

Dugout Management and Water Quality



Aquatic Vegetation

Algae are small rootless plants that normally live in surface water. They thrive when the right combination of sunlight, warm temperature and food is available. In farm dugouts, a good supply of algae is provided by nutrients in run-off water from agricultural land.

There are three main types of algae:

- **Planktonic Algae** - These are single cell, or small colonial groups, which are free-floating and green, blue green or brown in colour. They commonly appear as small specks in the water. After death, they may release foul odours, add tastes to the water and, in some species, toxins may be released that are capable of poisoning livestock.
- **Filamentous Algae** - These consist of long, stringy hair-like filaments that form mats or pond scum during the summer. In early spring, they grow on the pond bottom, rising to the surface during hot, calm, sunny weather.
- **Branching Algae** - This form of algae is more advanced and grows attached to the bottom. The branches are rough and gritty and give off a fish-like odour.

Aquatic Plants:

Aquatic plants are more complex than algae, with specialized tissues such as roots, leaves, stems or flowers. They are divided into four groups:

- **Free-floating** - These are generally unattached, but in some species may have simple roots. The main free-floating plants in Canada are the duckweeds.
- **Submergent** - These plants are usually completely submerged in depths from 0.5 to 3.5 metres (1 to 12 ft.). Rooted to submerged soils, their leaves are thread-like, broad or finely dissected. Examples of submergents are Canada water weed, coontail, water milfoil and water buttercup.
- **Emergent** - These are plants rooted on soil that is covered with water or on exposed soil where the water table is within 0.5 metres (1.5 ft.) of the soil surface. These plants are perennials with creeping root stocks. Vegetative parts are above the water. Some species are cattails, bullrushes, rush and marsh smart weed.
- **Floating-leaved** - These plants are rooted to the bottom, with long stems extending to the surface. The leaves float on the surface of the water. One example is water lilies.

Methods of Controlling Aquatic Vegetation

Mechanical - This method should be the first process selected to control aquatic vegetation. The following types of mechanical methods are suggested:

- Hand cleaning and pulling can be practical where there is a small amount of aquatic plants. Also, remove any foreign material and deadfall.
- Chaining, by dragging a heavy chain from a boat, may be effective for cutting submerged weeds. Another option is to use a heavy chain or cable attached between two tractors and drag it down the edge of the pond or dugout. Where two tractors are not feasible, one or two sections of harrows can be dragged through the growth. Remember to remove the floating debris.
- Drying or drawing down, if it is feasible to drain the pond or dugout, will kill many of the submerged aquatics and algae if they are exposed to sun and air for a few days. This method is not effective on emergent weeds that are well-rooted in the bottom. Note that all weeds removed should be placed some distance away from the water source to prevent their nutrients, released during decomposition, from being washed back into the dugout.

Altering Dugout Shape - Keeping all bank slopes, including the ends, sloped on a two to one ratio will reduce the large shallow water areas normally found on the ends of the dugout. Since the depth of water increases more quickly with the steeper slopes, there will be less area of shallow water for aquatic weeds to grow.

Chemical - Chemical control of aquatic vegetation should be restricted in the following ways:

- Any chemical control measures should be applied according to the label instructions and restricted to areas where applying the product will not deteriorate water quality, or have other unintended impacts on aquatic life in these bodies of water or other systems downstream.
- Chemical control should also be restricted to the portion of the dugout where weed control is necessary.
- If the water is turbid and has suspended clay particles, pre-treatment will be necessary before any chemicals can be used effectively. Turbidity or suspended particles in the dugout results in dirty looking water. It is frequently caused by rapid run-off from a heavy rain. Clay or other fine particles can remain suspended in dugout water for several months. Spreading 45 to 90 kg (100 to 200 lbs) of powdered aluminum sulfate (alum) evenly over the entire surface will settle the suspended particles. This leaves the water clear for chemical application.

Water weeds should be kept out of dugouts. When weed growth becomes apparent, usually in early June, apply Reward (PCP 26721) (Diquat) according to the label instructions. Water treatment with Reward should not be used for swimming, human or animal consumption for 24 hours after application or for irrigation for five days after application.

NOTE: Reward is the only chemical with a low waiting period after application. All other chemicals have either one year waiting periods or they are not recommended at all if humans or animals are consuming the water.

Algae

A particular strain of algae, commonly referred to as small green algae, has become very resistant to the copper normally used to control algae in dugout water. This algae creates a series of problems because of its extremely small size. The algae is too small to be seen with the naked eye or filtered out with any standard filtering equipment presently on the market. In large numbers, it will tint the water a light green colour, cause staining and create taste and odours in the water. To determine if it really is blue green algae (as color is not really a definitive indicator), try to pick up a handful. If it runs through your fingers like slime, it is blue green algae. If you can pick it up, it likely is not blue green algae.

Many types of algae are a blue green color, but the problem happens when the algae start to die off, release a bacterial toxin and float. The wind will blow it over to the edges of the dugout. It concentrates in one area and then, if livestock are watering directly from the dugout, they may ingest a lot at one watering. This is when you see death from blue green algae. To dilute the concentrations that your cattle will get, place the intake line in the center of the dugout under the surface of the water. This way, the toxins are greatly reduced in concentration and the chances of poisoning are extremely remote.

It is important to control nutrient loading in to the dugout because this is the main factor in algae growth. It's a good idea to prevent your cattle from watering directly in the dugout, and to maintain a grass barrier to prevent manure run-off into the dugout.

If you introduce large doses of bluestone to the dugout to control other algae growth, the natural biological controls that hold this algae in check are upset. Treatment with bluestone will prevent the growth of algae but once the algae is present, treatment will make the algae die off and release toxins. Therefore, the level of toxins will increase, causing greater concentrations of toxins. Treatment can be done early on before there is algae growth in the dugout. All competition for available nutrients is also eliminated, resulting in ideal conditions for the development and growth of this particular strain of algae.

To control small green algae, a number of steps are recommended to minimize the nutrients (food for algae) available in the water, maximize the natural biological controls present, and provide some competition for the nutrients that make their way into the dugout water:

- Stabilize the dugout banks and the surrounding area by establishing, and maintaining, a grassed area extending out from the dugout at least 10 metres (30 ft.) on all sides.
- Keep all trees and shelter belts back at least 50 metres (150 ft.) from the dugout.
- DO NOT allow cattle or other farm animals to drink directly from the dugout.
- DO NOT divert any run-off from cultivated and nutrient rich fields into the dugout unless absolutely necessary. Only allow the first melt water into the dugout by diking and using a culvert control gate, or by pumping the water into the dugout while diverting all the rest around the dugout. This will reduce the amount of nutrients entering the dugout and reduce the algae growth.
- DO NOT treat the dugout with bluestone, unless algae growth is clearly visible to the eye, and then only at reduced rates. Unnecessary treatment can upset the natural biological controls present and cause an uncontrollable algae bloom.
- Copper sulfate can be poisonous to sheep and chickens on farms at normal application rates.
- The preferred method of controlling blue green algae is with spot treatment (applying chemical directly to high algae density areas) according to label instructions.

- Use mechanical control as previously outlined to control aquatic weeds wherever possible. Any above surface growth (e.g. cattails) should be cut off and removed from the area in the fall to limit nutrients being introduced back into the dugout.
- To control black water and smell, aerate the dugout water continuously.

Major problems with the copper resistant strain of algae can be averted by following the steps below, and not trying to maintain a sterile and algae-free dugout.

Unless algae is visible to the eye, NO TREATMENT should be undertaken. Where algae is noticeable, the dugout can be treated at the reduced rates and according to label instructions. It should be noted that treating the dugout with larger doses of copper sulphate will cause the phosphates stored in the bottom sludge to be reabsorbed into the water, resulting in increased algae growth. Where no algae can be seen, but the water has a green tint, treating it with copper sulphate will increase the problems.

Dugout Aeration

If the dugout water turns a dark colour during winter and has an offensive odour, consider dugout aeration.

Not all water weeds are easily controlled with the above methods. If these procedures are not effective in controlling growth in dugouts, contact Manitoba Agriculture at: agriculture@gov.mb.ca or 1-844-769-6224.