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Sanitizer Dosing Systems

Mixing a specific concentration of commercial sanitizer in wash water can be challenging for several reasons. First, the task usually involves mixing small amounts of the concentrated sanitizing chemical into larger volumes of water. Second, the opening on the shipping container is large and not very well designed for pouring small amounts of concentrate in a measurable way. Finally, the task is usually being done in a pack and wash area with low light.

Protect Yourself - Proper personal protective equipment (PPE) should be used when handling chemicals that may pose a hazard to health. Sanitizers are generally acidic (low pH) and can cause burning and other personal injury. Splash resistant goggles and Nitrile gloves should be used and made readily available in the work area where these chemicals are used. Review the product's "specimen label" and "material safety datasheet" (MSDS) before using and ensure new employees are also oriented to the use of the product. Have absorbent rags or paper towels available along with water to wash up any spills.



Know Your Dose - Before dosing wash water, be sure to know what the target parts per million (PPM) concentration of chemical in water is for the application. The product label will help you with this. Robert Hadad (Cornell Cooperative Extension) has a series of fact sheets to help with determining the correct dose you need of either [peroxacetic acid \(PAA\)](http://cyp.cce.cornell.edu/food_safety.php) & [bleach](http://cyp.cce.cornell.edu/food_safety.php) (http://cyp.cce.cornell.edu/food_safety.php). There is also [an online calculator](http://blog.uvm.edu/cwcallah/files/2015/06/Sanitizer-Dose-Calculation.xlsx) that can help with this (http://blog.uvm.edu/cwcallah/files/2015/06/Sanitizer-Dose-Calculation.xlsx).

Dispensing Options - Several options exist to help farms with the task of "dosing" wash water with sanitizer to treat it.

- **Measuring Cups** - Of course, pouring from the shipping container into a measuring cup is one option, but is likely to lead to a spill and may require multiple pours to get the right amount.
- **Smaller Containers** - Smaller containers with better pouring ability can be used to hold a portion of the larger container's volume. These smaller containers are likely to be easier to handle and can be purchased or repurposed with better spouts for improved pouring and measuring.
- **Pipette/Syringe** - Some growers use very small batches of sanitizer in water for sanitizing pruning cuts on tomatoes, etc. A small pipette or syringe can be useful for mixing these batches.
- **Spigot** - A threaded spigot can be purchased that fits into the cap of the shipping container. This allows you to keep the shipping container on a shelf and adjust simply open the spigot to dispense the chemical. The



Pipette

flow can be adjusted by the swing of the valve handle. This can make measurement easier, more accurate and more safe.

- **DIY Burette Doser** - \$50 - This do-it-yourself burette dispenser has been developed and [documented on FarmHack](http://farmhack.org/tools/small-doser-small-batch-produce-washing-sanitizer) for those who may want something they can build themselves, tailor to their specific operation and improve upon. This approach is inspired by the use of burettes (tall graduated columns) for dosing small amounts of concentrated medicine for intravenous therapy. This system can provide closed measurement and dispensing. (<http://farmhack.org/tools/small-doser-small-batch-produce-washing-sanitizer>) [see reverse for more details.]
- **EnviroSelect Dispensing Pump** (via BioSafe Safety Value Pack) - \$75 - Allows a manual pumping of liquid directly from container without pouring. No integral valve, and no closed measurement.
- **Goat Throat™ Dispenser** - \$299 - Goat Throat dispensers are small hand pumps that thread directly into the shipping container for easier dispensing of product. The company recommends the [Model 300 with Viton seals](http://goatthroat.com/all-items/pumps-standard-setup-4-standoff/goatthroat-300-pump-with-viton-single-medium-drum-seal-and-4-drum-standoff-gt300single/) for use with PAA type sanitizers. This does provide closed dispensing, but not closed measurement. (<http://goatthroat.com/all-items/pumps-standard-setup-4-standoff/goatthroat-300-pump-with-viton-single-medium-drum-seal-and-4-drum-standoff-gt300single/>)
- **Dosatron™ Inline Dispenser** - \$940-1,000 - Many greenhouse growers will be familiar with Dosatron™ products used to inject fertilizer and other amendments into irrigation water. The same sort of product can be used to inject sanitizer into wash water for applications like barrel washers and wash lines that have steady flow of water. Company sales engineers recommend model D14MZ3000VFIK \$1040.00 [for PAA](http://www.dosatronusa.com/markets-served/hygiene--sanitation/peracetic-acid.aspx) and model D14MZ3000VFII \$987.00 for Bleach. This provides closed measurement and dispensing. (<http://www.dosatronusa.com/markets-served/hygiene--sanitation/peracetic-acid.aspx>)



Teflon coated spigot with 3/4" NPT thread to fit right in shipping container cap.

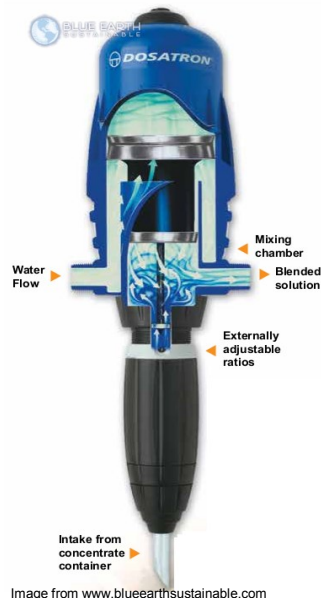


Image from www.blueearth sustainable.com



DIY Doser

Background - Measuring and dispensing an accurate dose of sanitizing chemical for small batch washing can be challenging and sometimes these chemicals are corrosive or otherwise hazardous in their storage concentrations.

The assembly described here should make this task easier and more safe for small producers. With two quarter-turn spigot valves, a 2-foot length of Teflon tube and some electrical tape you can accurately and safely measure and dispense up to 300 mL (10 fl. oz.) of chemical in 10 mL (0.3 fl. oz.) increments. In a 100 gallons of water, +/- 10 ML translates to +/- 3 PPM of Sanidate 5.0, +/- 8 PPM of Tsunami 100, or +/- 3 PPM of Chlorox Bleach.

If you need some help calculating your required dose for various washing batch sizes and products, use [this dose calculator \(link is external\)](#). Guidance on chemical concentrations as sold and target mix PPM concentrations depend on the chemical product you are using and the product being washed. Refer to product specimen label for guidance.

I've included only Teflon parts for wetted surfaces below based on material compatibility guidance for peroxyacetic acid, the active ingredient in Sanidate and Tsunami. The product is shipped in polypropylene containers which seems to handle it, but may also only do so for limited periods of time. This doser will see several dozen containers worth of solution in its life, so I think the extra expense for Teflon is worth some added life.

Materials List

- Qty 1 - Threaded industrial screw cap for shipping tote. Either [70mm \(2-3/4 inch\)](#) (for 5 gal tote), [61mm \(2-3/8 inch\)](#) or [51mm \(2 inch\)](#) (for 2.5 gal tote), either with 3/4" threaded reducer. \$1.00
- Qty 2 - 1/4 Turn 3/4" Male NPT threaded PTFE (Teflon™) [Spigot Valve](#) - \$10.00 x 2 = \$20.00
- Qty 1 - 24" L x 1" ID [Teflon™ FEP Tubing](#) - \$21.72
- Qty 2 - 11/16" to 1-1/4" [Hose Clamps](#) - \$1.79 x 2 = \$3.58
- Qty 1 - 3/4" Female NPT threaded to 3/4" barb ID hose barb
- Qty 1 - to length - 3/4" ID, 1" OD hose for ease of dispensing.
- As needed - Electrical tape, cut in thin strips x 3-1/2" long. Or use a permanent marker to make increment markings (e.g. Sharpie(TM)) [Zip ties](#) - 25 pack \$6.49, need 4. - \$1.04 or [Mounting clip](#) - Need two, \$1.29 each - \$2.58 or [Strap roll](#) - 25 feet \$4.29 - need about 16 inches - \$0.23
- Scrap piece of wood to mount on.

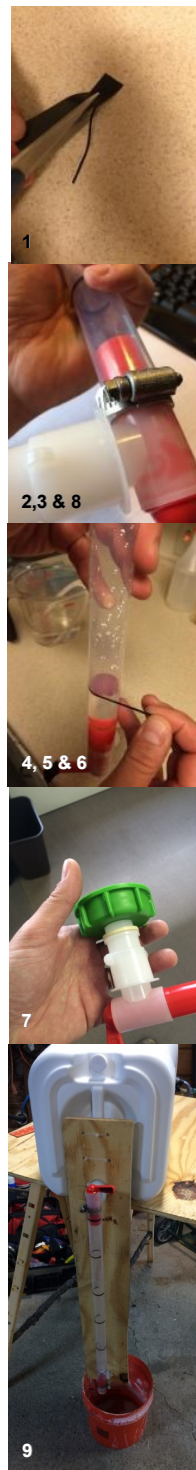


To Build

1. Cut a few strips of electrical tape about 1/16" thick and 3-1/4" long. This length wraps almost completely around the tube and these strips will be your level markings. You can also use a label maker.
2. Next start assembling your tube. Use a 24 inch piece of 1 inch ID Teflon tubing. This provides about 300 mL of dosing capacity as noted above. This tubing will slip right over the red end of the Teflon valve in the last step and can be secured with a hose clamp (tightly, so it doesn't twist off).
3. Attach one valve to the Teflon tube, and tighten securely with a hose clamp (tight enough so it can't twist off). This will be the bottom of the tube. You can also attach a hose barb to the threaded end of this valve for future attachment of a dispensing hose.
4. Measure 50 mL of water using a measuring cup. You can use other incremental measures, e.g. 10 mL, 20 mL, etc. In fact, if you have a few doses you routinely use that are odd measures, consider marking those also and labeling them to help the user do it the same way every time. Pour the incremental measure into your tube and hold it plumb.
5. Attach a strip of tape or printed label at the water level for the first increment.
6. Repeat for additional increments of water, and/or mark specific odd measurements for common dosing mixtures that you use.
7. Ensure the other valve is in the closed position. Attach it to the threaded cap of the chemical container (which should have a 3/4" NPT fitting to match the valve and a hole to let product flow out and the air vent tube from the valve to be inserted.) Take care to have the container in an upright position to prevent spills.
8. Attach the measurement tube to the valve you just connected to the chemical container and secure with a hose clamp. Don't hesitate to torque these hose clamps down. I'm looking for an adhesive or sealant that will work with the Teflon materials to improve this connection. But this is the best I have for now.
9. Mount the doser assembly to a piece of scrap wood to make it more stable. This may require you laying out the location relative to where your chemical is stored and where you plan to dispense to. I've listed several mounting options above.
10. Consider attaching a hose to the bottom (exit) valve using a hose barb attachment to make dispensing easier and less prone to spills.

To Use

1. Ensure the bottom valve is closed (these could be better color coded, perhaps a black Sharpie to fill in the side of the valve handle that shows when closed and leave the other one as is (red)). Direct dispensing hose to the wash tank or an intermediate container.
2. Open the top valve slowly and carefully to dispense the required dose into the measurement tube.
3. Close the top valve.
4. Confirm the discharge hose is directed where you want the chemical to go.
5. Open the bottom valve and allow chemical to dispense.
6. Close the bottom valve.
7. Check for leaks and repair as needed.
8. Wash hands.



Full, living, open-source plans available on FarmHack. Join the open-source community! www.farmhack.org

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Chris Callahan. UVM Extension, Agricultural Engineering. 802-773-3349. chris.callahan@uvm.edu. blog.uvm.edu/cwcallah.