Compost establishes growing media pH similar to limestone

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As concerns increase about the environmental impacts of harvesting peat and the rising costs of peatmoss used as a growing substrate, researchers are seeking feasible alternatives. Compost can be used as a replacement for peatmoss, but issues such as phytotoxicity, high concentration of heavy metals, chemical carry over, high salts, and high pH have limited its use in the industry. The authors of a study in the September 2016 issue of *HortScience* studied the pH buffering capacity of substrates produced with compost and found that compost can be used to establish growing substrate pH similar to limestone, with "little to no effect on pH buffering capacity."

Matthew Taylor, lead author of the research, said there are many positive impacts of using compost in horticultural substrates. "Compost is created from recycled materials and places them back into the production stream," Taylor noted. "Compost can provide supplemental nutrition, may suppress disease-causing organisms, and can be used as a limestone substitute for pH establishment. Because of the high pH of most composts, limestone rates can be reduced or even eliminated when compost is used as a component of substrate or as a peatmoss replacement."

Taylor and coauthors Rachel Kreis and Lidia Rejtö said that determining the pH buffering capacity of substrates produced with compost is important for pH control and high-quality crop production. The scientists designed experiments to determine the resulting substrate pH when using a range of compost and limestone rates, and then compared

the pH buffering capacity of substrates that had the pH established by the addition of compost, limestone, or a combination of both. Compost made of horse manure and bedding:wood chips:and a variable mixture of green plant material and restaurant food waste was used in all experiments (at a 1:1:1 ratio by weight).

The first experiment featured five compost rates (0%, 10%, 20%, 30%, and 40% by volume), and four limestone rates (0, 1.2, 2.4, and 3.6 $g \cdot L^{-1}$ substrate) in five replications. The experiment was conducted three times, each time using a different batch of compost. "With 0 lime, initial substrate pH increased from 4.5 to 6.7 as compost rate increased," the authors said. "This trend occurred at all other lime rates, which had pH ranges of 5.2-6.9, 5.6-7.0, and 6.1-7.1 for rates of 1.2, 2.4, and 3.6 $g \cdot L^{-1}$ substrate, respectively. Substrate pH increased significantly as either compost or lime rates increased."

The second experiment used four compost rates by volume (0%, 10%, 20%, and 30%) and the same four limestone rates as in the first experiment. Each substrate treatment was titrated through incubations with six sulfuric acid rates. "Substrates with a similar initial pH had very similar buffering capacities regardless of the compost or limestone rate," the authors said.

The experiments demonstrated that compost (with properties similar to the material used in the study) can be used in the same fashion as lime. "When compost is used in this fashion, lime will need to be applied at lower rates or eliminated to achieve the target pH, and growers can anticipate a similar pH buffering capacity," the authors added.

"Growers still need to consider that not only will pH buffering be influenced by the substrate composition, but also by the type of fertilizer, specific crop, and water alkalinity," Taylor added. "It should also be understood that all composts are not created equal. Proper

chemical and physical tests must be done to ensure the compost is used properly."

More information: ASHS *HortScience*: hortsci.ashspublications.org/c… t/51/9/1153.abstract

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