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Applied Research Update

Inconclusive evidence for use of Barley Straw for Algae Control

ABSTRACT

Although European research suggests that barley straw can be used to reduce algae concentrations in surface waters, there have been no scientific assessments of this technology in the Canadian prairies. When we followed the techniques recommended in existing literature we found that algal reductions were **inconsistent** and **not substantial** enough to be viewed as a significant benefit to a producer.

We did find a slight reduction in algae concentration in the second year of the study when dose and water temperature were higher. This suggests that changes to the application techniques could possibly be used to overcome the limitations of water temperature.

Based on our findings we suggest that traditional best management practices such as **Livestock Exclusion, Aeration, Gated Inlets,** and **Grassed Buffer Strips and Waterways** be adopted to improve water quality in farm ponds. Severe blooms can be treated with copper sulphate but continued use of copper sulphate is not recommended as a good practice.

The full report can be found at:

R. Butler, S. Reedyk, S. Murrell and B. Mah. 2005. Use of Barley Straw for Algal Control in Prairie Dugouts: Final Report. Agriculture and Agri-Food Canada, Prairie Farm Rehabilitation Administration, Regina Saskatchewan 43p

ISBN: 0-662-42192-2

www.ac.gc.ca/pfra/etc

What is the history of barley straw use in ponds?

- The use of barley straw as a method for controlling algae in surface water reservoirs has been well demonstrated in Europe, and is referenced in many university extension fact sheets in the United States.
- Although there have been some demonstrations of the technology in Canada, no comprehensive scientific evaluation of the technique is available for the Canadian prairies.

What was the purpose of the current study?

- The main objective of this work was to assess the applicability of the barley straw technology, as reported and recommended in the scientific and popular literature, to farm ponds in the Canadian prairies.

What is the technique that has been recommended in the literature?

- Barley straw is loosely packed with floats in porous fabric bags and tethered in the centre of the pond.
- Aerobic conditions are required.
- A mechanism to distribute the rotting straw extract throughout the pond is required.
- Straw is applied before significant algae growth is present.
- Reported straw doses range from 10-50 g/m^2

Canada

How was the technology tested in Canada?

- Eleven dugouts (ponds) were selected across the Canadian prairies. Each dugout was divided into treatment and control sides using a geotextile membrane.
- Ponds were dosed with barley straw according to the doses and methods identified in the published literature.
- Ponds were aerated to maintain aerobic conditions. The aeration plume enabled distribution of the barley straw extract.
- Water quality was assessed bi-weekly using indicators for algae concentration (chlorophyll-*a*) and water clarity (turbidity and Secchi depth). Other field measurements such as temperature and dissolved oxygen were taken.

Typical dugout (pond) site showing curtain and barley straw bags.

What did the current study find?

- Statistical tests of the data showed no significant difference between the treated and control sides of the ponds in water clarity (turbidity and Secchi depth) in either year (Table 1).
- Algae concentration (chorophyll-*a*) was significantly less in the treated side of the pond than the control side only in 2003 (Table 1).
- The percent reduction in algae concentration (chlorophyll-*a*) in the treated sides of the ponds ranged from -14 to +39% (Figure 1).
- Although the maximum percent reduction in algae concentration (chlorophyll-*a*) was 39%, the maximum absolute reduction corresponded to < 10 µg/L.
- Water temperatures were higher in 2003 when response was better. Water temperature may have been a limiting factor in the response.

Table 1: Paired t-test comparisons for barley straw treatment effect on mean summer turbidity, Secchi depth, and chlorophyll-*a* concentrations by year (α =0.05)

Parameter	Year	Control	Treated	P-Value
Turbidity (NTU)	2002	21.6	20.6	0.1772
	2003	16.7	15.8	0.2296
Secchi Depth (cm)	2002	113	99	0.0714
	2003	80	85	0.0932
Chlorophyll-*a* (µg/L)	2002	22.1	21.8	0.3886
	2003	22.7	20.5	*0.0373*

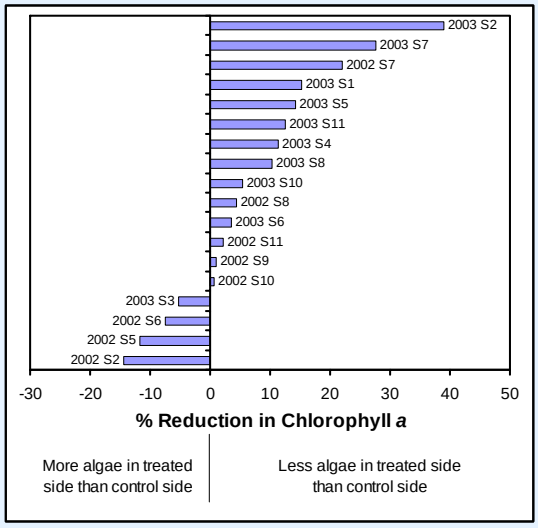

Figure 1: Percent reduction in chlorophyll-*a* concentration in the treated side of the ponds. Labels indicate year and site number.

What was concluded from the current study?

- In ponds on the Canadian prairies, barley straw treatments which use the techniques recommended in the literature produce algae reductions which are **inconsistent** and **not substantial** enough to be viewed as a significant benefit to a producer.
- The Canadian prairie climate, with low average water temperatures may be a contributing factor limiting the applicability of the technique. A slight response was experienced with increased **temperature** and **dose**, and this suggests that changes to the application techniques could possibly be used to overcome the limitations of water temperature.