

Algae Headaches

Identify the causes of algae and learn how to control it.

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Chinese algae eaters can help to reduce certain types of algae, but their waste must be removed or the nutrients in the algae will not go away.

Photo Credit: Joshua Wiegert

There's nothing that can make a healthy aquarium look ugly as easily as algae. Even a tank that may not be decorated according to your tastes can eventually appear to be attractive, but no one can forgive those spots on the glass, tufts on the decorations or the green shade in the water. Algae problems are one of the common difficulties with aquariums and one which all aquarists share.

Algae Etymology

First off, let's get a little grammar out of the way. Algae is a plural word. The singular form of it is alga. It's a little like the word data, in that we don't generally speak of one alga or one datum. Algae is almost always plural. So, it is technically incorrect to say, "Algae is growing on my glass." Rather, "Algae are growing on the glass." The adjective form of it would be algal, so if you want to be absolutely correct, "I have algae growth on my rocks" is wrong, and "I have algal growth ..." is correct.

The reason algae is a plural word is because you can't really have one alga. Algae are single-celled, nearly microscopic organisms. There are certain exceptions — kelp, for instance, are algae — but the ones we'll focus on are single-celled. Some are large enough that an individual cell can be viewed with the naked eye, but most are quite tiny. If you've ever grown *Nitella* spp. or *Chara* spp. in the home aquarium, these are actually algae as well. An individual *Nitella* spp. cell is quite long and can be viewed in some detail with a magnifying glass.

Classification

The term "algae" can refer to a number of different organisms, which actually cross three of the five traditional kingdoms: plants, bacteria and protozoa. For the sake of sanity, we'll use "algae" in its vernacular form to mean any sort of plantlike growth in the aquarium that is generally a pest. We'll ignore classification issues anywhere possible and not worry too much about the difference between chlorophytes and cyanobacteria.

Though unsightly, algae are almost never harmful in the aquarium. With heavy blooms, it is possible that algae may deplete the aquarium water of oxygen overnight. Certain species of photosynthetic bacteria — especially cyanobacteria — are known to produce chemicals to inhibit the growth of plants. These chemicals, called allelopathic chemicals, also act as predator inhibitors. In sufficient quantity, they can be quite lethal. Occasionally, news reports of pets killed from drinking contaminated water will circulate — these are one of the rare exceptions where algae actually are harmful.

Generally, however, algae can actually benefit the aquarium. Whenever fish food, or any other material containing nutrients (plants, fish or even nutrient-laden tap water), is put into the aquarium, the nutrients remain in the aquarium until they are physically removed. This includes chemicals that can be toxic or stressful to fish at sufficient quantities, such as ammonia, nitrite and nitrate. If your replacement water happens to have nutrients of any kind in it, then you'll never see nutrient levels fall below the tap level, unless these nutrients are either reduced to another form (e.g., ammonia to nitrite) or sequestered inside something. Algae do just this — they use the nutrients in the water to grow and reproduce. In the case of toxic chemicals, such as ammonia, they are locked away inside the algae.

"Green water" blooms are common in new aquariums because of the build up of ammonia and the lack of beneficial bacteria. Doubtless, green water has saved many fish from an untimely death due to ammonia build-up by converting it into more algae. When these algae are finally removed from the aquarium, so too are the nutrients.

Causes of Excess Algae

Algae are going to appear in your tank, and that's all there is to it. Every aquarium has algae in it, at least in small amounts. But there are certain events that can trigger serious problems, or result in overproduction of algae (an event referred to as a "bloom"). For all intents and purposes, algae are plants. Just like any other plant, they do best with a lot of light and a lot of nutrients. If the tank lights are on too much, you'll get algae blooms. If there are too many nutrients in the water, you'll get algae blooms.

Nutrients can come in many forms. Excess fish food is the most common culprit. With too much fish food, food is left uneaten and remains in the tank. This waste settles and becomes mulm, which eventually becomes algae food. The second most common culprit is the presence of too many fish in the aquarium. In this case, you may never see excess fish food in the tank, but the fish are producing enough waste to fuel algae growth. A low-grade fish food may also result in the fish excreting too much waste. Lastly, your water supply may be high in plant nutrients, such as nitrogenous waste or phosphates.

After the nitrogenous wastes (ammonia, nitrite, nitrate), the most important two nutrients for algae are phosphate and silicate. Phosphate can come from fish foods, certain chemicals (especially to control pH) and particularly the tap water. Silicates most often come from the tap water.

Basic Types of Algae

Cloudy water is probably the most common form of pest algae, although this may be due not to algae but bacteria. Typically, algal blooms give the tank a greenish hue, while bacterial blooms have a white or yellow color. Both can be caused by excess nutrients and are particularly common in new tanks during the cycle process. Green water blooms are usually caused by ammonia or excess light.

Brown or rust-colored spots on the glass and gravel are due to diatom algae. Diatoms are incredibly interesting algae that actually produce a glass shell (called a frustule) that they carry around with them. Beneath the microscope, these shells are quite beautiful and persistent; they're an important paleological tool. Diatoms require silicates to survive, because this is what their shell is made from.

Green or red slime in the aquarium are bacterial — the dreaded cyanobacteria. Fortunately, I've never heard of anyone having cyanobacterial blooms of sufficient strength to cause a fish die-off, but these are the ones that can produce allelopathic chemicals. These algae tend to occur most in tanks that have high mulm concentrations. Many cyanobacteria are able to "fix" their own nitrogen — meaning they don't need to use nitrate or ammonia in the aquarium. They feed, instead, off of high phosphates.

String algae tend to form in aquaria with moderate to high nutrient levels and lots of light, while beard or tuft algae will form in tanks with any amount of light and high nutrient levels. String algae may not be attached to anything, and is quite fibrous. String algae may also be cyanobacterial, depending on type. Beard and tuft algae are darker in color and generally attach to solid surfaces.

Methods of Control

The first thing to understand about controlling algae is that algae are not a problem but a symptom of a problem. Imagine having the chicken pox. Which treatment would you rather take: antibiotics, bed rest and plenty of fluids, or an application of make-up? With the first, you'll have red dots all over you for a week or so. With the second, you won't have any red dots (as long as you keep up with the make-up), but you may never get well.

Most algae treatments are akin to the make-up treatment. They somehow treat the algae without attacking the root of the problem. The presence of too much light or too many nutrients causes algae. If too much light is causing the algae problems, the solution is obvious. Many parents decide that an aquarium would make an excellent night-light, and the aquarium light is kept on constantly. These tanks always suffer from problem algae. Others just simply turn the light on in the morning and off before bed, resulting in 16-hours of light.

Tank lights should only be on between six and eight hours a day (unless you're growing plants or corals). If you like to turn the light on in the morning before work and enjoy the aquarium in the evening, consider purchasing a timer that will shut the lights off during the middle of the day. Most can be set to turn lights on and off more than once.

Make sure the tank is not receiving direct sunlight. If it is, consider moving the aquarium, or purchasing a background to block the light. You may have to place a background on a side of the aquarium too.

Nutrient levels are harder to deal with. Make sure the fish food you are purchasing is high quality and is a reputable brand. Most will list the levels of phosphate in them — try switching to one that has a lower content. Be certain that you're not overfeeding the fish. The "one-minute" rule has saved many new aquarists. If any fish food remains in the aquarium after one minute, you've fed your fish too much. I personally follow more of a 30-second rule: if food remains uneaten after 30 seconds, it's too much. When feeding flakes, none should ever settle to the bottom.

You can also purchase a phosphate and a silicate test kit and determine if your tap water is the problem. The water supply company may also be able to tell you what these levels are (probably with more precision than any test kit). In order to

lower phosphates and silicates, you must purchase a phosphate remover. These are granules that resemble activated carbon and are used similarly. Not all remove silicates, though many do.

Prevention

Once we've got the root of the problem under control, we can move on and begin to treat the symptoms. Controlling the problem is the hard part. Controlling the symptoms are a little easier. There are essentially four ways to deal with problem algae. The first method is hand-removal control, which is also the most efficient. This can be as simple as using an algae pad to wipe down the sides of the aquarium and ornaments. One should always do a water change after cleaning the aquarium glass. Doing so will ensure that any algae scraped from the sides will be removed from the aquarium. Otherwise, it may resettle, or die and add to the nutrient problems — scraping it off doesn't remove it, it just relocates it!

There are a number of different algae scrapers available. The simplest is the algae pad, which is either a hand-held scrubbing pad or one attached to a handle. I prefer them without the handle, as I can get into corners a little easier. One should always use an algae pad purchased at an aquarium store. Kitchen pads, sponges and the like may contain chemicals or soaps that may kill your fish. Other models use either plastic or metal razor blades to really scrape algae — use caution not to scratch the tank. Still others involve magnets: one held on the outside, the other inside. These keep the hands dry. I prefer the type that floats, because the magnet won't drop to the bottom of the aquarium and require fishing out. Use caution near the bottom of the tank, as it is easy to get a piece of gravel caught between the two magnets and scratch the tank.

Algae Eaters

Secondly, you can use a fish to do the job for you. Novice aquarists often purchase snails, Chinese algae eaters, plecos and a myriad of other creatures to control algae in their community aquariums. More often than not, these fish either don't do a good enough job or soon die (generally from starvation). The problem with using a fish to control algae is that no one bothered to inform these fish that it is their job to keep the tank clean. They may be happily eating algae in the tank — it's just that their favorite place to nosh is the back wall. Or, the tank may have the wrong type of algae. Most algae eaters will not eat cyanobacteria, diatoms or tuft and beard algae. So while there's plenty of "algae" in the tank, there's nothing for the poor algae eater to eat.

Many algae eaters will eat all the algae in the tank and then starve. It is important that any algae eater's diet be supplemented with algae tablets or vegetables. Further, don't expect miracles. While they may help out a little bit, it's your job to keep the tank clean, not theirs. Purchase a pleco or other algae eater only if you have the tank space and the desire to keep it. Be sure to check into the long-term needs of these fish. The common pleco, by the way, can easily reach 18 inches or more. Chinese algae eaters when they reach about 3 to 4 inches stop eating algae (and may start eating fish).

Chemicals

The most desperate solution to an algae problem is chemical. Algal controllers come in a number of forms, from liquids to pellets and even fizz tablets. All are generally herbicides and may harm plants. The big problem with these chemicals is that the algae remain in the aquarium indefinitely, and they're just dead, though their nutrient content does not leave the aquarium.

Dead algae may be quite persistent. It may also pollute the water, especially in the case of severe blooms. This may also cause a serious decrease in available oxygen to the fish. Because the algae remain in the aquarium, they are just broken down into new nutrients that can be utilized by new growing algae. Many algae controllers also will kill snails, shrimp and other inverts. Be careful when using these, and do regular water changes.

In the case of cyanobacterial (slime algae) blooms, a common treatment is to use antibiotics. These algae are actually bacteria, and things like penicillin will kill them. However, the trivial use of antibiotics in the aquarium should be discouraged. Not only can it produce resistant strains of bacteria, including pathogens, but it can also wipe out your biofilter!

UV Sterilizer

Lastly, you can try a UV sterilizer. For many people, this is simply the only solution, particularly in ponds with green water. A UV sterilizer is a closed cylinder through which water is pumped. Inside the cylinder an ultraviolet bulb is housed. As the water passes through, anything in it is zapped by UV light and killed. These can literally clear green water overnight. The UV light has no effect on fish; it only kills stuff that is pumped through the cylinder. This can include disease organisms as well as other microorganisms, some of which may be desirable. In ponds, for example, the UV light will kill Daphnia and other zooplankton.

While the UV sterilizer can be the miracle shot for cloudy water, it does have the same downside as chemical solutions (although it lacks the side effects of harming plants and invertebrates). Dead algae remains in the water. However, because it doesn't kill everything at once, just whatever passes through it, the effect is usually not as dramatic.

The other downer for the UV sterilizer is that it can't control algae that grow attached to surfaces. There's no way to sterilize the sides of the pond or tank. However, these algae do produce spores, which move through the water column and will be eliminated by the UV sterilizer, which will reduce the overall population of algae.

Best Practices

To properly control algae, use this approach: 1) limit light and nutrient input, even if this means reducing the light or food to less than usual levels, keep the tank lights off for a few days and feed every other day — it is virtually impossible to starve fish to death without actually trying; 2) remove as much algae as possible, scrub down the tank, remove ornaments, scrub and wash those, and do a water change to physically remove the algae and 3) eliminate nutrients from the aquarium by using phosphate, silicate or nitrate remover as necessary.

Large blooms of algae are typically indicative of water-quality problems, which should be addressed not only to get rid of the algae but for the health of the fish. Typical algae "problems" are never truly detrimental to the aquarium, no matter how unsightly they may be. Address the problem, not the symptoms.