

Date: 05-03-2016

SAMPLE(s): “Lagoon #3 and #4”

Received: 04/26/16

Analyzed: 04/26/16 – 05/03/16

Sample analyzed by Deborah Lee, Microbiologist, AQUAFIX

**Problem(s):** Identify algae and jar test with various products to kill algae fast and reduce pH.

### Microscopic Observations



Figure 1-algae unstained and viewed with 400X magnification showing *Desmodesmus*.

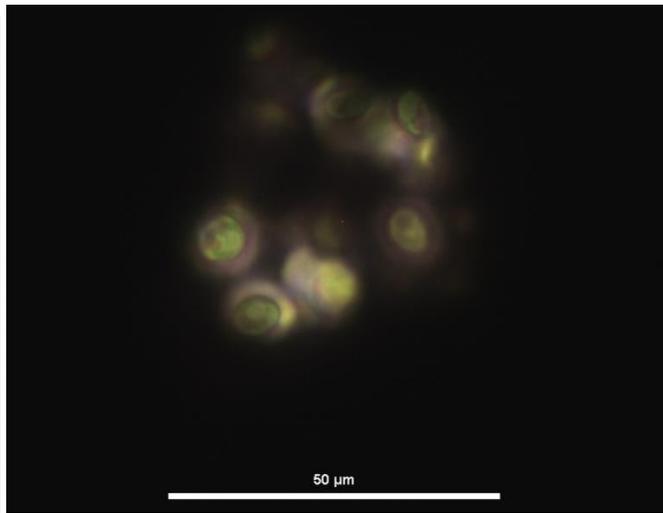


Figure 2-algae stained with India ink and viewed with 400X magnification showing *Dictyosphaerium* without high slime.

### Summary:

- The algae in the sample received contained high amounts of planktonic colonial green algae similar to *Desmodesmus* (Figure 1) and *Dictyosphaerium* (Figure 2).
- Scenedesmus* and *Desmodesmus* are related genera of colonial green planktonic algae. Both of these algae consist of flat coenobial colonies although they are sometimes found as solitary cells. Coenobial colonies are a type of colony whose shape and cell number is genetically determined, established early in development and does not change during the organism’s life. The most common species of both of these algae form colonies of four cells in a single row, but some species have more cells or may have cells arranged in double, alternating series. Each cell contains one nucleus and one parietal chloroplast with pyrenoid. The cells of the colonies can be oval, fusiform or crescent shaped and each colony may be composed of two different cell forms. Some species change structural features of their cell walls from generation to generation based on nutrition. Some species with spines are called *Desmodesmus* rather than *Scenedesmus*. Colonies generally reproduce

asexually through autospores that form autocolonies within each cell of the mother colony leading to the release of as many colonies as there were cells in the original colony. Both *Scenedesmus* and *Desmodesmus* are commonly found in freshwater ponds and lakes in the warmer months.

- *Dictyosphaerium* is a colonial green planktonic alga in arrangements of four (or more) cells connected by thin strands. The algal cells contain one cup-shaped, parietal chloroplast covering most of the cell wall. This alga also produces a distinct mucosal or gelatinous envelope surrounding the colonies and individual cells. *Dictyosphaerium* is known to be abundant in late spring and early summer in eutrophic mixed lakes and some fish ponds. The mucilage produced by these algae helps with buoyancy, gathering nutrients, and serves as a defense mechanism against grazing and metal poisoning. I have previously seen high concentrations of this alga in a pond that had high levels of ammonia, nitrite, nitrate, and orthophosphate in hard water.
- The high pH reported at this site is probably due to photosynthesis of the observed algal bloom. Killing the algae in this pond should help to return the pond pH to a more neutral level.

## Algal Jar Test

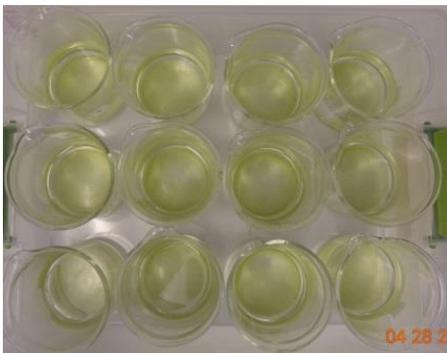
Procedure:

- 100ml sample added to 250ml glass beaker
- Product added initially at mid-range between lowest and highest dose on label for planktonic algae.

(9) 4ppm Cutrine Plus + 4ppm AS	(10) 22ppm OxyPaks XL + 4ppm AS	(11) 4ppm WCC + 4ppm AS	(12) No product
(5) 4ppm Water Column Clarifier (WCC)	(6) 4ppm AquaSticker (AS)	(7) 5ppm Captain XTR + 4ppm AS	(8) 12ppm SeClear + 4ppm AS
(1) 5ppm Captain XTR	(2) 12ppm SeClear	(3) 4ppm Cutrine Plus	(4) 22ppm OxyPaks XL

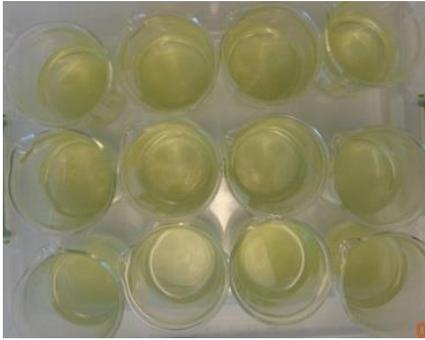
- Take 1ml from test beaker and add to microfuge tube containing product
  - Mix 3-5 times and add in circular motion to top of beaker
  - Swirl beaker 5 times to mix
- Cover with plastic wrap and put under light

Results:



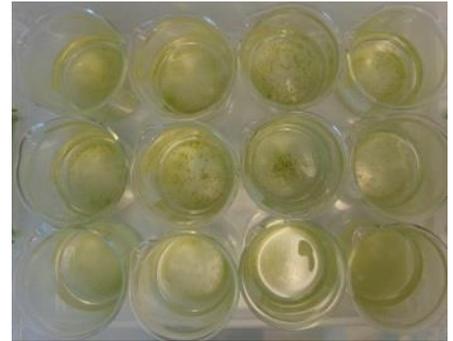
- 4/27/16 start test. All beakers have green liquid with small green particles.
- 4/30/16 Add another dose at mid-range between lowest and highest dose to beakers.

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- 5/2/16 none appear to be killing algae. Add highest label dose for planktonic algae. The control beaker was pH 7. This may indicate that the algae are not metabolically active.

- 5/3/16 End of testing. None of the tested products completely cleared the water column. If left to settle for 16 hours (overnight), most of the algal particles did settle out of solution leaving clear overlying water.



### Summary of Jar Test:

- None of the products tested on this sample quickly killed the algae in the sample. This may be because the algae in the sample were in a state of low metabolic activity and most of the products tested will work better when the algae is rapidly growing. The one exception may be OxyPaks XL. This product will still kill algal cells with low metabolic activity by damaging the cells from the outside in. By the end of the second mid-range dose on the test beakers, it seemed that beakers (4) and (10) had algae that was more yellow than green, indicating some cell death. Beakers (8) and (1) had the lightest green colored sample and may indicate that some algal death also occurred in these test beakers.

### Recommend:

- Add **OxyPaks XL** at 100 pounds per surface acre every day until algal bloom goes away.
- Turning off the aeration for 16 hours before discharging may help the planktonic algae settle and result in clear overlying water to discharge.
- Adding **AquaSticker** may improve nutrient removal and/or flocculation of algae. If **AquaSticker** is to be used in combination with **OxyPaks XL**, wait at least one hour after adding **OxyPaks XL** before applying **AquaSticker**.
- General nutrient reduction is recommended to control blooms of *Desmodesmus* and *Dictyosphaerium*. For aerated ponds and lakes with high flow, it is recommended to reduce the nutrients from sediments using **VitaStim MD Pellets**. Addition of dye may not control *Dictyosphaerium* since this alga does relatively well under low light conditions.
- If alum is used to precipitate phosphorus, it is best to meter this into the splitter before Lagoons #3 and #4 so the excess phosphorus does not contribute to an algal bloom.

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