CALIFORNIA'S OWN
NATIVE LANDSCAPE DESIGN, INC.

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GENERAL BACKGROUND ON ANTS

Lots of people have been experiencing mortality problems with many native species, such as Ceanothus, manzanita, mallow-like plants, and mounding perennials. One of the primary causes, surprisingly, appears to be invasion by Argentine ants! The increasingly hot, monsoonal weather of recent years has greatly promoted them. These ubiquitous pests nest in rootballs, placing insects like scale and aphids all over the ROOTS, which literally suck the life out of the plant from below, often undetected and beyond the reach of Safer soap and Tanglefoot (Figure 1).

Figure 1. Ceanothus killed by root scale apparently placed by Argentine ants. The rough bumps are individual scale insects. Note the cracking due to dehydration.

Argentine ants appear to be responsible for other horticultural threats. They plant innumerable types of weeds, including Veldt grass, spotted spurge, petty spurge, purslane, scarlet pimpernel, chickweed, brass buttons, Mexican feather grass, and dandelion, as well as natives like Miner's lettuce and Purple three awn grass (they're not very picky). Often massive infestations of weeds are associated with ant activity; they often reveal root colonization by the weeds they plant around the base. It appears these weeds can serve as additional nesting sites, allowing for exponential population growth.

Another concern, of grave consequence, is that these same ants may be spreading pathogens like Phytophthora, Pythium, Apricot dieback (commonly afflicting Ceanothus), and Verticillium wilt. Sudden Oak Death is just one example of Phytophthora, and Verticillium wilt is known to kill portions of plants like Bee's Bliss groundcover sage. Pathogens may be the ultimate cause of mortality in most cases.

Indications of Argentine ant presence may include:

- Lots of tiny black/brown non-biting ants (obviously!). They are the same type that get into our kitchens and trash.
- If pulling back the mulch from the base of the plant reveals ants, it's probably infested.

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- Sometimes the entrance to the nest is not at the immediate base of the plant. If you suspect an ant infestation, pull the mulch back here and there a couple feet away.
- Also look for little bumpy scale insects at the base of the trunk or higher. May be white, gray, or brown, and can be hard to detect because they look like rough bark
- Look for previously mentioned weeds around the base or marking their trails. The ants love to eat the small fleshy seed attachments and end up planting the seed as they go (see Fig. 2).

Figure 2. African veldt grass "planted" by Argentine ants marks the location of a nest in the roots of this now dead Salvia "Bee's bliss"

- As the ants remove soil from the roots, the plant may become "loose" (destabilized) in the soil and can be easily rocked back and forth.
- Often when we remove a recently dead manzanita or ceanothus, the dirt just falls away from the roots, leaving behind almost polished wood. Mallows and mallow-like plants, including Fremontodendron, and Ceanothus appear to be especially vulnerable. Soil removal from around roots may be partly responsible for downing many trees in powerful storms.

Ants thrive on the honeydew secreted by sucking insects, so they have evolved farming methodology to promote them. The ants loosen and remove soil from the roots, then apparently place the scale all over them in large galleries. This alone can be tremendously damaging to the plants. The ants will then defend them with their lives, even attacking lady bugs and lacewings that try to eat above-ground scale or aphids. Ants can also drive away pollinators as they compete for the nectar. Because most of the scale is below ground, they are much easier for ants to defend. However, it appears that in the absence of their ant protectors, sucking insects are devoured quickly by natural predators or suffocate from an accumulation of honeydew. Hence, we target the ants.

IMPORTANT: Treating the PERIMETER to divide & conquer ant colonization

Dealing with infestations usually requires 2 approaches: Part 1 involves localized treatment of individual plants (only those threatened with imminent collapse if nothing is done) to kill the scale that is currently damaging the roots, and Part 2 is to set up a bait program to eradicate ant nests in the long term. **In both cases** we create a defensive repellant barrier around individual planters to segregate populations and better divide & conquer individual nests (see next section and page 7 for instructions).

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We begin all treatments by spraying a concentrated, unbroken line of synthetic pyrethroid (or pyrethrin if you are restricted to organic products only) around the perimerter and/or discrete sections of a yard to prevent additional trails coming into your property from the neighbors or other areas, thus isolating the treatments. **Using a hose end sprayer is recommended as the increased water delivery drives it down more.** We have found concentrated UP-Star Gold™ or Bifen XTS™, available at many farm & garden supply stores or on-line, to be an acceptable product for this, with an efficacy of up to 3 months. Www.domyown.com has been an excellent resource. There are other concentrated products, like Home Defense Max Concentrate™, that also contain Bifenthrin – ALWAYS FOLLOW PERSONAL PROTECTIVE EQUIPMENT (PPE) INSTRUCTIONS ON LABEL AND FOLLOW THE LABEL WHEN MIXING. **See Page 9**.

How we treat for ant/scale root infestations to save a dying plant

To treat an active infestation, we spray the lower part of the plant and saturate the soil underneath to kill the scale and ants in the root ball. This is typically done for plants that are showing signs of collapse, often with dropping or yellowing leaves. IMPORTANT: NEVER SPRAY OPENING FLOWER BUDS NOR FLOWERS, WHICH MAY KILL POLLINATORS! We have developed a contact-only approach in order to replace systemic neonicotinoid treatments that can be highly destructive to pollinators. We utilize a mix of synthetic pyrethroid (as an insecticide/repellant), Neem oil (to natural fungicide/miticide), and Superthrive™ (a mix of hormones & vitamins to stimulate root regrowth). We HIGHLY recommend the use of a hose-end sprayer, with the component volumes reflecting the ratio of recommended product per gallon. If you are restricted to organic products only, Monterey makes an excellent organic product called Fruit Tree Spray Plus™, which contains Pyrethrin and

Neem Oil, to which we add the Superthrive™. Since natural pyrethrin is sensitive to high pH, we recommend adding a teaspoon per gallon of No Foam B, which is a surfactant/buffer that neutralizes our 8+ pH water, making pyrethrin much more effective. However, it only last 1-2 days in the soil. ALWAYS FOLLOW PERSONAL PROTECTIVE EQUIPMENT (PPE) INSTRUCTION ON LABEL!

If using a synthetic pyrethroid mixed with Neem oil & Superthrive™, following the recommended dilution ratios, there is no need to add a buffer like No Foam B™ as a water pH of up to 9 is acceptable. Pyrethroids, like Bifenthrin or Pyrethrum, last months in the soil but are not considered organic. With any of these methods, spray the plant and immediate understory only, as described above, because we do not want to kill the rest of the ant colony, so that the

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workers are available for Part 2, bringing the bait back to the colonies to kill the queens, thus eradicating the nests. There may be even more organic approaches, like beneficial nematodes, worm castings, and diatomaceous earth, that we haven't tested sufficiently yet. **See Page 9 for our recipes.**

How we knock out colonies for long term control

The best time to bait for ants is the end of February through March, when the colonies are ramping up their numbers following the cooler winter months. For Part 2 we use a bait like Advion, approved by several UC Riverside entomologists, which comes in either bait station or gel form (see Figure 3). Advion arena bait stations are somewhat protein based, in that the bait is peanut butter. The gel is more sugar based, but very attractive to the ants. **It is very effective to squirt little lines of gel within the Arena bait stations, around the internal bait holder, which seems to make them irresistible to ants!**

Argentine ants seem to go back and forth between sugar and protein in preference. Both types of bait have been extremely effective, especially during the warmer months when the ants are most active, knocking out most of the colonies within a week or two. The bait is highly targeted to just Argentine ants and should have no effect on desirable insects, other than increasing the number of good bugs in their absence (we have even seen native Harvester ants re-colonizing areas once the Argentine ants are controlled). The key is that it acts slowly enough to be brought back to the nests and fed to the queen, which ends up dying from the accumulation. Unfortunately, most baits kill the workers too quickly and it doesn't make it back to the queens and larva. Workers only live about 40 days; queens can live upwards of 15 years, pumping out up to 800 babies per month when active, and there may be hundreds of queens on any given property.

Figure 3. Photo of Advion Ant Bait Arenas (30ct) and Advion Ant gel.

Our tests with Advion have achieved about 80% eradication in just 1-2 weeks. What is significant is that in the absence of ants, most of the problems start to disappear. It remains to be seen if this is a "silver bullet", and whether it may turn out to be the main issue with higher native mortality in landscape situations. This is fairly new insight, but it is becoming apparent that the level of the problem is enormous, and we have been able to bring

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hundreds of plants back from the brink of death using these methods.

We have discovered that many Advion arena bait stations were being devoured quickly and seemingly without end. Thinking this method might be insufficient to stem the apparent onslaught of ants, a midnight investigation revealed hordes of – slugs! We now recommend putting Sluggo™ (non-toxic and unattractive to animals) bait around each station or placing the station on some copper foil. The baits are lasting much longer now, but it is too early to tell whether the snail bait may be discouraging ants from utilizing the Advion. Copper foil may end up being the better solution.

Figure 4: Advion Arena Bait Station

There are occasionally other issues, like pathogens un-related to ants (if there are any), that can lead to native plant mortality, but it looks like ants may be responsible as much as 75% of the time. Both the Advion Arena Ant Bait stations and the Advion Ant Gel are available on Amazon, or can be ordered through most local farm & garden supply stores.

It appears that ants will often abandon baits that have been determined to be harmful to the colony. Therefore, it can be a good strategy to use different methodologies (or even different brands of Pyrethroids) at different times.

There is another treatment out there that has at times been quite effective but can also be a bit spotty. It is called Gourmet Liquid Ant Bait (see Figure 5), which is a glucose/protein-based bait with 1% boric acid content (we usually dilute this by 50% with **distilled** water). The problem with the Terro baits available at Home Depot is that they are way too strong, at 5.4% concentration. They kill the workers too quickly, so the bait rarely makes it back to the nest. It may be a strategy to dilute Terro baits with distilled (not chlorinated) water in a 4:1 ratio, but you will need to add sugar back to the solution to restore the sugar's concentration. The Gourmet Liquid Ant Bait is loaded into KM AntPro dispensers and placed in shady areas generally in a 50 to 75' grid on your property. They should be located

Figure 5. KM AntPro station and Gourmet Liquid Ant

at least a few feet away from the ant trails in order to entice scouts to set up scent trails that bring in the workers. Follow the instructions as precisely as you can. If you have no choice but to locate the AntPro dispensers out in the open, you can place a tilted bucket (or other object) over the dispenser to shade it. Shim it slightly underneath so that the ants can get under it.

Many entomologists recommend starting a bait program in February to March, when the colonies are gearing up for summer. They also recommend using a combination of all approaches, as ants will change appetite throughout the year.

For those do-it-yourselfers out there, here is our homemade sugar-based bait that gets you to about 1% Boric acid concentration:

1. Dissolve 1 teaspoon of boric acid crystals (available at most home improvement or farm & garden stores) and 6 tablespoons of sugar in 2 cups of **distilled** water. Mix till all the boric acid crystals have dissolved.
2. To make a bait station, punch holes in the sides of a plastic container (such as a margarine tub) and place the soaked cotton balls inside. Cover the container with the lid so it doesn't dry out. The ants will enter through the holes to get the bait. The holes should be big enough to allow ants entry but no bigger than about ¼" diameter.
3. Place the bait station where you see active ants.
4. Refresh the bait and clean the containers at least once per week. Be patient, as the ants are taking it back to the nest and dosing the queens over time.
5. After a few weeks you can dilute the boric acid to around ½% and continue to use the solution for long term control. The low dose assures that the ants will continue to take the bait back to the nest.

Having both forms of bait (protein and sugar based) on hand may be the best approach as the colonies may change their appetites from time to time.

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Before and after treatment photos

Proof is in the pudding, as they say. Here are some before and after photos of native plants that were experiencing serious decline, but were restored to health through the root soak treatments described above. One critical step that is often missed, however, is the perimeter soak, which is essential to keeping outside ants from replacing those that have died in those garden colonies (they are a non-competitive super-colony, for the most part).

Ceanothus "Owlswood blue" before:

Ceanothus "Owlswood blue" after:

Fremontodendron "West hills" before:

Fremontodendron "West hills" after:

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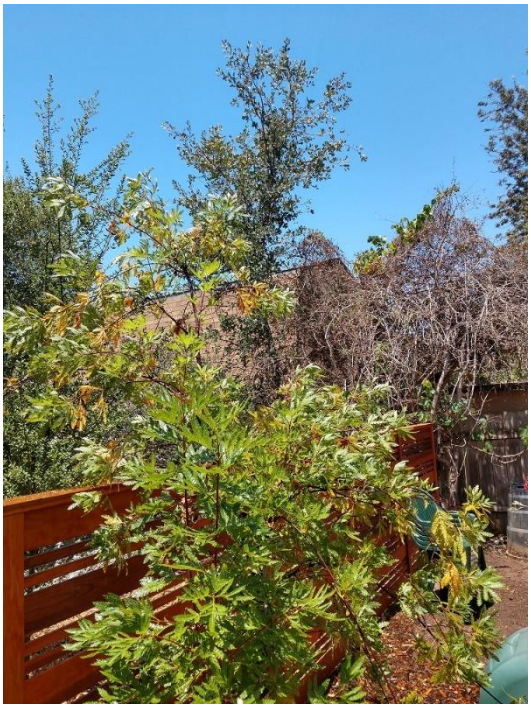
Lyonothamnus floribundus before:



Lyonothamnus floribundus after:

Ribes sanguineum glutinosum before:

Ribes sanguineum glutinosum after:

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Our Treatments for Argentine ants

NOTE: WE ARE SHARING WHAT HAS WORKED WELL FOR US. ALWAYS CHECK WITH A LOCAL PEST CONTROL ADVISOR OR COUNTY AG DEPARTMENT FOR SPECIFIC RECOMMENDATONS. ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT AS SPECIFIED ON PRODUCT LABELS.

Perimeter spray

In our experience it is helpful to use a hose-end sprayer to first spray the perimeter of planters and/or the property with just the Pyrethrin/Pyrethroid to discourage infiltration of outside ants into treatment areas (save the Neem oil & Superthrive for the plants). **We set the rate on the dial to the setting shown for just the Pyrethrin/Pyrethroid (e.g. 1 teaspoon per gallon for Bifen XTS, or 6 teaspoons per gallon for Home Defense Max Concentrate).**

32 oz. Hose end sprayer application

The hose-end spray bottle we use is typically 32 oz. The amounts (tan color) are in ounces. We water dry ground below the dripline of the plant thoroughly the night before (unnecessary for already moist ground) to enhance the wettability of the soil. **The application rate we use, on the dial of the sprayer, is shown by the asterisk comment (in red)**. We usually soak the ground with the treatment at least ½ of the diameter of the dripline. We may hit other parts of the plant, BUT DO NOT CONTACT FLOWERS OR BREAKING BUDS. Wash any of these parts off immediately with clean water if accidentally sprayed.

Bucket drench

We water dry ground below the dripline of the plant thoroughly the night before (unnecessary for already moist ground) to enhance the wettability of the soil. We use 0.5 gallons of mix for perennials, 1-2 gallon for shrubs, 3 gallons for large shrubs, 3-5 gallons for small trees, & 5-10 gallons for larger trees. We soak the ground with the treatment at least ½ of the diameter of the dripline. We may hit other parts of the plant, BUT DO NOT CONTACT FLOWERS OR BREAKING BUDS. Wash any of these parts off immediately with clean water if accidentally sprayed.

Mix ratios for Non-Systemic Ant Control

3/4/2022

"Organic" mixes (Only effective for a few days)

Product:	Evergreen Pyrethrin (5%)	Superthrive	No Foam B	Neem oil (Add Last)	Total	
Teaspoons per gallon (bucket drench):	3	1	1	6	11	**teaspoons**
32 oz. hose-end sprayer*	9	3	3	17	32	**ounces**

*Set hose-end bottle sprayer to 1.5 oz. per gallon

Product: ϒ	Monterey Fruit Tree Spray Plus	Superthrive	No Foam B	Total		
Teaspoons per gallon (bucket drench):	6	1	1	8	**teaspoons**	
32 oz. hose-end sprayer *	24	4	4	32	**ounces**	

*Set hose-end bottle sprayer to 1 oz. per gallon

ϒ**Monterey Fruit Tree Spray Plus already contains both Pyrethrin and Neem oil.**

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NOTE: ALWAYS CHECK WITH A LOCAL PEST CONTROL ADVISOR OR COUNTY AG DEPARTMENT FOR SPECIFIC RECOMMENDATONS. FOLLOW ALL PERSONAL PROTECTIVE EQUIPMENT (PPE) RECOMMENDATIONS ON PRODUCT LABELS. NEVER APPLY WITHIN 100' OF NATURAL WATER SOURCES-HIGHLY TOXIC TO AQUATIC ORGANISMS & FISH.

"Synthetic" mixes

Note: **Bifenthrin** is the active ingredient

Product:	Home Defense Max concentrate (2.4%)	Superthrive	Neem oil (Add Last)	Total	
Teaspoons per gallon:	6	1	6	13	**teaspoons**
32 oz. hose-end sprayer *	14	3	15	32	**ounces**
*Set hose-end bottle sprayer to 2 oz. per gallon					

Product:	Bifen XTS (25.1%)	Superthrive	Neem oil (Add Last)	Total	
Teaspoons per gallon:	1	1	6	8	**teaspoons**
32 oz. hose-end sprayer *	4	4	24	32	**ounces**
*Set hose-end bottle sprayer to 1 oz. per gallon					

Product:	Talstar or "Up-star Gold" (7.9%)	Superthrive	Neem oil (Add Last)	Total	
Teaspoons per gallon:	4	1	6	11	**teaspoons**
32 oz. hose-end sprayer *	12	3	17	32	**ounces**
*Set hose-end bottle sprayer to 1.5 oz. per gallon					

WE SPRAY PERIMETERS OF PLANTER AREAS WITH BIFENTHRIN PRODUCT **ONLY** ACCORDING TO LABEL INSTRUCTIONS

Note: Bifen XTS is available at www.domyown.com. The rest of the constituents can usually be found at local farm & garden/irrigation suppliers (like Grangetto's, Site One, or Ewing), as well as Amazon.