEMBER 15 ORDER DEADLINE
- 4) Disease Testing of California Certified Stock  
(article by FPMS staff)
- 5) Leafroll and the California Grapevine Certification Program;  
questions and answers  
(leaflet by FPMS staff)

- 6) National Grapevine Importation Program  
(leaflet by FPMS staff)  
- importation application  
- flow chart for grape material processing

### **Related Articles**

“Potential Interactions between Rootstocks and Grapevine latent Viruses”  
by Dr. Debra Golino, Manager FPMS  
Amer. J. Enol. Vitic., 44:2, 1993

### ***POTENTIAL FOR WINTER INJURY IN GRAPES AND WALNUTS***

As of this writing (October 21), rainfall is already behind. This follows yet another exceptionally dry year. Although night temperatures are dropping incrementally, days are warm and the soil dry. Grape and walnut growers should be aware of the potential for late fall cold injury if there is a sudden temperature drop, typically around the third week of November.

### **Grapes**

Vines that suffer the most late fall/early winter damage are:

- too vigorous due to excessive irrigation or N fertilization
- prematurely defoliated due to insufficient irrigation or pest damage
- overcropped
- young (pre-cropping)

Although reports vary, local observations on **bearing** vines rank Cabernet Sauvignon more susceptible than Sauvignon blanc. This matches data from New Mexico, which after a January 1989 freeze, had 10% injured Sauvignon blanc and 33% injured Cabernet Sauvignon. Merlot damage was 14%, Chardonnay 27% and Zinfandel 32%. For non-bearing vines, vigor is probably more of a factor than variety.

Although winter injury occurs to some extent throughout the county, the “hot spots” are in the Big Valley (especially south of Hwy. 29) and, to a lesser extent, Upper Lake. Growers with chronic winter kill are used to spring frost protection, but should **fall** protection be considered? There are pros and cons.

PRO - damage probably can be reduced some unknown amount (there is no data)

CON - if vines are still “green”, i.e. not hardened off yet, the extra water may  
delay hardening even further

- it is difficult to judge when to turn on
- it is EXPENSIVE

Although experimental data is noticeably lacking, most with experience with late fall injury downplay sprinkler frost protection as a routine. Rather, they encourage pre-injury practices to reduce risk of injury. These include:

- an irrigation and N fertilization schedule that promotes **moderate** vigor; this is especially important for young vines (where injury is chronic, a year may need to be sacrificed to avoid rapid and overly-succulent growth);
- delay pruning until after January 1; again, no data but much observation;
- matching site to variety; is it smart to plant Cabernet Sauvignon in a problem location?
- adequate powdery mildew and pest control to insure healthy canes and carbohydrate balance
- in very severe cases (probably unnecessary in Lake County), multiple (2-3) trunks during initial training to show vigor and/or insure at least one healthy trunk.

Fall frost protection is probably unwarranted if temperatures have dropped incrementally to below freezing (there have been several cold nights this fall already). If you choose to frost protect, local National Weather Service Meteorologist Art Horton suggests protecting at around 28°F, which is below the normal 31°F for green tissue. This will allow for acclimitization. After the first "radical" frost, **normal** vines should be okay. Of course, turn on temperature depends on how fast dew point drops - expect it to be fairly rapid at that time of year.

If growers suspect winter injury or wish more information on the subject, contact me. Hopefully, the 1994-95 winter will be rainy and not too cold.

## **Walnuts**

The following article was written by Yolo-Solano Farm Advisor Wilbur Reil. If dry weather persists, growers with irrigation capacity should strongly consider post-harvest irrigations going into early winter. Dry land growers, of course, must accept Mother Nature's hand. However, trees should be kept as healthy as possible via **proper pruning**, **weed control** and **late** winter N fertilization.

### ***Winter Kill On Walnuts***

by Wilbur Reil, UCCE, Yolo-Solano Co.

It is still summer so why would I discuss winter kill in walnuts? Waiting until winter to do something is too late. About the only thing to do then is watch the limbs die unless you want to rush out and paint all the limbs and even this doesn't always help much. The time to take action to prevent winter kill is now during the late summer and fall.

We have seen serious damage the last few years in many of our orchards. Damage will occur on both young and old trees, although young trees are generally the most damaged.

Winter kill damages young trees that are growing very vigorously late in the fall. It also occurs on trees that are too dry. Generally, it does not occur on trees that are hardened off and then watered properly in late fall. On mature trees, the orchard is hardened off at harvest. Young trees should also be hardened off in mid to late September. Usually withholding irrigation water until all terminal growth ceases and no more reddish leaves are emerging is sufficient, although full coverage irrigation systems may require slightly longer. Water should not be withheld until older leaves turn yellow and drop. After hardening the tree off, then a more normal irrigation program should occur. If the weather is dry like it has been in the fall for the last 12 years, this may require more than one irrigation so that the tree has sufficient moisture and is not stressed.

Prevention of winter kill is, therefore, a two phase management program. Stop new terminal growth in late September, then provide adequate moisture before the first freezing weather of the winter. Winter kill is usually most severe when warm weather extends into late fall with no freezing weather, followed by a sudden cold spell of freezing weather. The freezing weather does not have to be very cold. I have seen damage at about 28°F on very dry trees. The onset of cold weather needs to be sudden. Once the trees have experienced a few freezing nights, they are quite capable of withstanding temperatures in the teens without damage.

Winter kill occurs during the early or first freeze of the fall and usually on stressed trees or extremely young succulent growing trees. Protecting walnut trees at this time will prevent, or greatly minimize, winter injury.

### ***LATE FALL CHECKLIST***

contact me for specific details on these topics

**Weed Control** - By now, most of you know of my bias toward a late fall-early winter program if you use pre-emergent herbicides (October 1993 Hort Notes). Control is especially important in dry years which require maximum use of valuable water supplies by the crop rather than the weeds. Current herbicide tables are on pages 13 to 15.

**Zinc Sprays** - For pears, apply 36% zinc sulfate ( $\text{ZnSO}_4$ ) just prior to leaf fall (remember, no oil within 30 days!). In severe cases, follow-up zinc treatments of chelate or oxide may be warranted. Unless soil is very dry and the weather very cold, spur-pruned grapes may be treated by daubing 36%  $\text{ZnSO}_4$  onto fresh, non-bleeding pruning wounds. Foliar-treat cane-pruned (or spur-pruned) varieties in the spring. Walnuts should be treated with  $\text{ZnSO}_4$  or chelate in the spring just after full pistillate bloom when reddish leaves have lost most of their color.

**Potassium Soil Applications** - Heavy crops use up available K supplies. If leaf levels and symptoms show a need, late fall is the ideal time to apply  $\text{K}_2\text{SO}_4$ . Generally massive doses are needed to overcome being tied up by soil colloids.

# 1994 HERBICIDE LABEL STATUS FOR NUT CROPS AND VINES

| HERBICIDE<br>Common Name<br>(trade name) <sup>1</sup> | ALMOND | WALNUT | GRAPE | KIWI | PECAN | PISTACHIO | APPLES | PEARS | PEACHES | PRUNES/PLUMS |
|-------------------------------------------------------|--------|--------|-------|------|-------|-----------|--------|-------|---------|--------------|
| DICHLOROBENIL<br>(Casoron)                            | ---    | ---    | R     | ---  | ---   | ---       | R      | R     | R       | R            |
| PROPRIONAMIDE<br>(Devrinol)                           | R      | R      | R     | R    | R     | R         | R      | R     | R       | R            |
| DIPROPYLTHIOCARBAMATE<br>(Eptam)                      | R      | R      | ---   | ---  | ---   | ---       | ---    | ---   | ---     | ---          |
| OXYFLUOREN (Goal)                                     | R      | R      | R     | R    | R     | R         | R      | R     | R       | R            |
| DIURON (Karmex)                                       | ---    | R      | R     | ---  | R     | ---       | R      | R     | R       | ---          |
| PRONAMIDE (Kerb)                                      | ---    | ---    | R     | ---  | ---   | ---       | R      | R     | R       | R            |
| SIMAZINE (Princep)                                    | R      | R      | R     | ---  | ---   | ---       | R      | R     | R       | ---          |
| PENDAMETHALIN<br>(Prowl)                              | NB     | NB     | NB    | ---  | ---   | NB        | NB     | NB    | NB      | NB           |
| NORFLURAZON<br>(Solicam)                              | R      | R      | R     | ---  | R     | ---       | R      | R     | R       | R            |
| ORYZALIN (Surflan)                                    | R      | R      | R     | R    | R     | R         | R      | R     | R       | R            |
| TRIFLURALIN (Treflan)                                 | R      | R      | R     | ---  | R     | ---       | ---    | ---   | R       | R            |
| FLUAZIFOP (Fusilade)                                  | NB     | NB     | NB    | ---  | R     | NB        | NB     | NB    | R       | R            |
| MSMA                                                  | NB     | NB     | NB    | ---  | ---   | ---       | NB     | NB    | NB      | NB           |
| SETHOXYDIM (Poast)                                    | NB     | NB     | R     | ---  | NB    | NB        | ---    | ---   | NB      | NB           |
| GLYPHOSATE<br>(Roundup)                               | R      | R      | R     | R    | R     | R         | R      | R     | R       | R            |
| 2,4-D (Envy)                                          | R      | R      | R     | ---  | R     | R         | R      | R     | R       | R            |
| GRAMOXONE                                             | R      | R      | R     | R    | R     | R         | R      | R     | R       | R            |

NOTE: This is intended as a general guide only. Before use of any herbicide, consult the label carefully. Labels change frequently and often contain special restrictions regarding specific use of a company's product.

R = Registered

--- = Not Registered

NB = Registered in Nonbearing Orchards

<sup>1</sup>) Other brand name products may be available

# SUSCEPTIBILITY OF WEEDS TO HERBICIDES

## PREEMERGENCE

## POSTEMERGENCE

|                           | CASORON | KARMEX | DEVIRINOL | SOLICAM | SURFLAN | GOAL | SIMAZINE | TREFLAN | PROWL | ROUNDUP | MSMA | GRAMOXONE | 24-D | POAST | FUSILADE |
|---------------------------|---------|--------|-----------|---------|---------|------|----------|---------|-------|---------|------|-----------|------|-------|----------|
| <u>ANNUAL BROADLEAVES</u> |         |        |           |         |         |      |          |         |       |         |      |           |      |       |          |
| CHEESEWEED (Malva)        | C       | P      | P         | P       | P       | C    | P        | N       | N     | P       | N    | P         | P    | N     | N        |
| CHICKWEED                 | C       | C      | C         | P       | C       | N    | C        | C       | C     | C       | C    | C         | P    | N     | N        |
| CLOVER                    | P       | P      | P         | N       | N       | P    | C        | N       | N     | P       | N    | P         | P    | N     | N        |
| FIDDLENECK                | C       | C      | C         | P       | C       | C    | C        | C       | C     | C       | N    | P         | P    | N     | N        |
| FILAREE                   | P       | C      | C         | P       | N       | C    | N        | N       | N     | P       | N    | P         | P    | N     | N        |
| FLAX-LEAVED FLEABANE      | C       | N      | N         | N       | N       | N    | C        | N       | N     | C       | N    | P         | C    | N     | N        |
| GOOSEFOOT                 | C       | C      | C         | C       | C       | C    | C        | C       | C     | N       | N    | P         | C    | N     | N        |
| GROUNDSEL                 | C       | N      | P         | P       | N       | C    | C        | N       | N     | C       | N    | C         | C    | N     | N        |
| HENBIT                    | C       | C      | N         | P       | C       | C    | C        | C       | C     | C       | C    | C         | P    | N     | N        |
| HORSEWEED (Marestail)     | P       | N      | N         | N       | N       | N    | C        | N       | N     | C       | N    | P         | C    | N     | N        |
| KNOTWEED                  | C       | C      | C         | P       | C       | P    | C        | C       | C     | C       | N    | P         | P    | N     | N        |
| LAMBSQUARTER              | C       | C      | C         | P       | C       | C    | C        | C       | C     | N       | N    | N         | C    | N     | N        |
| MUSTARD                   | C       | C      | P         | P       | N       | C    | C        | N       | N     | P       | N    | C         | C    | N     | N        |
| NIGHTSHADE                | C       | C      | N         | C       | P       | C    | C        | N       | P     | C       | P    | C         | C    | N     | N        |
| PIGWEEED                  | P       | C      | P         | P       | C       | C    | C        | C       | C     | C       | N    | C         | C    | N     | N        |
| PRICKLEY LETTUCE          | C       | C      | C         | C       | N       | C    | C        | N       | N     | C       | N    | P         | C    | N     | N        |
| PUNCTUREVINE              | C       | P      | N         | C       | C       | C    | P        | P       | P     | C       | N    | C         | C    | N     | N        |
| PURSLANE                  | C       | C      | C         | C       | C       | C    | C        | C       | C     | C       | N    | C         | C    | N     | N        |
| SHEPHERDSPURSE            | C       | C      | N         | P       | N       | C    | C        | N       | N     | C       | N    | C         | C    | N     | N        |

|                  | CASORON | KARMEX | DEVIRINOL | SOLICAM | SURFLAN | GOAL | SIMAZINE | TREFLAN | PROWL | ROUNDUP | MSMA | GRAMOXONE | 2,4-D | POAST | FUSILADE |
|------------------|---------|--------|-----------|---------|---------|------|----------|---------|-------|---------|------|-----------|-------|-------|----------|
| SOWTHISTLE       | C       | C      | C         | C       | N       | C    | C        | N       | N     | C       | N    | P         | C     | N     | N        |
| SPURGE           | C       | P      | N         | C       | C       | C    | P        | C       | C     | C       | P    | P         | P     | N     | N        |
| WILD RADISH      | C       | C      | N         | N       | N       | C    | P        | N       | N     | C       | N    | C         | C     | N     | N        |
| ANNUAL GRASSES   |         |        |           |         |         |      |          |         |       |         |      |           |       |       |          |
| ANNUAL BLUEGRASS | C       | C      | C         | C       | C       | P    | C        | C       | C     | C       | N    | P         | N     | N     | N        |
| BARNYARDGRASS    | P       | C      | C         | C       | C       | P    | C        | C       | C     | C       | P    | P         | N     | C     | C        |
| CRABGRASS        | P       | C      | C         | C       | C       | N    | P        | C       | C     | C       | C    | C         | N     | C     | C        |
| RYEGRASS         | N       | C      | C         | C       | C       | N    | N        | C       | C     | C       | N    | P         | N     | C     | C        |
| WILD BARLEY      | C       | C      | C         | C       | C       | P    | C        | C       | C     | C       | N    | P         | N     | C     | C        |
| WILD OATS        | -       | P      | C         | C       | P       | P    | C        | P       | C     | C       | N    | P         | N     | C     | C        |
| FESCUES          | P       | C      | C         | C       | C       | C    | C        | C       | C     | P       | N    | C         | N     | N     | N        |
| PERENNIALS       |         |        |           |         |         |      |          |         |       |         |      |           |       |       |          |
| FIELD BINDWEED   | P       | N      | N         | N       | P       | N    | N        | P       | P     | P       | N    | N         | P     | N     | N        |
| BERMUDAGRASS     | P       | N      | N         | P       | P       | N    | N        | P       | P     | C       | N    | N         | N     | P     | P        |
| DALLISGRASS      | N       | N      | N         | N       | P       | N    | N        | N       | N     | P       | C    | N         | N     | C     | C        |
| JOHNSONGRASS     | N       | N      | N         | C       | N       | N    | N        | N       | P     | C       | C    | N         | N     | C     | C        |

C = Controlled

P = Partial Control

N = Not Controlled

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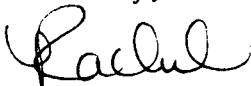
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HAVE A GREAT WALNUT HARVEST!...  
See you at the winter meetings

Sincerely,



Rachel Elkins  
Farm Advisor

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