

# subtropical

# FRUIT

# NEWS

## A New Information Resource for California Fruit Farmers

Editors:

Guy Witney  
University of California Farm Advisor  
Riverside/SanBernardinoCounties

Warren Currier  
California Avocado Society

*Welcome to the first edition of Subtropical Fruit News, a quarterly publication made possible by the generous support of the California Avocado Society and the Citrus Research Board.*

Subtropical Fruit News will bring you the latest research results, farm issues, general topical information and upcoming events from University of California Farm Advisors, Specialists, Faculty and industry leaders throughout the State. Each issue covers broad topics for all fruit farmers, but is also tailored to fruit farming in your area and includes pertinent information from your local county Farm Advisor.

**Subtropical Fruit News is free, but in order to receive copies in the future the enclosed red subscription form MUST be returned.**

We would like to expand and improve this publication with each new issue, but have very limited funding. Industry/grower contributions would be greatly appreciated. All contributions would go 100% toward hard improvements in this newsletter such as adding photographs, and increasing the content and number of annual issues. Contributions can be made to *Regents, University of California, 21150 Box Springs Road, Moreno Valley, CA 92557.*

## Snails - This Could Be The Year

Nicholas Sakovich  
University of California Farm Advisor  
Ventura/Santa Barbara Counties

*For the most part, snails have not been a problem for a number of years, due primarily to the lack of abundant precipitation. This grace period would have been an excellent time to release the predatory decollate snail and give it a chance to establish.*

If a biological control program was not established and snails are now a problem, there are a number of things to do:

### Baiting:

Metaldehyde is a bait commonly used for the control of the brown garden snail. Placement of the bait is most important. Metaldehyde has a toxic effect both on contact with the snail's "foot" and after ingestion. Under the influence of metaldehyde, the snail loses a large percentage of water due to the muscle contractions and secretion of slime. If, however, the snail can reach shelter (that is a place of shade and high humidity such as underneath a tree), it may survive.

Placing the bait out between the tree rows may not attract a large percentage of the snails. Therefore, the metaldehyde bait should be placed nearer the tree dripline, close enough for the snail to find it, yet where the snail might encounter some difficulty finding shelter upon ingestion of a sub-lethal dose.

Deadline is a liquid metaldehyde product with a consistency of Elmer's

glue. It can be dotted down the tree row, close to the drip line. Small equipment (manufactured by Scotcan of Santa Paula) has been custom-built for easy application of this material using an ATV-type vehicle to pull it. It is best to apply this material just prior to an irrigation or rain. Water will not dissolve the Deadline or wash it away. There is also a dry Deadline formulation called Deadline Bullets. Both materials have proven very effective in University of California tests.

### Biological Control:

As mentioned earlier, the decollate snail (*Rumina decollata*) can provide excellent control of the brown garden snail; however, establishment of the decollate snail may take as long as five years, and not everyone is successful in establishing them. Decollates feed mainly on the young brown garden snail. If one has a large brown snail population, it is a good idea to bait first, then wait approximately 60 days for the bait to break down before releasing the decollates. Though it can be costly, it is best to distribute 50 decollate snails per tree throughout the orchard. A less expensive method would be to choose a cluster of core trees in areas that will not be baited and "raise" the snails there. As they multiply, they can be physically moved throughout the orchard. Supplemental food (rabbit pellets or yesterday's salad) and cover (old fertilizer bags) can be provided to increase the chance of successful snail rearing. Even light additional irrigations may be conducive to quicker colony establishment. Ducks have been used for many years in other countries for snail and weed control. Recently growers here have established their "herds" of ducks. They have done an excellent job of controlling both snails and weeds. As with many non-pesticide methods of control, extra care and labor will be in-

volved in handling the ducks. It is also best to pen them at night to protect them from coyotes and dogs.

A word of caution: Do not let snail populations get out of hand. Once large populations of snails are in the trees, it is very difficult to get them out. They will come back down to the ground eventually but in their own good time. The only way to get them out would be to spray with Guthion. This, however, would seriously upset biological control and integrated pest management programs. Chlorine solutions have been tried with some success; but if the dosage is not right, the leaves (along with the snails) will drop from the trees. The chlorine solution does not kill the snails.

#### Barriers:

Skirt pruning, in conjunction with some type of barrier placed around the trunks of trees, can be effective in keeping snails out of the trees. Even skirt pruning alone during these dry years has helped to minimize snail damage. Once the trees have been skirt pruned, trunks can be painted with a bordeaux slurry which will repel the snails. White latex house paint, or spreader can be added to increase the persistence of the bordeaux; otherwise, the bordeaux mixture alone could wash off after one season. The addition of paint will likely hold it through two seasons.

Copper foil (Snail-barr) can also be permanently fixed around the trunks. By using a large nickle paper clip, the foil will expand with the tree. Once placed around the trunk, the foil does an excellent job of repelling snails for many years. In some areas, problems have been cited where birds and/or other animals will tear the bands from the trees. When this happens, diligent efforts are needed to constantly patrol areas and re-establish the bands.

Skirt pruning has other advantages for the grower. They include:

1. A reduction in brown rot-damaged fruit and soil-abraded fruit.
2. Better cold air movement out of the orchard.
3. Increased under-tree visibility for better detection of trunk diseases and dis-

orders and the condition of irrigation equipment.

4. Improved sprinkler coverage.
5. Potential for ant and Fuller rose beetle control.

Skirt pruning older trees for the first time will obviously decrease the number of fruit on that tree. University of California tests have shown, however, that in the long run, skirt pruning does not decrease yields. Citrus trees do compensate for the loss of the skirts by setting more fruit on the remaining parts of the tree.

## Fertilization and Irrigation Practices to Reduce Nitrate Contamination

Ben Faber  
University of California Farm Advisor,  
Ventura/Santa Barbara Counties

*California may follow Arizona's lead and require some form of best management practice (BMP) when it comes to nitrogen fertilizer use. BMP's are practices that minimize a degrading process, such as erosion or groundwater contamination, or maximize a resource, such as water.*

There has been some talk in Sacramento of requiring permits for Nitrogen use just as required for pesticides. Recently, California legislation was passed that increased the fertilizer tonnage tax to support research and education in the environmentally sound uses of fertilizers. Failure to adopt appropriate standards and methods of fertilizer practice could lead to the adoption of more burdensome regulations.

How did we get into this situation? After World War II the munitions industry turned its production capacity to the manufacturing of nitrogen fertilizers, creating a cheap, easily handled material for agriculture. Nitrogen, aside from water, is most often the most limiting nutrient in crop production, and with the new source of nitrogen, yields increased across the country. Unfortunately nitrogen applied in excess of plant need must go somewhere. Frequently this is lost to runoff, eventually arriving in sur-

face waters, or it percolates below the root zone of plants and ends up in groundwaters.

"So what's a little waste," you might say. That "little waste" was shown to be sufficient to grow sugar beets in Glenn County when irrigation water was applied that had been pumped from groundwater. This groundwater had a concentration of 10 parts per million (ppm) nitrogen with previous soil applied nitrogen as the likely source. 10 ppm is the public health limit for drinking water standards. This standard applies to all municipal waters. The reason for this health standard is the possibility of methemoglobinemia, or "blue baby syndrome." This problem is associated with infants who ingest nitrates which can result in a reduced capacity of the blood to carry oxygen. As of 1987, 10% of the wells in California and 4% of the Metropolitan Water District exceeded the 10 ppm limit.

Growers are well aware of the existing problems of price, availability and quality of water. But managing water to reduce nitrate contamination should be of concern to all growers, especially in improving relationships with the urban population. The reason we are talking irrigation and fertilization at the same time is that they are inextricably linked. Water is the major carrier of nitrate in the soil, and improper irrigation leads to poor fertilizer management. If applied in excess of plant requirements, water will move away from the root zone carrying nitrates into groundwaters or in runoff into surface waters. With improved control over irrigation, there will be improvement in nitrate management.

The following are a few guidelines in improving fertilizer and irrigation management:

#### Put the water where the tree is:

- Cap off sprinklers to trees that are in poor health or missing. Isolate irrigation blocks.
- Make sure the water being applied is going to an area where there are trees.
- Put trees of similar size in the same irrigation block.
- Add new valves if replacement of trees are in areas that were once irrigated with older trees. Improve distribution

uniformity.

- Check for uniform pressures and orifice size in irrigation blocks.

#### Maintain the system:

- Flush, flush, flush to remove any debris or slimes that accumulate in lines and filters. Clogging is most commonly caused by poor flushing. Use acid if carbonates are clogging emitters.
- Replace emitters that are broken or clogged with similar emitters.
- Use flow meters to tell you if breaks or clogs cause more or less water to be measured in a specified time.

#### Schedule irrigations:

- Throw away the clock and calendar!
- Use tensiometers, soil moisture probes, evapotranspiration readings to alter irrigation patterns to fit changes in weather.
- If the soil is not wetting properly or there is runoff, do pulse irrigations so that uniform wetting occurs without runoff or ponding. Install backflow devices if fertigrating.

#### Monitor plant nitrogen requirements:

- Get a water analysis:
- 10 ppm N in water = 27 pounds N per acre-foot of applied water.
- Follow soil and tissue analysis to gauge nitrogen applications and leaching requirements.
- With reduced applied water, reduce nitrogen application to compensate for reduced leaching of N.

Ultimately, someone will pay for water pollution costs. Nitrate contamination of California's groundwater is widespread. In 1986, public drinking water suppliers requested \$49 million in state funds to help pay for measures to remedy excessive nitrate. This is likely only a small portion of the total cost, since many water suppliers are able to solve their problems without going to the state for help. Until nitrate is flushed out of the zone between the surface of the land and the water table, water will have to be treated or mixed with lower-N water for drinking purposes. For now the highest priority should be to develop and implement BMP's to reduce the load on the system.

## With The Rain Comes Gummosis

Nicholas Sakovich  
University of California Farm Advisor  
Ventura/Santa Barbara Counties

*One serious problem a citrus grower may encounter during the wet spring weather is gummosis, caused by several species of phytophthora, P. citrophthora being the most prevalent. The fungus is well spread throughout most of our growing areas, and in most cases, is not a problem as long as growers follow a few simple cultural and sanitary procedures and we don't continue to get large amounts of rain.*

#### Prevention steps:

1. Several resistant rootstocks are available. They include Troyer/Carrizo, Citrumelo, Macrophylla, C32, C35 and Trifoliata.
2. New trees should be planted high, using trees that have been budded high.
3. Care should be taken to minimize or eliminate irrigation water from contacting trunks of trees.
4. A bordeaux solution can be painted on the trunks to prevent infection (this is not a cure).
5. In older orchards, skirt pruning has helped increase air movement in the orchard, thereby accelerating the drying of tree bark.

#### Symptoms:

The first and most obvious symptom is the profuse gumming on the surface of the affected bark. When the bark is scraped, the infected areas are darker than the surrounding green or white tissue. This contrast provides us with a definite boundary line between healthy and infected tissues.

When entirely killed, the bark, which always remains firm, dries out and cracks in vertical strips. When trees with this symptom are found in an orchard, the infection most likely occurred many months ago or even years prior. The fungus, in all likelihood, is no longer present and treatment is not necessary. During high summer temperatures, the citrophthora species will usually die out or become inactive. It is therefore mainly

a problem during the spring and early summer.

#### Treatment:

Two fungicides, Aliette and Ridomil, have proven effective in controlling phytophthora lesions on citrus trunks. Both materials can be applied directly to the lesion. No prescraping or elimination of diseased tissue is necessary.

It is also wise to fumigate fields which have previously been planted to citrus and have had a history of phytophthora - especially when replanting with susceptible rootstocks. Even if there is no history of phytophthora, fumigation should be a consideration because of nematodes, other parasitic fungi, and the fact that phytophthora may still be present.

## Foliar Urea Increases Citrus Yields

Carol Lovatt and Anwar Ali  
University of California, Riverside

*Foliar applications of low biuret urea (LBU) in the winter increased the yield of 30-year old "Washington" Navel oranges and were profitable for three consecutive years in this study.*

In this study winter applications of foliar applied low biuret urea (Unocal Plus) at a rate of 28 lbs. of nitrogen per acre increased the ammonia concentration of "Washington" Navel orange trees. Previous studies (Table 1 and 2) show that this leads to increased flower numbers and more leafy inflorescences (flowers and leaves mixed on new shoots), which are known to be more productive in fruit yield than leafless inflorescences (flowers only). Overall, yields increased with no reduction in fruit size. The foliar applications were made once per season in November, December, January or February resulting in increased net dollar return per acre (Table 3 and 4). The yield increase resulting from the winter foliar application of low biuret urea was not due to improved nitrogen status of the trees. All trees also received 110 lbs. of nitrogen per acre as LBU applied to

the soil in winter to ensure that adequate nitrogen was available. More detailed information on this study can be obtained in Citrograph (December 1992), Unocal Solution Sheet (January 1993), Grower Magazine (February 1993) or from your local Farm Advisor.

*This research was made possible by the support of the Citrus Research Board, the University of California Water Resources Center, the Citrus Research Center and Agricultural Experiment Station of U.C. Riverside.*

**Table 1**  
Leaf ammonia content and flower number increased when sprayed with LBU.

Weeks of low-temperature treatment	Increase in leaf ammonia content	Increase in flower number
	-----%-----	-----%-----
4	166	194
6	215	230

**Table 2**  
Foliar LBU increases leafy inflorescences.

Treatment	Flowers on leafless Inflorescences	Flowers on leafy Inflorescences	Leaves on leafy Inflorescences
No LBU	290	110	136
Foliar LBU	615	406	499

**Table 3**  
Three-year net cumulative increase due to foliar LBU.

	Date LBU applied to the foliage			
	November	December	January	February
Increased # of packing cartons	288	319	452	400
Increased total return	\$924	\$1024	\$1451	\$1284
Increased net return	\$814-845	\$914-945	\$1341-1372	\$1172-1205

**Table 4**  
Average increased net dollar return per acre per year for trees receiving foliar LBU versus soil LBU

	Date LBU applied to the foliage			
	November	December	January	February
	\$271-282	\$305-315	\$447-457	\$391-402

## Is There Salty Water in Your Future?

Gary Bender  
University of California Farm Advisor  
San Diego County

*Salty water is the nemesis of the avocado tree, but it may play a significant role in the production of fruit in Southern California in the very near future. With water projected to cost \$900 to \$1000 per acre foot in San Diego County by the year 2000, many growers are currently drilling wells and hitting (you guessed it) salty water.*

Water samples from wells in northern San Diego County in 1992 ranged from a low of 300 ppm to a high of 4000 ppm with a mean of 1031 ppm total dissolved salts (TDS). Water from sewage reclamation plants is also somewhat salty, ranging from 950 to 1050 ppm TDS. As a benchmark, district water (derived mostly from the Colorado River) ranges from 590 to 640 ppm.

Except for a few lucky growers in the river valleys, well water in San Diego County has never been a major source of water for agriculture. Not only is the supply limited, but the water quality (as mentioned) is often poor.

The question remains; if we do incorporate poor quality water into our irrigation scheme, how can it best be used to cause the least deleterious effect on our tree crops?

Fortunately we have a reclaimed water trial running with the city of Escondido, which is providing valuable information. The trial is now into its second year, and we know that pure reclaimed water (1000 ppm TDS with 300 ppm chloride) applied at 100% ETc will cause unacceptable tip burn and leaf drop in avocados. The avocados were irrigated using CIMIS station readings multiplied by the old UC crop coefficients (ranging from 0.35 in January to 0.55 in July) with an additional 10% for leaching. The total applied water per acre in the first year was only 2.25 ac ft per acre. The solution to the problem with reclaimed water may be increasing application to 150% ETc.

### Methods for utilizing salty water:

1. The most obvious method for handling salty water is to just use more water and irrigate more often. Avocado growers in San Diego County have long noted that groves irrigated with 4 acre feet of water per acre per year will have reduced tip burn to the point where it is almost non-existent. Coincidentally, these groves often have the highest yields. Longer sets will keep the salts leaching below the rootzone, and irrigating more often (at least twice a week during the summer) will tend to keep the salts diluted - tree roots are better able to exclude salts when the soil is moist. A pump failure and/or a missed irrigation or two in the summer will often result in severe tip burn which will occur about one month after this incident.

2. The bloom and fruit setting period is a very sensitive time in the life of the tree and the best quality water should be applied during this period. Blending of saltier water into better quality water should begin gradually later in the season with the poorest quality water being applied in the fall when evapotranspiration is declining.

3. Preliminary information from the reclaimed water trial on avocados has indicated that chloride can accumulate to high levels in the soil during the summer months, but is apparently not absorbed into the tree until late August. Therefore a heavy leaching irrigation with good quality water should be applied in early August. The duration of the leaching irrigation depends on the amount of salt accumulation in the soil. The EC of the soil extract after the leaching should be less than 1.3 for avocados, less than 1.7 for oranges and lemons, and less than 1.8 for grapefruit.

4. Another method for handling salty water is to simply apply it to crops that are less sensitive to salts. We have observed persimmons being irrigated this past summer with well water that averaged around 1400 ppm TDS. The crop did not appear to be affected by the salt, and tip burn on the leaves was minimal. Tables in the Western Fertilizer Handbook can be useful in comparing the sensitivities of various crops to salty water. For instance, tree crops with in-

creasing salt tolerance are avocados (the least tolerant), plums, almonds, grapes, apricots, peaches, walnuts, pears, apples, lemons, oranges, grapefruit, pomegranates, olives, figs, and dates (the most tolerant).

5. When wells are drilled we have often noticed that the poorest quality water is often found at shallow depths (down to 200' deep). Some well drillers case the wells down to 200' and then pump concrete up the outside of the well casing to prevent salty water from entering the well. The well is then drilled down to 600' to 1000' depth. One driller reports that the water quality using this technique improved from 1800 ppm to 300 ppm by excluding shallow salty water.

## Some Pros And Cons Of Citrus Rootstocks

Nicholas Sakovich  
University of California Farm Advisor  
Ventura/Santa Barbara Counties

*Many citrus growers will be setting out new trees this spring. Choosing the right rootstock for your particular site is very important and should be done with great care. Below I have listed some of the more important advantages and disadvantages of commonly used citrus rootstocks.*

### Macrophylla

*Advantages:*

1. Vigorous
2. Prolific yielding, especially at an early age
3. Tolerant to gummosis
4. Acceptable tolerance to boron, chlorides and a calcareous soil

*Disadvantages:*

1. Susceptible to sieve tube necrosis

### Rough Lemon

*Advantages:*

1. Vigorous
2. Does well in sandy soils
3. The Schaub rough lemon shows better tolerance to gummosis than other rough lemons
4. Good replant in absence of phytophthora and nematodes

thora and nematodes

*Disadvantages:*

1. Suckers badly
2. Poor fruit quality with oranges and mandarins

### Volkameriana

*Advantages:*

1. Shows some resistance to gummosis, though not immune
2. Vigorous
3. Compatible with Eureka lemon
4. Of the vigorous rootstocks, it is the most cold tolerant

*Disadvantages:*

1. In California, not yet widely used, therefore limited information
2. Poor fruit quality with oranges and mandarins

### Yuma Ponderosa

*Advantages:*

1. Consistently a top producer
2. Compatible with Eureka lemon

*Disadvantages:*

1. Suckers badly
2. Poor fruit quality with oranges and mandarins
3. Growers have little experience with this rootstock, but with its high yields small trials are encouraged with lemons

### Troyer/Carrizo Citrange

*Advantages:*

1. Excellent fruit quality
2. Tolerant to phytophthora

*Disadvantages:*

1. Unsatisfactory in calcareous soils
2. Incompatible with Eureka lemons

### Citrumelo 4475 (Swingle)

*Advantages:*

1. Tolerant to phytophthora and nematodes
2. Good cold hardiness

*Disadvantages:*

1. Unsatisfactory in calcareous soils
2. Incompatible with Eureka lemon
3. Unsatisfactory in clay soil

### Trifoliolate

*Advantages:*

1. Tolerant to phytophthora and nematodes
2. Because of this tolerance, a good

- replant
3. Cold hardy
  4. Excellent fruit quality
  5. Does well in clay soils

**Disadvantages:**

1. Unsatisfactory in calcareous soils
2. Incompatible with Eureka
3. Slow growing

**C-35 Citrange**

**Advantages:**

1. Tolerant to phytophthora and nematodes
2. High cropping efficiency
3. High yields, especially with valencias

**Disadvantages:**

1. Unsatisfactory in calcareous soils
2. Incompatible with Eureka
3. A smaller tree, depending on scion

**Sweet Orange**

**Advantages:**

1. Good producer, good quality
2. Compatible with Eureka

**Disadvantages:**

1. Susceptible to phytophthora and nematodes

For more complete information on citrus rootstocks, California Citrus Rootstocks (publication #21477) is available through University of California Cooperative Extension, 21150 Box Springs Rd., Moreno Valley, CA 92557. The cost is \$10.00; please make checks payable to *Regents - University of California*.

**Avocado Root Rot Watch**

Guy Witney  
University of California Farm Advisor  
Riverside/San Bernardino Counties

*After nearly a decade of drought many growers may be complacent when it comes to avocado root rot hazards. However, if wet conditions persist we may enter the*

*spring with some of the most conducive root rot conditions in years.*

Many hundreds of growers came into the fruit production business during the drought years; and although I am sure all are well informed of the danger of root rot, few have had to face the reality of a severe outbreak. The winter deluge of 1992/3 may well be the drought-buster we have all hoped for, but the wet conditions these storms have left behind are ideal for the rapid infection of groves by root rot in the coming spring.

**Upcoming Events:**

*Living With Agricultural Regulations*  
March 9 (Ventura) and March 11 (Escondido)  
Cosponsored by the University of California and the California Avocado Society  
Info: Escondido (619) 431-8980  
Ventura (805) 647-2262

*1993 Vertebrate Pest Control Workshops*  
March 22 (San Diego) March 24 (Fresno)  
March 26 (Chico)  
Info: (707) 744-1424 or (916) 757-8623

*New Agricultural Enterprise Development in San Diego County*  
May 1, Mira Costa College, Oceanside  
Sponsored by U.C. Cooperative Extension, San Diego County, Call (619) 694-2854

*1993 Citrus and Subtropical Fruit Showcase*  
May 19, San Bernardino Orange Show  
Citrus Institute, Citrus Building, Orange  
Showgrounds, San Bernardino  
For info. call (909) 888-6788 ext 419

The dry years of the last many seasons did not see the disappearance of root rot. On the contrary, it remained a problem in infected groves because trees were stressed by water deprivation and salt buildup. These stress conditions weakened trees already infected with the disease, limiting their ability to grow new roots (which is the most effective line of defense). If not treated in some way these trees eventually weakened and died. The decayed remains of infected trees are now the very source of the problem we will likely face this spring.

The pathogen survives in the soil primarily as chlamyospores in decaying roots. These are eventually released to the soil and are able to survive for several years. When soil temperatures are between 55 and 85 F, the chlamyospores germinate. At these soil temperatures, sporangia are also produced at active infection sites. Both Chlamyospores and sporangia release swimming zoospores which are able to infect new roots. If conditions are wet, these zoospores may be able to travel some distance, particularly in free water running down hillsides. Also, moist soil carried on shoes, car wheels, picking bins, or any other surface can carry the potential inoculum to new sites.

Always spray shoes with alcohol or use a copper foot bath when entering a grove, particularly when visiting several different areas. Keep vehicles on the road and never enter a known root rot site. Be sure that the packhouse is cleaning bins before redirecting them back to the field. Direct freely running water down established channels, away from downslope trees.

Aliette and Ridomil are registered for use on avocados for root rot. Both have proven effective but should be used before the trees reach a state of severe decline. Permits must be obtained from your Agricultural

Commissioner's office to treat root rot with Aliette and the infected trees must be mapped, test positive for Phytophthora, and the recommendation for treatment made by a licensed pest control advisor (PCA).

Trees in early stages of root rot may show leaf wilting and some leaf loss from the tops of trees. As the disease progresses, the canopy thins and twig dieback occurs. Eventually the entire tree may die. It is important to treat trees in the earliest stage possible; if disease presence is suspected, contact your local PCA or testing lab.

**Riverside COUNTY**

**NEWS**

**Bracing for the Perseae Mite**

*Riverside County has seen only minor infestations of avocado groves by the perseae mite; mostly confined to areas near the San Diego County line. However, we should be prepared for the worst scenario this spring and expect the spread of this pest through our major avocado growing areas.*

With this in mind, the following comments by Gary Bender on the mite's progress and control in San Diego County are worth noting:

After the heavy rains, we've noticed a dramatic decline in perseae mite (*Oligonychus perseae*) populations on many avocado groves. Without mites on the leaves, the predacious mite (*Typhlodromus helveolus*), has nothing to eat and you may be wasting your money releasing now. The bottom line: before you release predacious mites, make sure you see perseae mite activity.

Based on last year's observations, mite populations will probably increase dramatically in May. If you had perseae mite problems last year, you need to get on the waiting list for receiving *T. helveolus* from the insectary. **Growers should expect, however, to pay \$15 per 1000 - at \$12 (initial cost estimate) the insectories are taking a loss. The rearing technique is slow and expensive, and we need to support the insectories with this price.**

Assuming that sufficient mites are available for release in spring, there is an important lesson we have learned from this past season's experience: We have noticed that tree-to-tree spread of predacious mites seems to be fairly slow. It would be best to release mites on every tree (if you can afford to).

**The predators are not a cure - it may**

take several seasons for them to bring the perseae mites down to levels below economic damage.

We have a lot of unanswered questions. For instance, will we still have to spray with sulfur or Omite this year if we have released predacious mites? Perhaps if the biological control activity on leaves is low and the amount of leaf damage and fruit drop is high.

Will the chemicals kill the beneficial mites? We don't have good information on this and this is a crucial question. Overall, we think that more research dollars should be spent on studies looking at the basic biology of the mite, alternative chemicals, scouting for other predators in Mexico and better techniques for raising predators in the insectary.

**Bumps and Ridges on Lemons and Limes**

Cool, foggy weather, or rain, during bloom time can increase the incidence of botrytis fungus infection on blossom parts, and these infected parts, if lying on a young fruit, can stimulate cells to grow as bumps or ridges on the peel. With the loss of chemicals in recent years, we don't believe that we have anything left to control this problem. General preventative measures such as avoiding mechanical or chemical injury, protecting against frost, and pruning out dead twigs and wood, help reduce the incidence of botrytis. With good, sunny weather during the bloom, this problem should subside. However, several growers have reported early bloom as a result of the January rain followed by late January early February warm weather. February rain on these new flowers and

fruitlets will certainly result in an increase in botrytis damaged fruit.

**Spots On Avocado and Citrus Leaves**

After the prolonged rainy spell in January, several citrus and avocado groves throughout the county have developed large dead spots on leaves. We have determined that the leaf spots are caused by a fungus - *Colletotricum gloeosporioides*. The fungus is a common, symptomless invader of citrus and avocado leaves which usually causes no injury to the tissue. However, if adverse conditions exist (such as prolonged wet weather) this may cause excessive tissue stress, and the invading fungus is able to cause these symptoms on leaves. In the past, symptoms have been referred to as "weather spotting".

*G. Witney*

Guy Witney  
Farm Advisor, Riverside/San Bernardino Counties

*Rudy A. Neja*

Rudy Neja  
Farm Advisor, Riverside County

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# Riverside County



## Riverside County

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Carol Lovatt  
University of California  
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Riverside, CA 92521