IMPROVING IRRIGATION POND WATER QUALITY FOR REUSE

Minimizing horticultural impacts on surface water quality to encourage re-use through enhanced pond management

Project Summary

Recycling irrigation water can lead to poor water quality and excessive biological growth in ponds. This can mean poor quality water or expensive maintenance costs to clean out ponds and/or repair clogged intake filters for irrigation. Research was geared towards better management of irrigation ponds. This project evaluated in-pond technologies as well as pre-pond treatments to improve water quality. Research conducted so far has shown that preventing nutrients from reaching the pond is the most important practice, with a woodchip and slag hybrid treatment swale showing promise for preventing nutrient runoff. Where pond quality is compromised, covering ponds is successful at decreasing levels of phytoplankton while aeration is effective for breaking down organic matter.

The recycling of irrigation water can lead to excessive biological growth in irrigation ponds. This often results in poor water quality, the clogging of intake filters, and expensive maintenance costs. The sector requires a better understanding of the nutrients that are entering and held in irrigation ponds to better manage water quality. Research was focused on improving how we manage irrigation ponds to achieve higher water quality for reuse and to decrease the risk of nutrients leaving production systems.

The objective of this project was to evaluate and compare pond management tools to recommend improved pond management strategies. Both in-pond management technologies and pre-pond water treatments were explored.

What you need to know

In-pond management technologies that work:

- **Covering** ponds through physical shade barriers or plant coverings (like duckweed and hyacinths) decreases phytoplankton levels, particularly the amount of cyanobacteria (or 'blue-greens').
- **Aeration** is effective for breaking down organic matter. Although it causes high turbidity, intensive aeration helps to degrade organic material in sediments while maintaining low levels of chlorophyll and phycocyanin, without releasing high levels of soluble phosphorus.

Pre-pond water treatment design:

- The **woodchips** successfully removed nitrate-N and partially removed phosphorus
- The **slag** cell removed some phosphorus in the second year, although a longer retention time (i.e., increased volume of slag material) is required to fully remove phosphorus

Checkout this poster on Solutions for Pond Water Quality and watch a video presentation on this research project by clicking here.

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Research Takeaways

For new ponds:

- It is crucial to keep them clean from Day 1
- Hybrid Treatment Swales are a potential solution for managing N and P inputs from production runoff

For existing ponds:

- It is crucial to prevent additional nitrogen and phosphorus from entering
- Covering ponds and silos can help limit growth of phytoplankton
- Sediment disruption and degradation improves long-term water quality

Read more about it

New research project focuses on improving standards for effective pond management

COHA is advancing the Canadian ornamental horticulture sector through research and innovation

This project is part of COHA's Research Cluster 3 – Accelerating Green Plant Innovation for Environmental and Economic Benefit Cluster – enabling the sector to **adapt to climate change**, **enhance environmental sustainability**, and **increase competitiveness through productivity gains**.

COHA is a proactive alliance between the *Canadian Nursery Landscape Association (CNLA)*, *Québec Vert (QV)*, and the *Flowers Canada Growers (FCG)* that provides a unified voice with a bird's eye view over the largest and most significant sector of horticulture in Canada. Since 2008, COHA has successfully hosted research clusters through the AgriScience Program as part of their industry-driven and solution-oriented approach to support the Canadian ornamental horticulture sector by bringing together government, industry, and academia to solve real-world problems.

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IMPROVING IRRIGATION POND WATER QUALITY FOR REUSE

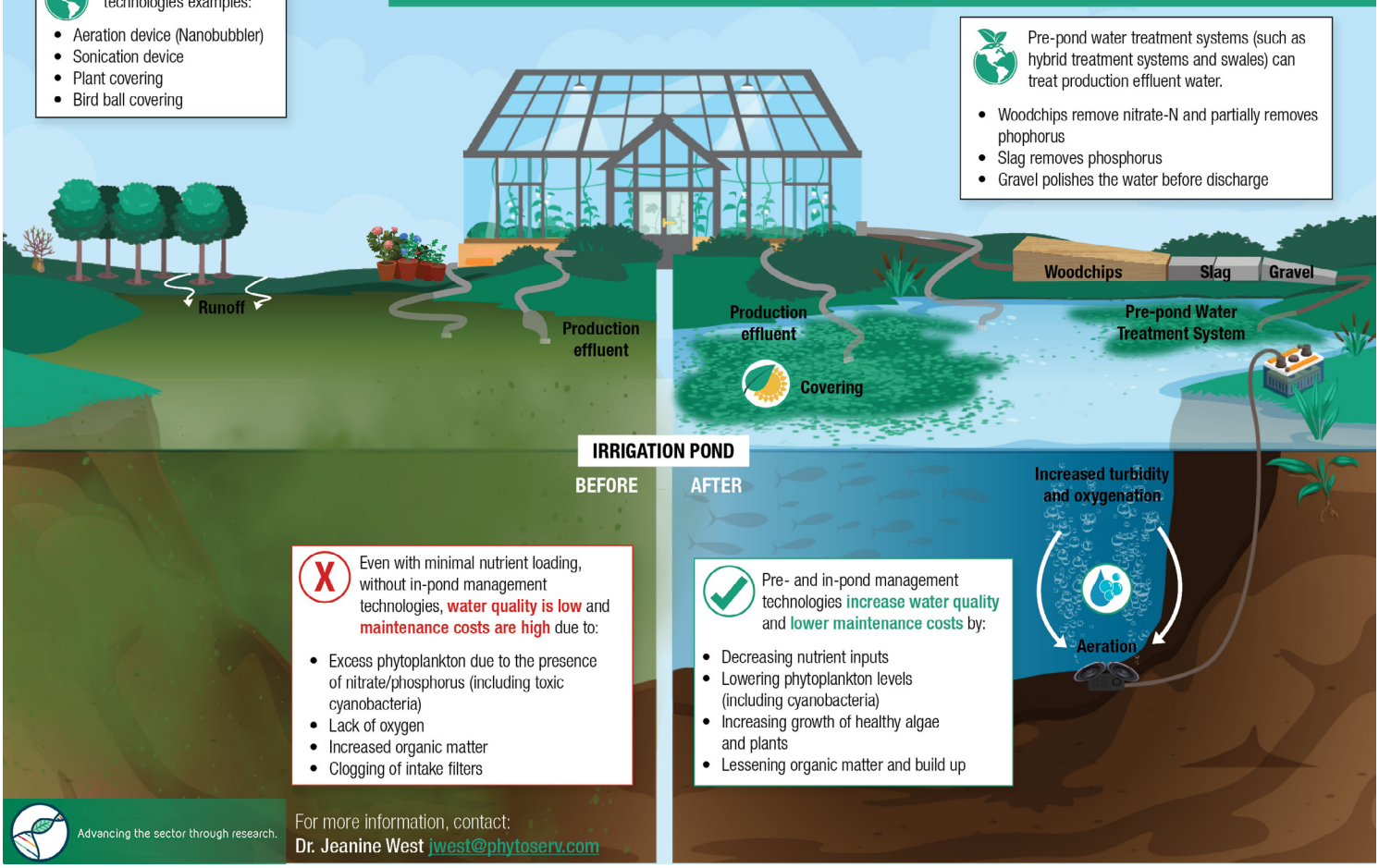
- Pre-pond technologies improve irrigation pond ecosystem health by preventing nutrients from reaching the pond in the first place
- Treating water using woodchips (including hybrid treatment swales) successfully removes nitrates, while other elements (such as phosphorus) can be removed using select mineral media
- In-pond technologies can help maintain pond health, and can prevent irrigation intake maintenance issues
- Coverings limit phytoplankton growth while aeration disrupts sediments and degrades organic matter, improving water quality long-term

In-pond management technologies examples:

- Aeration device (Nanobubbler)
- Sonication device
- Plant covering
- Bird ball covering

Pre-pond water treatment systems (such as hybrid treatment systems and swales) can treat production effluent water.

- Woodchips remove nitrate-N and partially removes phophorus
- Slag removes phosphorus
- Gravel polishes the water before discharge



Even with minimal nutrient loading, without in-pond management technologies, **water quality is low** and **maintenance costs are high** due to:

- Excess phytoplankton due to the presence of nitrate/phosphorus (including toxic cyanobacteria)
- Lack of oxygen
- Increased organic matter
- Clogging of intake filters

Pre- and in-pond management technologies **increase water quality** and **lower maintenance costs** by:

- Decreasing nutrient inputs
- Lowering phytoplankton levels (including cyanobacteria)
- Increasing growth of healthy algae and plants
- Lessening organic matter and build up

Advancing the sector through research.

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