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Clean Water³: A resource for all your water questions

Many greenhouse and nursery growers have questions about water quality, filtration, water-borne pathogens, particles, pH, and salts. Did you know that there is a centralized resource where you get common questions answered as well as become connected to the best greenhouse water quality experts? **Clean Water³** (Figure 1) was a federally funded Specialty Crops Research Initiative grant focused on research and outreach to help growers Reduce, Remediate and Recycle irrigation water. The collaborative efforts of professors at 10 Universities (Michigan State University included) are available to you at www.cleanwater3.org, which provides answers to common water problems, training, tools, research reports, and more.

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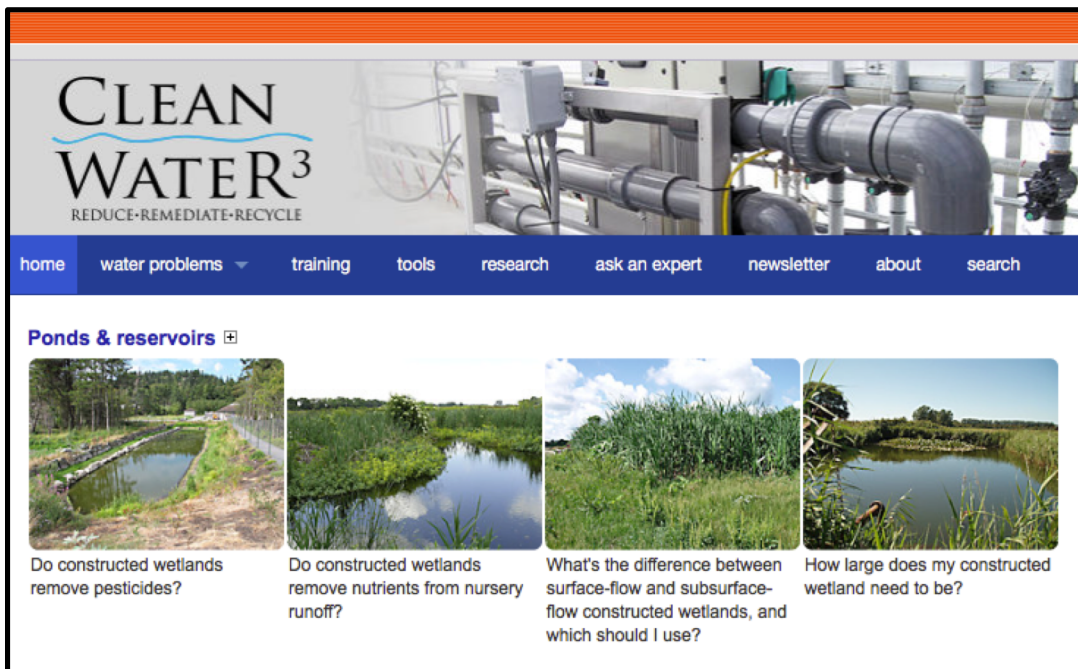


Figure 1. The Clean Water³ website provides answers to common water problems, training and tools for growers.

www.e-gro.org



Water Problems

The part of the website that growers will likely find most helpful are the links to the water problems section; experts provide answers and recommendations on the following areas: 1) conserving water, 2) pH and salts, 3) nutrients & agrichemicals, 4) pathogens & biofilms, 5) particles & debris, and 6) quality.

Constructed wetlands' effectiveness at removing agrichemicals

For example, say that you are wondering if a constructed wetland is effective at removing nutrients and agrichemicals from greenhouse or nursery runoff irrigation water. Specifically, maybe you are concerned about residual pyrethroids. Are these and other compounds cleaned up by wetlands? Well, it depends: the amount of the compound present depends on its: water solubility, the wetland's plant species, the microbes present, the pH, organic matter, and water flow within the wetland. Chemicals that have low water solubility are removed very effectively by constructed wetlands. These chemicals included: organochlorines, strobilurin fungicides, organophosphate insecticides, and pyrethroid insecticides. Wetlands are 84 to 97% effective at removing these compounds from irrigation runoff. Constructed wetlands are less effective at removing those compounds with high or variable water solubility (triazinone and urea-based pesticides, which are herbicides).

Particles and debris in irrigation drippers

Let's say that you are struggling with clogged irrigation emitters with your irrigation baskets. This is a common problem in greenhouses everywhere. The strategy to remove the debris in the emitters depends on what is clogging them. Is it biological, chemical, or a sediment problem?

If the cause is **biological**, a slimy, biofilm could be the cause of the clog. In that case, soaking the drippers in a bleach solution (Figure 3) and then shocking the irrigation system with a sanitizer (chlorine, chlorine dioxide, or peroxyacetic acids) will help clean the lines. If the clog is caused by **chemicals**, it is most likely hard water buildup - or calcium, iron, and manganese deposits (Figure 4). The most effective treatment in this case it to soak the drippers in vinegar with is a low pH which will help to dissolve the basic mineral deposits. You should send in a water sample to a commercial lab to figure out how to treat your water in the future (such as injecting acid into the irrigation water) or what pre-season cleaning you will need to do to combat the hard water.



Figure 2. Constructed wetlands can be effective at removing some agrichemicals. Photo: Courtesy of Cleanwater3.org.



Figure 3. Irrigation emitters with biological biofilm build-up should be soaked in a dilute bleach solution. Photo: Courtesy of Cleanwater3.org.

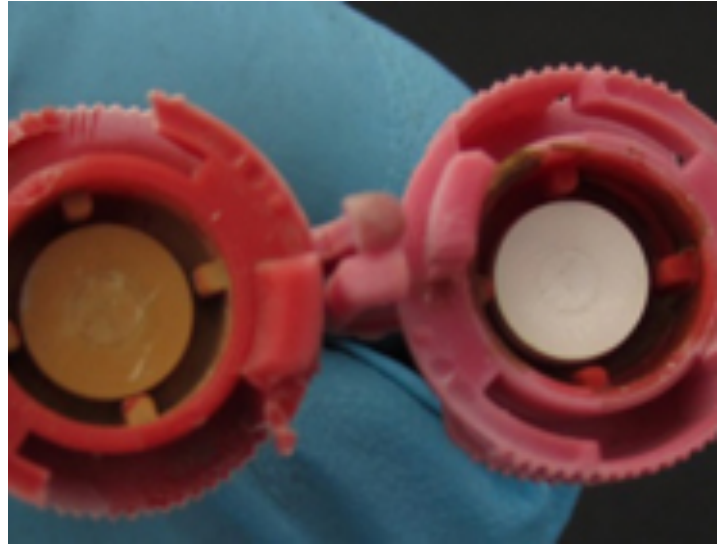


Figure 4. Irrigation emitters can become clogged with iron deposits. Emitters can be soaked in vinegar to dissolve the hard water deposits. Photo: Courtesy of Cleanwater3.org.

The final reason for clogged irrigation emitters is sediment buildup. The gritty material will fall out when rinsed and placed in warm water. You will need to flush the irrigation lines, add additional filtration to your irrigation system, and reinstall the clean emitters. For more, read e-GRO Alert 9.15 “[Match the filter to the problem.](#)”

Training, Tools on Clean Water³, and Newsletters

The major training resource that was released in part due to efforts of the Clean Water³ initiative was the [Water Quality & Treatment Online Course](#), which is hosted by the University of Florida in their online greenhouse training program. The next offering of the [course](#) is in 2021. There are a number of [tools](#) available to growers on the website, including:

- Irrigation Volume Tool: How many water you are applying per irrigation cycle?
- Slow Sand Filtration Sizing Tool: How large of a filtration system do I need?
- Alkcalc: How much acid do I add to neutralize the alkalinity in my water?

You will also be able to find an archive of their previous newsletters such as “[Diversity of Phytophthora, Pythium, and Phytopythium species in recycled irrigation water in a container nursery](#)” from June 2019.

Have a question that is not answered directly on the website? There is an “Ask an Expert” tool which links you to the 27 collaborators on the project who will help you address your specific situation at your greenhouse. Check out the [Clean Water³](#) website today! For more [e-GRO Alerts](#) on [water issues](#), check out these alerts:

- [e-GRO Alert 7.33](#): Dealing with Salty Irrigation Water
- [e-GRO Alert 6.10](#): Manage pH with Water Soluble Fertilizers
- [e-GRO Alert 5.24](#): Tracing Water Quality Back to the Source

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