

Slug and Bush Snail Problems?

Solved!

Text by Chuck Oldenburg

I HAVE BEEN growing orchids for over 20 years and have had many struggles along the way: learning how much and when to water, figuring out the optimum light level to maximize flowers but not burn the leaves, battling with scale and other pests and coping with the depression of finding a favorite plant infected by a virus. However, no problem has given me the headache and struggle that I have faced with slugs and bush snails.

I built my greenhouse 23 years ago and shortly afterward slugs started to appear. Some moved in naturally, but I suspect many were stowaways in plants brought in from nurseries and fellow orchid growers. My greenhouse in western Pennsylvania is the ideal habitat for slugs and bush snails: it is moist, warm, and has a plethora of food throughout the four seasons. At the time, I did not think it was a big problem, after all they are small and move at a snail's pace (ha! ha! get it?). How much damage could they possibly do? Like a lot of other orchid growers, I had to find out the hard way — a lot.

We need to talk about the enemy. There are at least two species of slugs living in my greenhouse and at least one species of snail. The most predominant species is the gray garden slug, *Deroceras reticulatum*. It is a common agricultural pest and anyone who has ever grown a garden has observed these voracious creatures at work.

Less common in the greenhouse, but prevalent nonetheless, is the European black or red slug, *Arion subfuscus*. This species does not appear to be as prolific as the gray garden slug, but they take a fancy to freshly opened cattleya flowers. I have noticed other species of slugs to a lesser extent, but they do not appear to be as prolific as the gray garden slug or European slug or their numbers would be higher.

A lot of my pots are infested with bush snails (*Zonitoides arboreus*). At first, I did not pay much attention to them because they are small (3/16 inch [0.5 cm] in diameter) and rather cute. However, they are much like icebergs: you have to multiply what you see on the surface by 10 to get an idea of how many are actually in the pot. Bush snails feed on the green



tips of the roots. Enough of them will stunt the growth of the plant and lead to no flowering and a slow decline in the overall health of the plant.

With a background in engineering and good with my hands, I designed and built my 35 × 17 foot (10.7 × 5.2 m) greenhouse entirely by myself. However, I made a major error during the construction phase of my endeavor. I decided to fill the benches and line the floor with tons and tons of pea gravel. Little did I know that the pea gravel is a great habitat for slugs and snails and gives them a warm, moist place to hide during the daylight hours. I

- [1] Grey field slug (*Deroceras reticulatum*). Courtesy of hedera.baltica at <https://flickr.com/photos/125741467@N05/50965453392>. Wikimedia Commons.
- [2] European black or red slug (*Arion subfuscus*). Courtesy of Aleksandrs Balodis, Latvia. Wikimedia Commons.
- [3] Common garden snail (*Cornu aspersum*) feeding on a cattleya flower.
- [4] Slug and snail damage, especially that of bush snails, can be subtle. The damage to these roots was caused by bush snails.

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have considered removing the pea gravel, but it provides a good heat sink, and it would be a monumental task to remove all of it again (and I am 23 years older now, so not as ambitious as I was then!). If I were to build another greenhouse, I would skip the pea gravel.

Slugs feed on the green algae that grows on the polycarbonate glazing and hard surfaces of the greenhouse. They do a reasonable job of keeping the algae down so the light level stays high; however, they do not stop with just eating the algae. They like to supplement their diet with the green growing tips of the roots, plump buds, and open flowers. I would gladly trade cleaning the glazing by hand than have slugs do it for me. It is maddening to go out to the greenhouse and find slug damage to a flower on a plant that you have spent the past year cultivating. The whole reason we grow orchids is for the flowers, so having a slug make a meal of your prize is quite insulting.

I have found slugs to be damaging to the overall health of orchid plants. In the spring when the lead pseudobulb starts sending out new roots, those fresh roots are especially delectable to the pests. Good flowering is contingent on a healthy plant and a healthy plant is contingent on healthy roots free from slugs' nibbling. If you get enough root damage, flowering is out the window.

SLUG LIFECYCLE We need to discuss the lifecycle of slugs so you can see why these creatures can be so prolific. First of all slugs are hermaphroditic, meaning they possess both female and male reproductive parts. For the orchid grower, this is bad news because all it takes is a single slug for things to get out of hand quickly. The average adult slug lays about 40 eggs in a clutch, and, depending on temperature, the eggs hatch in about a month. Within three months, those hatchlings mature and are ready to lay their own eggs. So, if one slug lays 40 eggs, and the hatched 40 slugs each lay their own 40 eggs and within five months your population has grown to 1,600 slugs. Three months later, those 1,600 slugs are ready to begin laying eggs again! Slugs can put bunnies to shame. Of course, not all the eggs are going to hatch and not all the slugs will live to maturity, but you get the picture. If slug populations are allowed to grow unchecked in the greenhouse, a disaster is brewing.

THINGS I HAVE TRIED

COPPER When I first realized I had a problem with slugs many years ago, I did some online research and found that

a chemical reaction happens when slugs crawl over copper and causes unpleasant feelings on their skin. Thus, they avoid moving over copper. I thought, "Great! I'll line the benches with copper to prevent the slugs from moving around the greenhouse. That will take care of the problem!" I located as much sheet copper as I was able to get at various scrap metal yards and lined the inside of the benches and hard surfaces. A few months later and a couple grand poorer, I realized this was a failure or, should we say, a "learning experience." The copper did prevent some movement from plant to plant but did not do anything to help or protect the plants that had already been colonized by slugs and bush snails. Those slug populations still needed to be eradicated. One side-benefit of copper though is that orchid roots do not stick to it, unlike pretty much every other hard surface on the planet!

DIATOMACEOUS EARTH Diatomaceous earth is advertised to be effective at killing slugs, so I decided to try that next. It is a powdered rock made of fossilized diatoms that have sharp edges. When slugs crawl over it, the sharp edges cut their bodies. In theory, this sounds like a slam dunk. In practice, I found the diatomaceous earth to be completely ineffective in a greenhouse setting. Not only is it time consuming and difficult to spread in an orchid greenhouse where leaves are sticking out in every direction, but it also becomes an ineffective mud after the first watering. There may be applications where diatomaceous earth is effective, but in my experience an orchid greenhouse is not one of them.

BEER We have all read about how slugs are fatally attracted to beer — just put out a tray with some beer in it and wait for the slugs to drown their sorrows after a hard night destroying orchid roots and never return. I bought a six pack of Milwaukee's Best, submerged a half dozen trays in various locations throughout the greenhouse and waited for nightfall. It felt like Christmas morning when I headed out to the greenhouse the next day to check the trays. However, I was completely disappointed when I found a grand total of zero slugs in all the trays combined. I experimented with this method for weeks: changing the location of the trays, trying different fill levels of beer and letting the beer age; however, no success. I did catch a few slugs, but I think it was just bad luck on the slugs' part to happen upon a tray of beer in its path. It is also possible that slugs just do not like Milwaukee's Best, they may prefer a good

Kolsch or maybe a New England IPA. I am not sure, never tried them.

BAIT PELLETS I have also tried numerous over-the-counter slug and snail bait pellets that are sold at garden centers. The pellets contain molluscicides (mainly metaldehyde), a poisonous substance that kills slugs and snails, as well as an attractant that makes the slugs and snails want to eat the pellets. I have tried many different brands of bait. They can be effective under the right circumstances, but I have found they do not last long in the high-humidity greenhouse environment. They become moldy in a matter of days and become a great site for botrytis spores to begin developing. The mold is unappetizing to slugs so they lose all efficacy quickly. In a 600 square foot (58 m²) greenhouse with over 800 plants, it is not cost effective to spread an expensive bait with a short lifespan to deal with slugs and bush snails. They can be effective for spot treatment, but population control is not practical.

LIQUID BAIT One of the most effective materials I have used is Force II Deadline Slug & Snail Killer. It is a ready-to-use liquid bait with metaldehyde as the active ingredient and is available in most garden centers. A teaspoon (5 ml) squirt of this thick, dark-gray liquid on the surface of the pot or on a hard surface in the greenhouse can be very effective at controlling slugs and snails. The liquid can be applied to the plant and roots without fear of damage; however, there are numerous drawbacks. First, my experience is that once the thick liquid dries in a few days, the attractant becomes inactive and requires reapplication. Second, the product itself is unsightly. It is a thick, dark-colored liquid that can easily be mistaken for bird poop. Third, the active ingredient metaldehyde is not only toxic to slugs and snails, but it is toxic to humans and other animals as well. Breathing the vapor can result in damage to the kidneys and liver in the long term. Obviously, this is a chemical that needs to be used with caution. Since I have children, pets and other guests that regularly visit my greenhouse, this was not a good, long-term solution for me.

HUNT AND PICK The most environmentally friendly method of slug eradication that I have found over the years is the "hunt and pick" method. Because slugs are most active at dusk and dawn, I would get up before sunrise armed with a flashlight and a cup of coffee and check all the surfaces and plants in the greenhouse. I would then repeat this process after sundown. There is definitely a lot of satisfaction in this method but

it is time consuming. After years, I was only able to reduce the slug population, not eradicate it. Damage to green root tips and flowers was still a regular and frustrating occurrence. There are other advantages to this method in that you get to know all your plants well while you inspect them each day. It is easy to stay on top of scale outbreaks, rodent problems, check for developing buds, etc. However, you need to have a lot of free time on your hands, which most of us do not. As an aside, I tried many times to convince my wife that slug hunting is a great bonding experience. I had absolutely no success with that tactic!

THE SOLUTION

After years and years of unsuccessful trying, I finally admitted to myself that I have a problem that I could not solve and did something completely uncomfortable for me: I reached out to other growers for advice. I contacted Dave Off of Waldor Orchids in Linwood, New Jersey. After a phone discussion on the matter, it became clear that we were experiencing similar problems and the control methods just were not cutting it. Dave reached out to some of his contacts in the commercial orchid-growing industry. One grower recommended we investigate commercial, agricultural slug baits with iron as the active ingredient. Some internet research indicated that an agricultural slug bait called Ferroxx made by a German chemical company, Neudorff, met the criteria.

Ferroxx contains 5 percent iron chelate, which acts as a stomach poison with proven performance regardless of the weather. The product can be used around people, pets and wildlife, which for me is a huge plus given the frequent visitors my greenhouse receives — from human beings to birds and rodents. Moreover, the rain-fast material is supposed to provide superior performance in moist greenhouse conditions, prolonging the useful life of the product and minimizing sites for botrytis fungus. The shelf life is 5+ years as well, so there is minimal concern about the product spoiling before it can be used.

I contacted Neudorff and was put in touch with the local salesman for my area of the country, Eric Maurer. Eric was kind enough to direct me to an agricultural supply store in eastern Ohio that stocked Ferroxx. I contacted the store and was pleased to find out they had inventory and it was only about \$2/lb (\$4.42 kg). I picked up a couple 50-pound (23-kg) bags and could not wait to try the product in the greenhouse.



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I applied the Ferroxx for the first time last August and am pleased to say after eight months, the material is working exactly as advertised. I estimate that the population has been reduced by 99 percent with little effort on my part.

My application method is as follows:

- Process: I use a handheld Scotts, grass-seed spreader to disburse the blue pellets across the benches, the walkways and under the benches. I try to cover all surfaces as evenly as possible because slugs do not travel far from home. Since they are not going to travel to find the bait, it is imperative to get it right to their front doorsteps.
- Volume: About six or eight of the highly visible blue pellets on the surface of the pot are enough to clear out all the bush snails and slugs that might be living in the medium.
- Cadence: Slugs and bush snails are determined and prolific pests. A few always slip through and it will not take them long to repopulate, so monthly reapplication is wise to ensure population control. A little goes a long way, and a 50-lb (23-kg) bag of Ferroxx is enough for years to come in my greenhouse.

Ferroxx has solved a lot of problems for me. I wish I had reached out for help years ago so I could have purchased this product sooner. Maybe I should call Dave Off and see if he knows anyone that has cured virus!



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[5] Ferroxx loaded into a garden spreader.
[6] Ferroxx (bright blue pellets) sprinkled over the potting medium of this cattleya.

— Chuck Oldenburg has been growing plants since his early teens and caught orchid fever over 20 years ago. A 1991 Penn State graduate in chemical engineering, he tries to use his background to optimize his growing area, become a better grower and solve orchid growing problems (email the_oldenburgs@comcast.net).