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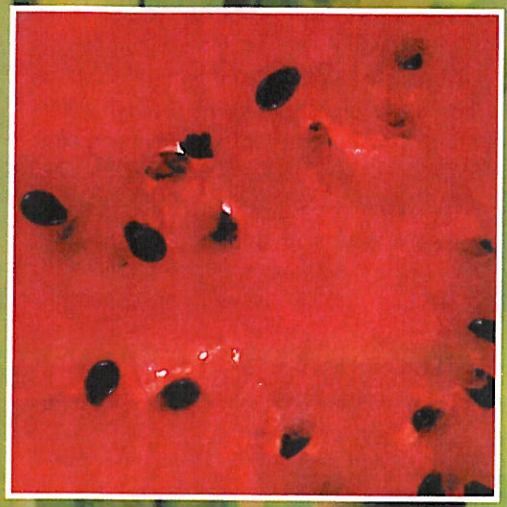

Inside

OREGON AGRICULTURE ROOTED. GREEN. VITAL.

Crystal Green

Environmentally-Responsible Phosphorus Fertilizer

By Misty Zakrzewski

When Matt Gold of Gold Hill Nursery learned there was a new, environmentally-responsible slow-release fertilizer made in Oregon—called Crystal Green®—with a reduced risk of leaching and runoff, he couldn't refuse the opportunity to be one of the first to try it.

"I don't like to waste money," says Gold, who has been in the nursery industry for more than 16 years, "I don't like to throw money down the drain. I spend hundreds of thousands of dollars on fertility supplies and I know a lot of it ends up in my pond."

Crystal Green is the world's first slow-release, environmentally-safe fertilizer made from phosphorus, magnesium and nitrogen, unique for its renewable source of phosphorus—wastewater.

The fertilizer is a product of Ostara Nutrient Recovery Technologies, a clean water company founded in 2005 and headquartered in Vancouver, B.C., that provides an innovative phosphorus management solution to municipalities to help recover precious nutrients from their wastewater streams and transform it into a fertilizer. The fertilizer is marketed and sold to fertilizer blenders, distributors and independent growers throughout North America as Crystal Green.

OSTARA

Creating Value from Waste

Ostara's technology was discovered at the University of British Columbia—in 1999 a group of researchers at the university decided to address the issue of struvite in Metro Vancouver wastewater treatment plants. Struvite, an excess build up of nutrients such as phosphorus and nitrogen in wastewater streams, accumulates as a cement-like substance in water treatment pipes, pumps and valves, reducing the plant's efficiency and requiring costly maintenance. Their resolve to find a solution to this costly problem led to the discovery of an innovative system for recovering phosphorus from wastewater. The researchers designed a new technology—a fluidized bed reactor that forces the struvite minerals to crystallize inside the vessel before they have a chance to plug the pipes. The crystals stay in suspension in flowing water and as nutrients are added, crystals form and grow.

In 2005, the proprietary technology was licensed, and Ostara Nutrient Recovery Technologies was founded to

Ostara board member Robert F. Kennedy Jr. and Ostara President & CEO Phillip Abrary in front of Rock Creek's Pearl® 2000 system.

Brett Laney, Operator, Clean Water Services; Honorable Ted Wheeler, OR State Treasurer; Robert F. Kennedy Jr., Environmental Advocate & Attorney & Ostara board member; Phillip Abrary, President & CEO, Ostara Nutrient Recovery Technologies at press conference to open Rock Creek Nutrient Recovery Facility.

Crystal Green's hard crystal prill does not break down during blending and application, resulting in less feast or famine. It also reduces need for extensive clean-up after each manufacturing and application process.

market the nutrient recovery process. "Crystals are very exclusive in what they allow into their matrix," says Ostara Co-founder, President and CEO, Phillip Abrary, creating a 99.9 percent pure product. The struvite nutrients form in layers, like a pearl, which led to the technology's appropriate name—Pearl® Nutrient Recovery Process.

In 2007, after successful demonstration of the technology at the Gold Bar Wastewater Treatment Plant in Edmonton, Canada, Ostara moved forward commercially. They scaled up the Pearl technology to 100 times more capacity than the lab, calling it Pearl 500, as the system had capacity to produce 500 kilograms of Crystal Green daily. During the demonstration, Ostara's "Pearl Process" was proven to recover up to 90 percent of phosphorus and 20 percent of ammonia from treated waste water, transforming wastewater streams into a renewable resource and creating an environmentally-friendly fertilizer.

By 2008, Ostara was ready to put the Pearl 500 in action and partnered with Clean Water Services' Durham Advanced Wastewater Treatment Facility in Tigard, Oregon. With the Tualatin River running through Washington County, Clean Water Services has extensive experience dealing with some of the highest phosphorus regulations in the country, and they maintain stringent phosphorus limits. Abrary attributes Clean Water Services' visionary mind set, as well as their industry leadership in being progressive as the primary reason Clean Water Services was a natural partner.

Bill Gaffi, General Manager of Clean Water Services celebrates opening of the largest municipal nutrient recovery facility with Phillip Abrary, President and CEO of Ostara.

"They are very innovative in their thinking, and they've won many awards for being amongst the leading wastewater treaters in the country," says Abrary.

The partnership has been mutually beneficial, helping Clean Water Services meet nutrient discharge limits, increase plant efficiency and optimize phosphorus recovery to produce a revenue-generating product, while providing a successful example of the technology benefits for Ostara.

With success at the Durham Facility, Clean Water Services and Ostara partnered to install a second nutrient recovery facility. On May 8, 2012, the Rock Creek Advanced Wastewater Treatment Facility in Hillsboro, Oregon, launched the largest municipal nutrient recovery facility in the world. The Rock Creek facility is the first treatment plant to be equipped with the latest Pearl 2000 technology, capable of recovering up to 1.2 million pounds of phosphorus from the waste stream each year. The Pearl 2000 reactor requires one-seventh the amount of energy to create 1,200 tons of Crystal Green as it takes to create an equal amount of conventional fertilizer. The energy savings earned Clean Water Services an Oregon Department of Energy Business Energy Tax Credit of $1.12 million which helped fund the facility's construction.

"They're definitely into improving the quality of life around them," says Ostara Managing Director Ed Carmody about Clean Water Services, "Since our technology is green, it's a good fit."

Ostara has two additional facilities in the United States producing Crystal Green, located in Virginia and Pennsylvania.

Crystal Green® All Ways Green.

Crystal Green is sold at Wilco stores, Wilbur-Ellis and Simplot. Although production has been successful at their four facilities, the limited number of production sites makes Ostara's greatest obstacle keeping up with demand. "Going into the market with a few hundred tons of product is pretty hard to get people's attention," says Abrary. They are currently addressing that challenge by adding production facilities around the world, including nutrient recovery facilities soon to be launched in Saskatoon, Saskatchewan; Thames, United Kingdom, later this year; and Madison, Wisconsin, in early 2013. "As our production grows, so will our distribution," says Carmody.

As for Gold Hill Nursery, they plan to expand their use of Crystal Green to a larger selection of their nursery—up to one-third of their production. They found that Crystal Green was not only cheaper per application, but performed at the same level or better than other fertilizers, improving root development in their plants.

Ostara's goal is to continue to make inroads in the professional turf and horticultural markets, expanding on an international level, but they emphasize the importance of Crystal Green being a local product for Oregonians. Abrary wants Oregonians to know that Crystal Green is the first time a phosphorus-based fertilizer has been manufactured in Oregon that doesn't have to be mined, converted into a furbish product and travel long distances.

As Abrary puts it, "Crystal Green really stands for a greater message of sustainability, and for consumers in the local community it signifies the full circle of sustainability—to try to be more efficient and do better with our limited resources and energy consumption."