

Diagnosing Landscape/Garden Problems

Problem diagnosis is similar to successful gambling – you need to play the odds. In diagnosis you start by assuming the most probable cause and as Curtis Smith used to say – look for horses, not zebras. Observing your garden to learn what's normal and what's not is the way to hone your skills. Look at how much plant damage is actually occurring – does that damage recover easily or is it fatal, is it worth treating or does the problem go away naturally? Plants have coexisted with insects and diseases for eons and survived without treatment so we know some chewing on the leaves and some amount of mold is expected. We need to determine if and when the damage is bad enough to warrant action.

The approach I take to diagnosis is called the “disease triangle”. To get an infection three things need to be aligned. You need to have a pathogen (bacteria, fungi, nematodes, or virus), a susceptible host plant, and the right environment (temperature, sun/shade, humidity, time of year). I believe this same situation exists with insects. You need a damage-doing insect, a susceptible/preferred host, and the right environment. Insects and diseases often prefer specific plants and do not attack others – for example pine bark beetles attack pines and sometime just pinons. This is why knowing the name of the plant and the plant family is helpful in diagnosis. More importantly, insects and diseases typically do not attack healthy plants. With very few exceptions, a plant has to be putting out a distress call for insects and diseases to attack. Then the role of the insect and/or disease is to help the plant decay into the soil to return the nutrients that were absorbed during the plant's lifetime.

Playing the odds then a stressed plant is much more likely to be attacked by insects and diseases. One of the key points you should take away from this article is **that if you want to reduce the problems with your plants, start by reducing or eliminating the stress.**

There are two possible sources of plant stress: man-made and natural. Man-made stresses are much more probable and this is where you should begin looking. Some man-made sources include: salts put on driveways and sidewalks to melt snow, Weed-n-Fed lawn fertilizer which contains a broad leaf weed killer (think of trees and shrubs as broad leaf plants), soil compaction caused by heavy equipment or just walking especially when the soil is damp, over or under watering, and even jumping a wall and landing on a shrub. Other man-made sources include paint/lube/stucco/concrete clean-up, trenching through roots (e.g. irrigation), drift when spraying herbicides, pet urine, and pruning by truck along the street or driveway. We are our own worst enemy. Many times plants won't recover from our or our pet's treatment of them. Of lesser probability is insect damage and of lowest probability is disease. So think man-made, then insect, and finally disease as the cause when diagnosing problems. Natural sources of plant stress include: unusual freezes, a wet spring, prolonged drought, highly volatile temperatures, violent winds, and high temperatures among others.

Against damaging insects and disease we have nature's helpers that can often treat a problem without us getting involved. Both predators and parasitoids help control prey. You've certainly seen predators like lady bird beetles devour prey like aphids. The larva of lady bird beetles look like little alligators and they are even more voracious than their parents. However, the presence of lots of aphids is not a cause for the launch of a serious chemical attack. Leave them in place and the lady bugs will eat them. Remove them and there's no food source for the beetles so they won't come. In addition when you use chemical and some organic sprays, the predators are often more susceptible than the prey/pest. When treated continually with the same chemical the prey develop tolerance. These survivors breed even

more tolerant survivors and the chemicals become ineffective. The least damaging treatments then are the best and most effective treatments - like a hard spray of water, a diluted milk solution for fungi, hand picking, or just doing nothing and allowing natural enemies to do the work.

If treating for insects you need to remember that insects have growth stages. It does no good to treat a butterfly when the caterpillar is the one eating the leaves. So treating for insect damage needs to be done when the insect is in the stage where treatment will be most effective. An example of this is scale, a crawling insect found on the bark or branches of trees and shrubs. Once the shell on the scale has hardened, dormant oil is ineffective. But applied when the shell is still soft, dormant oil will suffocate the scale.

With insects and diseases it is important to know the mode of action of the control. Dormant oil and insecticidal soap for example must be sprayed directly on the insect because their mode of action is to suffocate the pest. If you spray the leaf with oil or soap thinking the pest is going to eat the leaf and die, you'll be unsuccessful. If the control is systemic, then it must be absorbed into the vascular system of the plant. A pest that eats the leaves *may* die. But if the particular pest doesn't chew leaves or if the control doesn't work on that particular pest, then it will be ineffective. You need to **READ THE LABEL** to know 1) mode of action for the control, 2) what insects or diseases it controls, and 3) how and when to use it. The label also tells you what to do if the control is ingested by little humans, how to store it, how to dispose of it, and how toxic it is.

So what are we looking for when we go out into the garden? Usually we see a symptom of the problem: chewed leaves or spots in leaves, emergence holes in twigs, brown leaf edges, needle drop, wilted leaves, branch dieback, or frass (insect poop). We can often tell what the cause was just by knowing the plant or plant family and seeing the type of damage. We might also see signs on the leaves: white powder, a sticky solution (aka honeydew) with a black mold, or a rusty powder.

All of the above assumes you are solving the problem. If instead you want to take the problem to someone else, you need to provide the plant name, a photo of the problem both close in and one further away that shows the environment (*pictures that are in-focus are most helpful*), recent changes in the environment, recent weather when the problem started occurring, location of the plant and surrounding conditions (north facing, near a wall, driveway...), your soil type, and how you care for it including watering and fertilizing. If you are going to bring in a sample, provide one that shows both live as well as dead tissue. I have to tell you – I can't diagnose the problem from a dead branch or diagnose a disease from a rotted sample. Insects are best brought in on an affected branch or leaf in a sealed jar with holes in the lid. Disease samples should be placed in a paper envelope or a jar similar to insects, part live tissue and part dead tissue, and quickly before the pathogen is gone and only secondary feeders are present.

Finally if you want to enjoy your garden more and spend less time diagnosing problems: choose resistant plants, keep your plants and soil healthy (organic matter, if needed), diversify your plantings, and promote habitat for the predators, parasitoids, and good pathogens. Sources for more information include the web sites from universities and their cooperative extension services (regional is better than national). Sources for insect photos and management strategies include the Texas Bug book or the UC Davis website.