Science and Technology for Product Support and Development

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V. P. Sales & Marketing
Lonza Overview

- Trusted supplier to the pharmaceutical, biotech and specialty ingredients markets
- Founded in 1897 with headquarters in Basel, Switzerland
- Sales of about $3.4 billion in 2013
- Global operations:
  - Located in more than 40 major sites
  - Employs approximately 10,000 people
- Global leader in microbial control and custom manufacturing:
  - Hygiene
  - Water treatment
  - Active pharmaceutical ingredients, both chemical and biological
  - Cell therapy
Alpharetta Innovation and Technology Center

• Opened in September 2011 to support Lonza’s market segments
  - $10 million; over 65,000 square-feet dedicated to research and product development
  - Space dedicated to innovation and process technology, applications research, center of excellence for analytical research, cutting edge microbiology infrastructure, and technical resources for customer support
• Additional 24,000 square-feet devoted to business support
Alpharetta Innovation and Technology Center

- 65 total employees, 25 PhDs (Chemistry, Microbiology, Engineering, Biology, Physics, Weed Science)

- Research laboratories consist of:
  - Front End Development
  - Center of Excellence for Microbiology
  - Center of Excellence for Analytical Research
  - Manufacturing and Process Technology
  - Application and Technical Services Water (Pools and Surface Water)
  - Personal Care (Antidandruff and Preservatives)
  - Application and Technical Services Industrial Solutions (Building Products, Antifouling Paints)
  - Industrial, Commercial and Municipal Chlorine Feeder Technologies
Research to Support Aquatic Plant Management
Targeted Algal Management – Lab Scale

- Targeted Algal Management
- Algal Challenge Test (ACT)
  - Rapidly screen algae and algaecides based on site specific conditions
  - Allows for prescriptive algal management of target species in the field
  - We offer a high level of testing reliably and consistency for algae management
Laboratory Results

**Lyngbya magnifica**- Chlorophyll a

![Graph showing laboratory results for different algaecides and concentrations.](image)
Operational Application – Lake John Hay Case Study

Targeted Management of Taste and Odor producing Cyanobacteria and resulting water quality improvements in Lake John Hay Reservoir, Salem, IN


THE PROBLEM

“Water Superintendent Russell Brown said his department is continuing work to address the taste and odor issues that many customers have been complaining about for the past several months.”

“Algae bloom is believed to be the root of the taste and odor issue. Brown noted algae was very bad this summer and many other water departments in the region are dealing with similar issues. He said there are some forms of algae that bloom during cold weather. Both Brown and Mayor David Bower said the city is committed to getting to the root of the problem and correcting it permanently. “We know people expect good, clean water with no taste or odor,” Brown said.”

Excerpt taken from “Water taste and odor issues continue”, written by Stephanie Taylor Forrester as published by The Salem Leader on December 4, 2009

THE FACTS

Lake John Hay

- Six miles northwest of Salem, Indiana
- 210 acre impoundment
- Has experienced persistent, recurring algae blooms causing taste and odor problems
- Used for drinking water and tournament and recreational fishing
- Average depth of ~14.5 feet, (much of Lake John Hay is within the photic zone, ideal for algae and plant growth)
- Frequent complaints led to officials seeking an action plan

Water samples showed two primary planktonic taste and odor producers - Planktothrix and Chrysocromelinia. Geosmin concentrations in excess of the human detection threshold were also measured at several locations within the reservoir as well as in sediment samples.

GEOSMIN

Produced by several classes of microbes, including Cyanobacteria (blue-green algae)

“Geosmin, an organic compound whose name literally translates to ‘earth smell’, is detectable by the human nose in concentrations as low as five parts per trillion.”

Excerpt taken from “Geosmin levels below detectable threshold”, written by Chad Eatonwood as published by The Salem Leader on June 22, 2010

TARGETED TREATMENTS

Data Collection Survey Stations -

Target Treatment Area - Identified Area for May Application

May 4, 2010

First treatment made to 1/3 of the surface area of the reservoir using calibrated delivery pumps

Treatment Area and Track

Aerial photograph © 2011 DeLear

May Station 4 Cell Densities (Pre/Post)

Post treatment, cell densities of Planktothrix and Chrysocromelinia declined significantly one day after treatment.

May Raw Water Geosmin Levels

Geosmin concentration in the vicinity of the water intake structure declined from about 50 ng/L to non-detectable (detection limit <5 ng/L) two weeks after treatment.

Treat the algae, not the water.
Basics of What Have We Learned

• Variable responses in the same algae to different algaecide formulations, even with the same active ingredient
• “All copper algaecides are not chelated equal”
• Algaecide application distribution is critical to contact as much of the algae as possible where they are growing
• “Treat the algae, not the water”
• An effective dose for achieving control is influenced by the amount of algae present
• “Use what you need / need what you use” (within the label directions)
Product Development – Lab Scale

- Efficacy testing of both aquatic plants and algae in controlled growth aquaria
- Allows for greater understanding of herbicide/algaecide interactions
- Can evaluate products on mixed plant assemblages to determine selectivity and sensitivity
- Establish concentration exposure time relationships
- Capabilities to model formulation dissipation, formulation stability, establish release rate curves
Product Development – Lab Scale

- Capabilities to model formulation dissipation
- Formulation stability
- Establish formulation release rate curves
Product Development – Mesocosm Scale

- New mesocosm test facility under construction
- Planned capacity: approximately 50 - 100 tanks
- Tank size: 100 – 1000 gallon
- Support research on submersed, floating, emergent plants and algae
- Use patterns, herbicide combinations, efficacy, new product screening, formulation testing, interactions, selectivity, and sensitivity
Product Development – Field Scale

- Product development and support under operational management conditions

- Growing list of cooperators including:
  - University scientists
  - Federal and State government scientists
  - Professional lake managers
  - Consultants
  - Applicators
  - Private citizens
Evaluation of Auxin Herbicides Applied Alone and in Combination with Select Algaecides for Control of Eurasian Watermilfoil in Long Lake, Iosco County, MI

- Long Lake, MI (493 acres)
- Field project to support use of algaecide and herbicide combinations for enhanced control of Eurasian watermilfoil
- Navitrol® Landscape and Aquatic Herbicide (Triclopyr), Navigate® A Selective Herbicide (2,4-D), Cutrine Ultra® Algaecide/Herbicide, Phycomycin® SCP Algaecide and Oxidizer
- Biomass Sampling Schedule:
  - Pre-treatment (June 4, 2013)
  - 8 WAT (August 4, 2013)
  - 1 YAT (TBD)
Operational Field Study Results

- All products, rates and combinations effectively controlled Eurasian watermilfoil
- The use of Cutrine Ultra® or Phycomycin® SCP in combination with Navitrol® and Navigate® accelerated knockdown of Eurasian watermilfoil
- The removal of Eurasian watermilfoil allowed for native species to re-colonize
- There was an increase in native plant biomass and native species richness (particularly monocotyledon species)

Asterisk indicates a significant difference between native biomass
A plus symbol indicates a significant difference between EWM
Aquatic Products
Algaecides, Aquatic Herbicides, Colorants, Biological Products
Thank you