Controlling Algae in Ponds and Lakes

Tom Dorn
Extension Educator

The dream of many folks in the urban setting is to move to the country, live on an acreage and have their own pond for fishing, swimming, livestock water or just because it is pretty.

One of the perennial problems faced by pond owners in rural and suburban settings is excessive algae growth, also called algae blooms in the water. Algae are divided into three classifications. Planktonic (single-celled), filamentous and Chara. Planktonic algae remain diversely suspended in the water and turn the water a uniformly green or blue-green color. Filamentous algae species string together, becoming floating mats of "pond moss." The third type of algae, called Chara or muskgrass, are large green algae that are anchored to the bottom but do not extend above the surface. Chara is stem-like, with thin, leaf-like structures and is often confused with seed-bearing aquatic plant species. When crushed, chara produces a musky odor.

For maximum production, all plants need adequate water, sunlight and nutrients. Algae is no exception. In a pond, water and sunlight are a given, the limiting factor is plant nutrients. The first step in algae control is to reduce the movement (loading) of nutrients into the water. Whenever, I get a call about an algae problem in a pond, I try to identify the source of nutrients that is causing the problem. The two primary nutrients that must be controlled are nitrogen and phosphorus, with phosphorus being the larger concern when it comes to algae control.

If applications of commercial fertilizer or animal wastes applied to the soil surface are followed by a hard rain, they may be carried directly into the pond by runoff water. In addition to movement of surface-applied products carried in the runoff water, nutrients can be carried to the pond attached to soil particles that erode from slopes and end up in the pond as silt.

Nitrogen and Phosphorus are water soluble nutrients. Nutrients incorporated into the soil by tillage or surface applied and later dissolved by rainwater and carried into the soil with the water may also find their way into the pond. Most of our southeastern Nebraska soils can be classified as silty clay loam topsoil overlaying heavier clay subsoil. When water that is percolating down through the soil profile encounters the clay layer, its downward movement is impeded. It then moves downslope along the boundary and may emerge as a spring in a creek bottom or in the pond itself. In addition to applied fertilizer or animal waste, another source of potential nutrient loading can be domestic wastewater. Effluent entering the soil from septic absorption fields also becomes part of the soil water matrix and can move downslope as described above.

Once nutrient loading has been reduced to the extent possible, chemical treatments can be used to control algae in a pond. Copper compounds such as copper sulfate and various chelated copper products are both safe and effective when used according to directions. Some aquatic herbicides that are used for seed-bearing aquatic plant species are effective against certain algae species as well. For more information on chemical control methods, go to the Aquaculture page in the Lancaster County Extension Agriculture and Acreage Resources section of our Web site. http://lancaster.unl.edu/ag/aquaculture.shtml

Pesticide Container Recycling Program

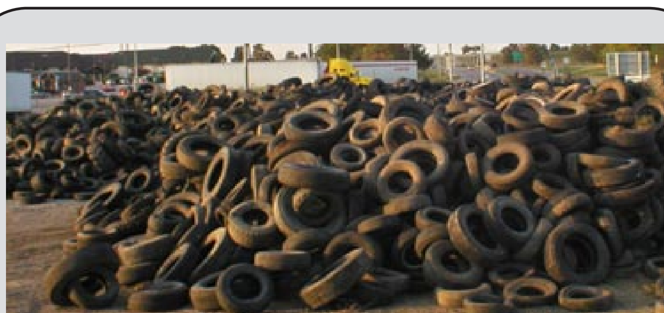
Collection in Bennett, Aug. 10

For 14 years, University of Nebraska–Lincoln Extension has been coordinating a recycling program for plastic agricultural pesticide containers. All containers must be inspected to make sure that they have been properly rinsed, with the caps and labels removed before they can be placed in our trailer. (Paper labels one layer thick may remain on the containers.) We will accept all sizes of agricultural pesticide containers, including 30 gallon plastic drums.

Containers may be brought to the UNL Extension in Lancaster County office, 444 Cherrycreek Road, Lincoln, during business hours 8 a.m. to 4:30 p.m. Monday–Friday, EXCEPT for the weeks of July 2, July 16 and July 23. Please call ahead at 441-7180 to ensure someone will be available to inspect and accept the containers before you come.

A remote collection dates has been arranged in cooperation with Farmers Cooperative Company. **Our semi-trailer will be manned on Friday, Aug. 10, 9 a.m.–Noon in Bennett at the Co-op headquarters.**

The material is currently being recycled into plastic posts, industrial pallets, field drain tiles, speed bumps, railroad ties and parking lot tire stops.



Scrap Tire Collection Sept. 29 & 30

9 a.m.–9 p.m.

South parking lot, Shoemakers Truckstop NW 48 & West O Streets, Lincoln, NE

Will accept tires of all shapes and sizes with no limit, free of charge!

We cannot accept tires from dealers, outside the state or with rims.

For more information, call 476-3590

Sponsored by: Sanitary Improvement District (SID) #6, Emerald, NE

Larger Diameter Bins Can Save Time and Energy When Drying Grain

Tom Dorn
Extension Educator

The airflow produced by an aeration fan depends on the static pressure the fan must overcome. **Figure 1** shows a typical axial flow fan curve. The greater the static pressure, the lower the volume of air produced. **Table 1** shows airflow resistance for shelled corn. More static pressure is required to push a given rate of airflow, cubic feet per minute per bushel (cfm/bu) through grain as the depth of grain increases. Static pressure also must increase to push increasing rates of airflow (cfm/bu) through any given depth of grain.

The time required to dry grain in a bin is a function of the amount of water removed, the air properties and the rate of airflow through the grain (cfm/bu).

Since drying time is directly related to the rate of airflow, cfm/bu, we want airflow rates as high as practical when drying grain. By keeping grain depth as shallow as possible, resulting in higher airflow rates, we can reduce total drying time and save energy cost for drying grain.

Building larger diameter bins and then partially filling them when drying, keeps static pressure low while not sacrificing the number of bushels dried per batch. Consider the difference in static pressure when a 27 foot diameter bin and a 33-foot diameter bin are each used to dry 8,000 bushels of corn at one time. Grain depth in the 27-foot bin would be 17.5 feet, whereas grain depth in the 33 foot bin would be only 11.7 feet.

Using the **FANS** computer program from University of Minnesota to compare these scenarios provides some interesting results.

Table 1. Airflow resistance data for shelled corn.

Grain Depth (feet)	Airflow (cfm/bushel)					
	0.5	0.75	1.0	1.25	1.5	2.0
	Expected Static Pressure (inch of water)					
8	0.2	0.3	0.5	0.6	0.8	1.2
10	0.3	0.5	0.8	1.1	1.4	2.0
12	0.5	0.8	1.3	1.6	2.1	3.2
14	0.7	1.2	1.7	2.3	3.0	4.6
16	0.9	1.6	2.4	3.2	4.2	6.4
18	1.2	2.1	3.1	4.3	5.6	8.7
20	1.6	2.7	4.0	5.6	7.3	11.3

Smaller Fan—Same Bushels

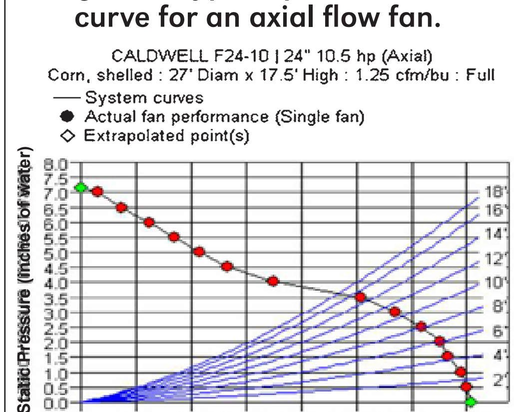
It would take 4.0 inches of static pressure and an estimated 10.6 horsepower (hp) to push 10,000 cfm (1.25 cfm/bu through 8,000 bushels) in a 27-foot diameter bin. To push 1.25 cfm/bu through 8,000 bushels in a 33-foot diameter bin would only take 1.5 inches of static pressure and an estimated 4.0 hp. *This scenario assumes a smaller fan was selected for the larger bin which would produce 10,000 cfm when overcoming 1.5 inches of static pressure.*

Assuming the fan motor is 70% efficient and electricity cost is $0.09/kWh, drying shelled corn using natural air in mid- to late-October (assuming 20 days drying time), the energy cost for drying in the 27-foot diameter bin would be $0.06 per bushel and the drying cost in the 33-foot diameter bin would only be $0.023 per bushel - 38% of the energy cost for the smaller bin.

Same Fan—More Bushels

A management alternative would be to fill the larger diameter bin to the point the same fan model used on the 27-foot bin would be delivering the same 1.25 cfm/bu airflow and would be using the same horsepower. The **FANS** program shows it takes the same 10.6 horsepower to push the 1.25 cfm/bu through 15.6 feet (10,674 bushels) in the 33-foot diameter bin. The fan would be producing 13,343 cfm and 3.04 inches of static pressure. The drying time would be the same as drying 8,000 bushels in the 27-foot diameter bin because the airflow rate is the same (1.25 cfm/bu). Increasing the bin diameter, and reducing grain depth and static pressure, results in the ability to dry one-third more grain in the same time and for the same energy cost as when using the smaller bin.

Figure 1. Typical performance curve for an axial flow fan.



Note low airflow at high static pressure and high airflow at low static pressure.

Actual operating conditions are shown as the interaction between the fan curve and the system curves for various depths of corn in the bin.

Curve generated by the **FANS** *program.*