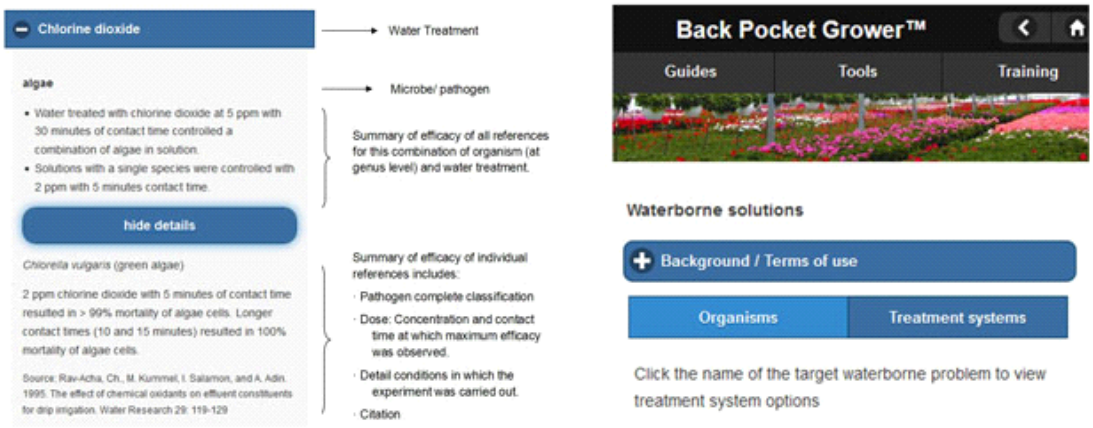
GROWERTALKS

Features

10/29/2014

Waterborne Solutions: Access Research on Water Treatment

Rosa Raudales, Bruce MacKay & Paul Fisher



Water-treatment alternatives to control waterborne microbes include chemicals such as activated peroxygens, bromine, chlorine, chlorine dioxide, copper-based products, ozone, quaternary ammonium, silver-based products and surfactants. Physical treatments are available, including heat or membrane filtration. Ecological alternatives include constructed wetlands and slow media filtration. Selecting a water treatment and knowing the concentration required to control a target problem, such as Phytophthora zoospores, is a difficult task given the wide range of options available.

“Waterborne Solutions” is an online searchable database that summarizes published research on water treatments for control of plant pathogens, algae and nematodes (see Figure 1). The database currently contains 15 water-treatment alternatives and 30 categories of waterborne microbes, including algae and plant pathogenic fungi, bacteria, water molds, virus and nematodes. Available phytotoxicity information is included. However, phytotoxicity levels are still unknown in most cases, and during grower visits, we occasionally see plant damage from over-application or inadequate dosing control.

Figure 1, above: Example of research summaries found in Waterborne Solutions.
Figure 2, left: Waterborne Solutions can be searched by “Organisms” or by “Treatment Systems.”

To access “Waterborne Solutions,” go to www.BackPocketGrower.com or www.WaterEducationAlliance.org and click on the ‘Tools” tab. You can search for information by “Organism’’ or “Treatment System” (see Figure 2). Under the “Organism” category, microbes are organized at the genus or broader level. Under each genus, there’s a summary of technologies where treatment efficacy has been tested and published. Additional information about the underlying experiment and citation can be found by clicking on “Show Details.” For example, a user interested in control of *Pythium spp.* in water can search by “Organism” and then select “Pythium.” Studies on 13 technologies are described for control of *Pythium spp*.

You can also search by “Treatment System” to list which microbes have been studied and the effective control dose. For example, a user interested in “Chlorine Dioxide” will find 10 categories of microorganisms listed. A concentration of ≤2.6 ppm chlorine dioxide controlled single populations of algae, *Colletotrichum spp., Erwinia sp., Phytophthora spp.* zoospores, *Pythium sp*. zoospores, *Ralstonia sp., Thielaviopsis sp.* and *Xanthomonas sp.* However, higher doses (5 ppm, likely to be phytotoxic) were needed to control combined populations of algae species, conidia of *Fusarium sp.* and more resistant life stages of Phytophthora and Pythium.

The tool doesn’t provide recommendations, but aims to make research available to support grower decisions. If a high dose was required in a reported study—for example 5 ppm of chlorine dioxide to control Fusarium—it emphasizes that this technology alone won’t be effective as a control strategy, except as part of an overall sanitation program. A high dose will increase application cost and may increase the risk to the crop (phytotoxicity) and workers (a safety hazard). Some products, including chlorine dioxide, have EPA pesticide labels indicating maximum allowable application doses, and state or federal regulations specify maximum allowable residual levels in runoff for many products. Water treatments are biocides and regulations must be followed for safe and effective use. As with any new technology, run trials on a small group of plants, consult experts and seek out other experienced growers.

Before investing in a water treatment technology, do your homework to ensure you’re making the correct investment and management decision. Find out about available research from “Waterborne Solutions.” Work with plant pathologists to identify the pathogen species, whether pathogens are likely to be introduced or spread by your irrigation water, and other issues such as overwatering, contaminated containers or diseased cuttings.

Send water samples to test microbial load (total bacteria density) and presence of pathogens in the water. For example, the plant diagnostics laboratory at the University of Guelph provides a broad DNA fingerprint of pathogens in irrigation water or the University of Massachusetts plates out water samples to test presence of Pythium and Phytophthora. Test other water-quality factors such as pH, salts, organic compounds and total suspended solids. These factors affect the efficacy of water treatments and design requirements for the treatment system, such as filtration and acid injection. Other factors such as cost, ease of use, worker and environmental safety, and regulations must also be considered.

Overall, an integrated crop management approach is required to successfully manage water quality. **GT**

Acknowledgements: Funding for this project was provided by our industry partners in the Floriculture

Research Alliance (floriculturealliance.org), the Water Education Alliance for Horticulture (watereducationalliance.org) and the USDA-ARS Floriculture & Nursery Research Initiative. Thanks to our co-authors Dr. Jennifer Parke from Oregon State University and Dr. Charles Guy from University of Florida who contributed to the literature review.

Rosa Raudales is Assistant Professor of Horticulture and Greenhouse Extension Specialist at the University of Connecticut. Bruce MacKay is Managing Director of ThomasBaine Ltd. in New Zealand. Paul Fisher is Professor and Extension Specialist in Floriculture at the University of Florida. He can be contacted at pfisher@ufl.edu

.