

## Different types of limestone to increase substrate pH

Part 1 of a series on adjusting substrate pH will discuss how the type, particle size and hardness of limestone will effect 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](http://msue.anr.msu.edu/experts/heidi_wollaeger)), and W. Garrett Owen, Michigan State University Extension



**Photo 1. Pulverized or 100 mesh dolomitic limestone is the least reactive in adjusting substrate pH because the particles are larger, similar to sand. All photos: W. Garrett Owen, MSU Extension.**

[Michigan State University Extension \(/\)](#) provided recommendations on how growers can determine greenhouse substrate pH and reviewed corrective procedures on how to increase low substrate pH in a previous article, "[Testing and corrective procedures for low substrate pH \(/news/testing\\_and\\_corrective\\_procedures\\_for\\_low\\_substrate\\_ph\).](#)" Many growers are testing incoming substrate pH and are reporting the pH of some batches of peat mixes are inconsistently low: between 4.0 and 5.4. The recommendations on correcting substrate pH will differ significantly

depending on the pH of the incoming substrate.

Growers should **always check the initial substrate pH of each bale** before amending any pulverized 100- or 200-mesh (particle size) calcitic or dolomitic limestone. The initial substrate pH will be the foundation and will help determine how many pH units increase are needed. Therefore, a grower with a bale of peat:perlite mix with a pH of 4.0 will need to amend the mix with more lime to raise the pH to 6.0 than if a bale had a pH of 5.0.

In this first article of a two-part series, [MSU Extension](#) will provide an overview of the types of lime that can be used to adjust pH and factors that effects its reactivity in the substrate.

Two types of limestone are commonly available and used in adjusting the pH of greenhouse and nursery substrates: calcitic limestone and dolomitic limestone (see table). Hydrated limestone [Ca(OH)<sub>2</sub>] is another option, but it is less frequently used because it is more caustic.

### Two common types of limestone used to adjust pH in greenhouse and nursery substrates.

Types of limestone	Active ingredient	Molecular formula	Notes
Calcitic limestone	calcium carbonate	CaCO <sub>3</sub>	<ul style="list-style-type: none"><li>• More reactive than dolomitic limestone.</li><li>• Adjust pH more quickly and may raise the substrate pH higher than the same amount of dolomitic limestone.</li></ul>
Dolomitic limestone	calcium magnesium carbonate	CaMg(CO <sub>3</sub> ) <sub>2</sub>	<ul style="list-style-type: none"><li>• Less reactive than calcitic limestone.</li><li>• Adjusts pH more slowly and to a lesser extent than calcitic limestone.</li><li>• Has a longer residual in the substrate than calcitic limestone.</li></ul>

Horticultural limestones are also available in two common particle size distributions, pulverized (100 mesh; 60 percent passing through a 100 mesh screen, see Photo 1) or superfine (200 mesh; 60 percent passing through a 200 mesh screen, see Photo 2). These terms are often used interchangeably in the horticulture industry to describe the particle size or mesh size distributions.



© W. Garrett Owen

**Photo 2. Superfine or 200 mesh calcitic limestone is the most reactive in adjusting substrate pH because the particles are smaller, similar to powder sugar.**

In general, superfine (200 mesh; smaller particles) is more reactive in adjusting substrate pH compared to pulverized (100 mesh; larger particles) because superfine limestone has more surface area and has a greater cation exchange capacity (CEC) (Photo 3). Growers need to be aware that the pulverized limestone, which is less reactive, may slowly increase the pH and then slowly decline once it has all broken down. Similarly, superfine limestone will quickly change the pH of the substrate, but the pH could then quickly decrease over the course of a few weeks. Therefore, soilless substrate manufacturers often mix both particle sizes into their mixes, which helps to regulate the pH more consistently throughout the crop's growing season.

## Reactivity of Limestone Types

Least Reactive

Most Reactive



Dolomitic  
limestone  
Pulverized  
(100 mesh)

Dolomitic  
limestone  
Superfine  
(200 mesh)

Calcitic  
limestone  
Pulverized  
(100 mesh)

Calcitic  
limestone  
Superfine  
(200 mesh)

**Photo 3. Pulverized dolomitic limestone is the least reactive while superfine calcitic limestone is the most reactive in the substrate.**

Limestone hardness refers to the soft or hard and smooth mineral structure of limestone crystals. Agricultural and horticultural limestones are considered soft crystals, reacting quickly with acid, which are more desirable in adjusting the pH of substrates formulated with peat moss, pine bark or coconut coir. Therefore, determining the rate of limestone incorporation required to adjust substrate pH depends on the components of the substrate and the type, particle size and hardness of limestone incorporated.

[Part 2 \(/news/commonly\\_used\\_limestones\\_for\\_adjusting\\_ph\\_in\\_greenhouse\\_mixes\)](#) of this series will discuss the commonly-used limestone products for adjusting soilless substrate pH.

## Other articles in series

- [Commonly used limestones for adjusting pH in greenhouse mixes \(/news/commonly\\_used\\_limestones\\_for\\_adjusting\\_ph\\_in\\_greenhouse\\_mixes\)](#)

*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 \(http://www.msue.msu.edu\)](http://www.msue.msu.edu). To have a digest of information delivered straight to your email inbox, visit [http://www.msue.msu.edu/newsletters \(http://www.msue.msu.edu/newsletters\)](http://www.msue.msu.edu/newsletters). To contact an expert in your area, visit [http://expert.msue.msu.edu \(http://expert.msue.msu.edu\)](http://expert.msue.msu.edu), or call 888-MSUE4MI (888-678-3464).



## Related Articles

[Commonly used limestones for adjusting pH in greenhouse mixes \(http://msue.anr.msu.edu/news/commonly\\_used\\_limestones\\_for\\_adjusting\\_ph\\_in\\_greenhouse\\_mixes\)](#)

*March 22, 2017 | Heidi Lindberg* | Part 2 of a series on adjusting substrate pH will discuss commonly used lime products growers are using to adjust (raise) substrate pH.

[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](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](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)

[http://msue.anr.msu.edu/news/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)

[http://msue.anr.msu.edu/resources/growing\\_michigan\\_agriculture\\_proceedings](http://msue.anr.msu.edu/resources/growing_michigan_agriculture_proceedings)