# New — and New Discovered — TOOLS FOR GROWERS

Use these six water tools to help manage water in your greenhouse more efficiently.

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hen thinking about managing water have you ever sat back and said, "There's got to be an easier way." I know I have a once or twice. If you've ever thought/spoken aloud that iconic phrase, the tools discussed below might help make some of your water management decisions a little easier. These tools don't replace your experience and common sense, but they will make interpreting water quality reports, tracking water quality data, figuring out how to mix fertilizers and pesticides, and determining water storage capacity a lot easier.

The Clean WateR<sup>3</sup> (Reduce, Remediate, Recycle) project is a National Institute of Food and Agriculture-U.S. Department of Agriculture, Specialty Crops Research Initiative funded collaboration of greenhouse and nursery growers and 21 researchers and extension specialists from nine institutions across the U.S. They are all focused on developing tools to help efficiently manage water, whether it is water applied, water leaving the production areas or water recycled for irrigation.

### **1. WATERQUAL TOOL**

Ever wonder how your pH and alkalinity influence each other, why adequate calcium and magnesium can counteract the presence of sodium, or at what concentration the presence of iron can become a problem? Well, we've got answers for you. The WaterQual tool (http://cleanwater3. org/wqi.asp) helps interpret your water quality report. Simply put in the values from your water quality analysis report, and this tool helps you understand what it means.

Explanations vary from how your water pH could influence pesticide (herbicide, insecticide, PGR) activity to how salt presence can impact soil structure. If you have a question about your water quality report, this tool can help you find the answer. If your question is not answered completely using WaterQual, you can also "Ask an Expert" and the Clean WateR<sup>3</sup> expert with the appropriate knowledge will help you find your answer.

					Terreter	action		
WaterQual							Es	1
This tool interprets the qua nurseries.	lity of a	water source fo	r use ir	n irrigation of plants	in greenhou:	ses and		
Enter data for quality parar click the 'Interpret' button.	neters	you are intereste	ed in (y	ou do not need to e	enter data for	all the p	arameters) and	
Total ions and alkalinity				Nutrients and	lions			
н	٢	no units required		Nitrogen (N)		( ) )	mg/L or ppm	1 <b>.</b>
Alkalinity	0	ppm CaCO3	٠	Copper (Cu)		()	mg/L or ppm	
Electrical conductivity (EC)	4.9)	mS/cm		Phosphorus (P)		9	mg/L or ppm P	5. <b></b> .
fotal Dissolved Salts (TDS)	0	mg/L	٠	Boron (B)		9	mg/L or ppm	1.
łardness (Ca+Mg)	0	mg/L	•	Potassium (K)		Q	mg/L or ppm	•
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### **2. GROZONE TRACKER**

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You know that in-house pour-throughs and water quality monitoring are valuable, but interpretation and understanding longterm trends can sometimes be difficult. GroZone Tracker is a mobile-friendly tool that is available for free at http:// grozonetracker.com. It was developed to track pH, EC and water quality over time on a map of your operation. It can help to quickly pinpoint problems in your container production areas.

Zinnia

Instant feedback about water quality and pour-through values are key components. For example, values of pH and EC for a specific crop are flagged red if immediate attention is needed, yellow if they need to be watched, or green if they are okay and within a normal range. Having this "big picture" information translates into faster decision making, and identifying problem plants and/or production areas. GroZone Tracker can help you make real-time decisions and become more self-reliant.

### **3. PIPE VOLUME CALCULATOR**

The pipe volume calculator (https://tinyurl.com/pipe-volume) helps you calculate the volume inside of your pipe or mixing tanks. Knowing the volume of your pipe or mixing tank can help you determine mixing rates, retention time (based on your flow rate) and if you have adequate contact time for sanitizers (like chlorine).

# **4. PPM TO RECIPE CALCULATOR**

Do you ever have a problem figuring out how much of a chemical to mix into a spray or stock tank? The parts per million (PPM) to recipe calculator (http://backpocketgrower. com/ppmtorecipe.asp) helps you determine how much fertilizer or chemical product to add to get a certain concentration.

The PPM to recipe calculator guides you through entering the values needed to arrive at the correct answer. Simply input:

- 1. The units you want to use (US/metric)
- 2. The products formulation (liquid/solid)
- 3. The required concentration (ppm)
- 4. The percent of active ingredient by weight
- 5. How much solution (gal) is being prepared (total volume you want)
- 6. If you use an injector (yes/no)
- 7. The specific gravity of the concentrate compared with water (look at your product label) Press calculate, and you have

your recipe for getting a solution at your desired PPM.

# **5. RECIPE TO PPM CALCULATOR**

Have you just been mixing a solution (whether fertilizer or pesticide) the same way for years but don't remember exactly what the final concentration is? The recipe to PPM calculator

(http://backpocketgrower.com/ recipetoppm.asp) helps you figure out the concentration of your solution by walking you through a series of questions, these include:

1. What is the percentage of active ingredient by weight (e.g., nitrogen) of the

Profusion & rofusion Double

product being mixed?

- 2. What are the units of the product added to the tank [e.g., liquids (fluid oz., gal, mL, or L) or solids (g, kg, oz, lb)]?
- 3. What is the amount of product added to the tank?



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### WATER MANAGEMENT

- 4. What are the units for the tank volume (L or gal)?
- 5. How much solution (L or gal) are you preparing in the tank?
- 6. Are you using an injector (yes/no)?

What is the specific gravity of the concentrate compared with water? Press calculate and you get your answer for the concentration of chemical of interest that your recipe creates.

# **6. ALKCALC TOOL**

AlkCALC (https://extension.unh.edu/Agric/AGGHFL/alk\_calc.cfm) estimates the amount of acid needed to add to neutralize alkalinity of your irrigation water. AlkCALC was initially created via a collaboration between Purdue University and North Carolina State University and is now hosted (thanks to the Fred C. Gloeckner Foundation) by the University of New Hampshire.

AlkCALC is a user-friendly application that calculates the amount of nitric, phosphoric or sulfuric acid required to neutralize the alkalinity in your irrigation water to a desired level. AlkCALC is relatively simple to use, but first you need to know the pH and alkalinity (whether in meq/L, ppm  $HCO_3$  or ppm  $CaCO_3$ ) of your irrigation water. You can get pH and alkalinity data from in-house pH and alkalinity tests or from a water quality analysis performed by a commercial laboratory.

Once you have this information, enter your:

- 1. Sample pH
- 2. Sample alkalinity
- 3. Target alkalinity or pH

Then, select the acid you want to add (nitric, phosphoric, or sulfuric) and the concentration at which you want to inject it (ranges from 35 to 96 percent, depending on the acid), and submit your "sample."



You'll be taken to a new tab that details how much of each acid (or a single acid) is needed to add to a known volume of water to get to your desired alkalinity or pH. You also receive information on the amount of additional nutrients added by acid injection, for each type of acid — giving you yet more information to determine if you can modify (reduce) your fertilization program in response to managing pH and alkalinity. You can print your report or save it as a .pdf file for future reference.

This is by no means an exhaustive list of tools curated through the CleanWateR<sup>3</sup> website, but it gives you a taste of the information available at your fingertips that can help make some of your decisions just a little easier. QPD

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