

Commonly used limestones for adjusting pH in greenhouse mixes

Part 2 of a series on adjusting substrate pH will discuss commonly used lime products growers are using to adjust (raise) substrate pH.

Posted on **March 22, 2017** by [Heidi Lindberg](http://msue.anr.msu.edu/experts/heidi_wollaeger) (http://msue.anr.msu.edu/experts/heidi_wollaeger), and W. Garrett Owen, Michigan State University Extension

[Michigan State University Extension](#) ([/](#)) developed a short survey to determine the types of limestone that are commonly being used in Michigan greenhouses to adjust substrate pH when needed. Adjusting pH of the substrate prior to transplant is much easier than adjusting the pH after transplant. Prior to planting, growers can amend their substrate with either superfine or pulverized limestone.

Adjusting substrate pH after transplanting is substantially more challenging. Some growers are decreasing the amount of acid injected into their water to use the naturally high alkalinity in their water to increase the substrate pH. Another method of increasing the substrate pH after transplanting is by switching to a more basic fertilizer that has a higher percentage of nitrate (NO_3^-) nitrogen and less ammonium (NH_4^+) nitrogen. Growers of diverse crops need to be careful when using either of these methods since you are changing the irrigation water's properties. Raising the pH of the substrate of petunias, for example, will lead to iron (Fe) deficiencies when the pH rises above 6.4.

Growers who need to rapidly increase the substrate pH with lime can do so by applying flowable lime directly to the pots or via an injector. There are numerous lime products currently being used to adjust substrate pH after transplanting. According to the online survey, greenhouse growers are using the following products to increase the substrate pH after planting: CalOx, Cal-Flo and Limestone F.

Products commonly used to adjust substrate pH after transplanting

 [CalOx \(pdf\)](#) (74 percent calcitic limestone; 26 percent inert ingredients)

- Suspended liquid calcitic lime.
- Will be more reactive than using a dolomitic limestone product.
- Product label says to use immediately after opening and for best results, use within one month of purchase.
- According to information provided by BioSafe Systems LLC, a drench with 250 gallons per 1,000 square feet caused the following increases in pH units 24 hours after application:

Starting pH	Ending pH	pH units increased	Injector ratio (Concentration)
-------------	-----------	--------------------	--------------------------------

4.05	4.44	0.4	1:100
4.05	5.28	1.23	1:50
6.15	6.65	0.5	1:1000
6.15	7.02	0.87	1:500
6.15	7.97	1.82	1:100

Growers should note that the injector ratio or rate of lime being applied varies significantly with the starting pH of the substrate. For example, starting with a pH of 4.05, an injector ratio of 1:100 was needed to get a 0.4 unit increase in pH. In contrast, when the pH started at 6.15 an injector ratio of 1:1000 was needed to get a similar increase in pH units. **Why? Remember that pH is a logarithmic scale and it is 10 times more difficult to raise the pH from 4.0 to 5.0 than it is to raise it from 5.0 to 6.0.**

 **Cal-Flo (pdf)** (62 percent calcium carbonate)

- Suspended liquid calcitic limestone.
- Particle size: superfine suspended (100 percent passing through a 200 mesh screen).
- Will be more reactive than using a dolomitic limestone product.

 **LimestoneF (pdf)** (50 percent dolomitic limestone; 50 percent inert ingredients)

- Liquid flowable limestone.
- Particle size: superfine (89 percent passing through a 200 mesh screen).
- Less reactive than calcitic lime products, but the superfine particle size will make it more reactive than pulverized limestone products.

The recommended rates of each of these products vary. Developing strict recommendations for growers is challenging since the pH of the incoming substrate varied between batches so widely. **Growers will need to do small scale, in-house trials with their substrate in order to develop corrective procedures for their situation.**

For more information

- Part 1 – [Different types of limestone to increase media pH](/news/different_types_of_limestone_to_increase_substrate_ph)
(/news/different_types_of_limestone_to_increase_substrate_ph)
- [Testing and corrective procedures for low substrate pH](/news/testing_and_corrective_procedures_for_low_substrate_ph)
(/news/testing_and_corrective_procedures_for_low_substrate_ph)

Thank you to Drs. Roberto Lopez and Brian Whipker for their reviews.

This article was published by [Michigan State University Extension](http://www.msue.msu.edu) (<http://www.msue.msu.edu>). For more information, visit <http://www.msue.msu.edu> (<http://www.msue.msu.edu>). To have a digest of information delivered straight to your email inbox, visit <http://www.msue.msu.edu/newsletters> (<http://www.msue.msu.edu/newsletters>). To contact an expert in your area, visit <http://expert.msue.msu.edu> (<http://expert.msue.msu.edu>), or call 888-MSUE4MI (888-678-3464).



Related Articles

[Different types of limestone to increase substrate pH](http://msue.anr.msu.edu/news/different_types_of_limestone_to_increase_substrate_ph)

(http://msue.anr.msu.edu/news/different_types_of_limestone_to_increase_substrate_ph)

March 22, 2017 | **Heidi Lindberg** | Part 1 of a series on adjusting substrate pH will discuss how the type, particle size and hardness of limestone will effect substrate pH.

[Drones in agriculture and hands-on drone training](http://msue.anr.msu.edu/news/drones_in_agriculture_and_hands_on_drone_training)

(http://msue.anr.msu.edu/news/drones_in_agriculture_and_hands_on_drone_training)

February 22, 2017 | **Robert Goodwin** | Training programs tie how to fly Unmanned Aerial Systems, or drones, together with data collection and geographic data analysis.

[Testing and corrective procedures for low substrate pH](http://msue.anr.msu.edu/news/testing_and_corrective_procedures_for_low_substrate_ph)

(http://msue.anr.msu.edu/news/testing_and_corrective_procedures_for_low_substrate_ph)

February 16, 2017 | **W. Garrett Owen** | Methods to determine substrate pH and corrective procedures to increase the low pH substrate in greenhouse and nursery plants.

[Are you ready for changes in the Worker Protection Standards?](http://msue.anr.msu.edu/news/are_you_ready_for_changes_in_the_worker_protection_standards)

(http://msue.anr.msu.edu/news/are_you_ready_for_changes_in_the_worker_protection_standards)

January 12, 2017 | **Jill O'Donnell** | Training programs help growers comply with changes to the Worker Protection Standards.

[New greenhouse and nursery educator serving west Michigan](#)

http://msue.anr.msu.edu/news/new_greenhouse_and_nursery_educator_serving_west_michigan

December 5, 2016 | **Heidi Wollaeger Lindberg** | Heidi Wollaeger Lindberg will begin serving the nurseries and greenhouses of western Michigan, including those in Kent, Ottawa and Allegan counties.



Related Resources

[Growing Michigan Agriculture Proceedings](#)

http://msue.anr.msu.edu/resources/growing_michigan_agriculture_proceedings