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A greener fertilizer


OSTARA NUTRIENT RECOVERY TECHNOLOGIES

Phillip Abrary, president and CEO of Ostara Nutrient Recovery Technologies and Robert F. Kennedy Jr. sift through the crystals of the first one ton bag of Crystal Green® fertilizer produced at the company's new facility in Hampton Roads, Va. The company also has a production facility in Durham, Ore.

Regulators increasingly target phosphorous in fertilizers because of its tendency to leach, but researchers have found a way to deal with this problem

By Jim Robbins

"Green" and "sustainable" are currently among the hottest buzzwords in manufacturing and marketing. The nursery industry — the poster child for green products — is facing enormous pressure to make certain aspects of production (such as plastic containers, nutrient use and run-off) more green and sustainable.

For many years, the primary focus of nutrient management in intensive, out-of-ground container and greenhouse operations was on nitrogen. More recently, phosphorus has come to the forefront as a nutrient that warrants more attention.

A disadvantage of container production is the fact that nutrients and water must be properly maintained, since the restricted soilless substrate has a limited ability to retain these inputs. Concerns over both water use and nutrient runoff have caused nursery operations to implement best management practices (BMP).

Regulating phosphorous

Phosphorus is one nutrient/chemical that continues to stay in the crosshairs of the U.S. Environmental Protection Agency (EPA). Regulators are interested because a leaching or runoff of phosphorous can contribute to eutrophication. This in turn can result in negative environmental effects, such as anoxia and a reduction in water quality and animal populations (Evans, et al. 2007).

Local regulators across the country have also been paying more attention to phosphorous. In 2002, the City of Minneapolis adopted an ordinance that prohibits the application of nearly all lawn fertilizers containing the nutrient. In Arkansas, a 2003 law stipulates that "no person (including nurseries) shall apply nutrients (with a focus on phosophorous) to soils within the nutrient surplus area, unless nutrients are applied in compliance with a nutrient management plan."

This is very similar to rules established in Maryland. As commercial businesses, you are essentially required to have a license, similar to a pesticide license, to apply nutrients!

Globally, agricultural producers and researchers are focused on increasing the uptake efficiency of both nitrogen and phosphorus as a way to reduce input costs and environmental impact. Obviously, to reduce environmental loss and maximize the fertilizer budget, growers strive for high nutrient uptake efficiency (NUE).

For container-grown plants, Lea-Cox and Ristvey (2003) at the University of Maryland documented that phosphorous uptake efficiency (PUE) ranged from 15–32 percent.

For many years the traditional source of phosphorous in agriculture was fertilizer made from rock phosphate (RP). The leading producers of rock phosphate worldwide, in order of decreasing production, are China, the

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United States, Morocco and Western Sahara, and Russia.

In the U.S., Florida and North Carolina account for 85 percent of the domestic output. Similar to the debate over domestic production of oil, some are worried about the sustainability of rock phosphate supplies in the U.S. Treating rock phosphate in a variety of ways results in common products that we recognize, such as phosphoric acid (PA), normal superphosphate (RP+sulfuric acid), triple superphosphate (RP+PA), and ammonium phosphates such as MAP and DAP.

One of the challenges for fertilizer manufacturers, regulators, and the end user, is how to equate the chemical reactivity (e.g. water soluble versus citrate soluble) of phosphate sources with plant availability. Researchers have demonstrated that phosphorous leaches readily from containers when single or triple superphosphate is used as a fertilizer source (Cole and Dole, 1997). Yeager and Barrett (1984) demonstrated that 55 percent of applied phosphorous leached away from superphosphate amended soilless container media within the first week.

Reducing phosphorous loss

A number of strategies have been developed to help reduce the loss of phosphorous from container nursery operations (Owen et al. 2008). One of these strategies is to reduce the leaching fraction (LF). Tyler et al. (1996) decreased phosphorous loss by 58 percent in a pine bark substrate by reducing the LF from high (40–60 percent to low (0–20 percent).

A second method to reduce phosphorous loss from soilless substrates

Further reading

Cole, C.J. and J.M. Dole. 1997. *Temperature and phosphorus source affect phosphorus retention by a pine bark-based container medium*. HortScience 32:236-240.

Evans, R.Y., L. Dodge, and J. Newman. 2007. *Nutrient Management in Nursery and Floriculture*. Univ. of California ANR Public. #8221. http://anrcatalog.ucdavis.edu/pdf/8221.pdf Accessed on May 3, 2010.

Lea-Cox, J.D. and A.G. Ristvey. 2003. *Why are nutrient uptake efficiencies so low in ornamental plant production?* Proc. SNA 48: 107-113.

Nurseries and Greenhouses: Nutrient Management. http://www.epa.gov/oecaagct/nurgreen.html#Nutrient%20Management . Accessed on May 3, 2010.

Owen, J.S., Jr., S.L. Warren, T.E. Bilderback, and J.P. Albano. 2008. *Phosphorus rate, leaching fraction, and substrate influence on influent quantity, effluent nutrient content, and response of a containerized woody ornamental crop*. HortScience 43:906-912.

Ruter, J. 2003. *Substrate amendments reduce leaching of phosphorus*. Proc. SNA 48:86-87.

Tyler, H.H., S.L. Warren, and T.E. Bilderback. 1996. *Reduced leaching fractions improve irrigation use efficiency and nutrient efficacy*. J. Environ. Hort. 14:199-204.

Warren, S.L., T.E. Bilderback, and H.H. Tyler. 1995. *Efficacy of three nitrogen and phosphorus sources in container grown azalea production*. J. Environ. Hort. 13:147-151.

Yeager, T.H. and J.E. Barrett. 1984. *Phosphorus leaching from 32P-superphosphate-amended soilless container media*. HortScience 19:216-217.

is the use of specific amendments that bind and then release the nutrient over time. Ruter (2003) reported that calcined clay reduced ortho-phosphorous leaching by 73 percent when incorporated into aged pine bark at a rate of 13 percent (v/v).

A third, and commonly adopted strategy, involves the use of controlled-release sources of phosphorous (Warren et al. 1995). Coating available sources of phosphorous with polymer films (such as Apex, Osmocote, Nutricote, and Plantacote) has proven an effective means to control the release of the nutrient over time.

A recent introduction to the fertilizer toolbox is a novel slow-release phosphorus fertilizer that involves a unique manufacturing process. Rather than mining rock phosphate from the ground, Ostara Nutrient Recovery Technologies has developed a proprietary process for recovering phosphorus from water treatment facilities.

The process, developed at the University of British Columbia, recovers waste nutrients that would otherwise be released into the environment. It harvests phosphorous and ammonia from municipal wastewater treatment facilities using magnesium, which causes a chemical reaction resulting in a crystalline phosphorous-rich fertilizer called Crystal Green®, a slow-release form of nitrogen, phosphorous, and magnesium in a non-coated form.

Nutrients which would typically be wasted into the environment are harvested to yield a slow-release phosphorous source for agricultural uses.

Continued development of novel solutions such as feather-based biodegradable containers (http://www.ars.usda.gov/IS/AR/archive/sep09/feathers0909.htm) and Crystal Green® fertilizer will help the ornamentals industry strive for recognition as a green and sustainable industry.

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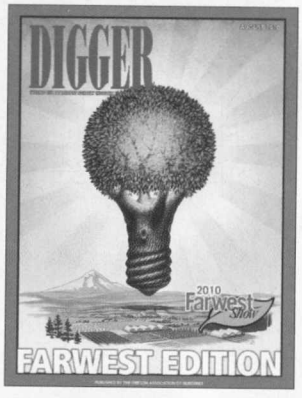

Cover: "Grow Here" is the theme for the all-new 2010 Farwest Show August 26–28 at the Oregon Convention Center in Portland, Ore. It's your opportunity to create new business relationships, grow your business, and see everything that is new in the way of plants and nursery-related products. Turn to Page 51 for the Show Guide, which has complete information on seminars, exhibitors, products and more!

This page: The Farwest Show floor will be packed with several exciting, all-new features, including the Garden Center Pavilion and the New Products Showcase.

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FARWEST SHOW GUIDE BEGINS ON PAGE 51

2010 Farwest Show