

pH Adjustment in Containers

by Mark Halcomb¹ and Donna Fare²
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When the pH is too high:

The Symptom: Yellow foliage (with dark green veins) and reduced growth.

The Cause: The pH of the irrigation water or too much lime added to the substrate (media) will drive the pH of the container substrate higher (more alkaline).

Be sure the problem is not root rot from being too wet or planted too deep in the container. The foliar symptoms look the same. Have a composite root sample collected from several containers checked for a root rot, such as Phytophthora.

The Reason: Iron and several other minor elements are unavailable at pHs above 6.0 and is often noticed by foliar symptoms rather than substrate or leachate analysis.

The Goal: A pH between 5.0 and 6.0 for most container crops.

The Solution for this Growing Season: “There are several cultural practices that can help alleviate high pH and depending on the severity of the problem, time of year, irrigation method used, if an injector is available, available labor, etc. will determine how to address the problem. Action may be required quickly to effect a change before frost.

You could topdress 90% sulfur prills if topdressing is convenient. Conditions can exist where a teaspoon per #1 container is required to drop the pH a full unit (7.5 to 6.5). It depends on the buffering characteristics of the substrate and water source. I probably would hedge on this rate on containers larger than 3 gallons and lower the application rate. A 1/4 teaspoon per #1 container rate is a 2 lb per cu yd incorporation rate. Producers that have chronic problems with high pH can incorporate 1-2 lbs 90% sulfur per cu yd at potting to overcome the high pH problems. Iron sulfate and Sulfur can be used at the same rate.”³

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“Dr. Ted Bilderback prefers to topdress iron sulfate rather than sulfur because iron (Fe) is usually on the verge of being deficient at high pH substrates. It is logical but several Tennessee growers never received any benefit from using iron sulfate in several attempts in 2000-2001. It burnt tender oak seedling foliage when applied over the top. Perhaps he never used 90% sulfur. 90% sulfur used at the same rate as the iron sulfate made the desired change in less than 2 weeks. It was sprinkled over the same seedlings, watered in and caused no injury.

The 90% sulfur stocked here is clean, dry sliced prills, not dusty and easy to apply. Sulfur is also more economical. Not as messy as the iron sulfate.

Different media recipes and water sources vary too much for this information to be precise, but in our experience, affected crops have responded positively to the rates in Table 1 below.”⁴

Table 1

	Amount of Iron Sulfate or Sulfur to topdress over container surface ⁴								
container class	#1	#2	#3	#5	#7	#10	#15	#20	#25
Amount to add in teaspoons	1/4 t. to 1 t.	1/2 t. to 2 t.	3/4 t. to 3 t.	1.25 t.	1.75 t.	2.50 t.	3.75 t	5.0 t.	6.25 t.
Amount to add in grams						18-40 grams	23-64	36-80	40-110

t = teaspoon T=Tablespoon

“I am comfortable incorporating 1 to 2 lbs **iron sulfate** per cu yd rate. The lower rate is very conservative. It probably would take some experimentation to really know, but growers may not want to wait. I have frequently recommended the 1-2 lbs iron sulfate incorporation and gotten good results.”⁵

Economics of Iron Sulfate vs. Sulfur: (Compare these 6-03 prices)

Iron sulfate was \$45 for a 45 lb bag; sulfur was \$8 for a 45 lb bag.

Our Co-op sold 90% Sulfur, Disper-sul Pastille by Martin Resources in Texas for \$7 for 50 lbs.

⁴ Halcomb

⁵ Dr. Ted Bilderback NC State Univ Extension Nursery Specialist

For Future Crops:

1- Try using a sulfur coated controlled released fertilizer and no lime in the next media mix before taking more expensive, technical measures. The sulfur releases slowly over time and helps lower the pH or keep it from rising.

Osmocote offers	17-3-6	3 to 4 month release
	19-5-8	8 to 9 month release
	19-5-9	12 to 14 month release

The pH of the irrigation water can be monitored at the spray stake or sprinkler head, using a Myron L meter, as well as monitoring the results by checking the leachates from the containers.

2- The 90% Sulfur can be incorporated into the media prior to potting. Begin with 2 lbs/yard and increase in 2 pound increments until you determine the best rate for your situation.

3- Acid injection is a last resort and should be engineered by a professional.

When the pH is too Low:

Low pH in container media may be caused by anaerobic conditions, formation of acetic acid from bark running too wet or too dry, piled over 8 feet and not turned frequently enough (monthly). Anaerobic means a lack of oxygen.

Dolomitic lime, regular Ag lime or pelletized agricultural lime can be spooned on to raise the pH. The amounts provided below are an educated guess. These rates should satisfy a year's requirement. Test the leachate 2, 4, and 6 weeks after.

Table 2

Amount of Lime to Topdress (Sprinkle) over media surface

Container size	teaspoons	Tablespoons	Total grams	Split rate in grams
#1	1.5			
#2	3			
#3	4.4	1.5	38.2	19.1
#5	7.3	2.4	63.6	31.8
#7	10.4	3.5	90.8	45.4
#10	18.3	6.1	158.9	79.5
#15	22.8	7.6	198.6	99.3
#20	36.5	12.2	317.8	158.9

26 g = 1 Tablespoon

8.7 g = 1 teaspoon

3 teaspoons = 1 Tablespoon

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