

Blue-Green Algae Questions and Answers



How can illness be prevented from blue-green algae?

- Do **not** drink untreated water from water bodies, whether you can see a bloom on the surface or not.
- Do not wade, swim or bathe in water with visible blooms.
- Do not cook, wash dishes, or do laundry using water with blue-green algae in it. Boiling water does **not** remove toxins from the water.
- If blue-green algal blooms are present, do not let livestock or pets get into the water. Provide other sources of drinking water for livestock and pets.
- Blooms grow more quickly in non-moving or stagnant water. If possible, remove natural blockages in creeks flowing into or out of lakes or ponds to assist the free flow of water.

Every year during the warm summer months, many Saskatchewan lakes may suddenly take on a soupy appearance. The water surface becomes blue-green, bright blue, grey or tan in colour. The organisms responsible for these changes are microscopic plants called algae or phytoplankton. When algae grows so thick it makes the water look like pea soup, it's called an algal bloom. Algal blooms commonly occur during calm, hot weather in areas of lakes and reservoirs where the water is slow moving and rich in nutrients.

The following are some common questions associated with blue-green algae.

What are blue-green algae?

Blue-green algae are among the most common types of bloom-producing algae. The first recognized species were blue-green in colour, which is how the algae got their name. Species identified since range in colour from olive-green to red. These algae are unusual because they share some features typical of both algae and bacteria, and they are often referred to as Cyanobacteria. A typical summer lake water sample from southern Saskatchewan usually contains 20 or more blue-green species along with dozens of other species of algae. The most troublesome blooms are caused by three species of blue-green algae: namely *Aphanizomenon flos-aquae*, *Microcystis aeruginosa* and *Anabaena flos-aquae*.

What causes blue-green algae to grow?

Blue-green algae grow in shallow, warm, slow-moving or still water. Since algae are plants that live in water, they need a number of the same things to sustain growth that other plants need such as sunlight, water and nutrients (mainly nitrogen and phosphorus). Nutrients enter a waterbody through runoff from farm fields and fertilized lawns, from wastewater discharges and from the atmosphere. They are also cycled into the water column from the bottom sediments under certain conditions. In general, the more fertile (nutrient-rich) the waterbody, the more likely it is to experience blue-green blooms.

What are algae "blooms"?

When algae grow so thick that they make lake water look like "pea soup", the condition is called an algae bloom. These blooms become particularly visible during calm, hot weather. The algal cells contain small gas bubbles, which cause them to rise to the surface of the lake and accumulate in scums. Wind and wave action concentrate these scums into bays or along the shore where they die and begin to decompose. As the algae break down, a coating which looks like bright paint may form on the sand and rocks along the shore.

Algae blooms are most common in southern Saskatchewan lakes from mid-June to mid-September, although they may occur at other times as well. In most lakes blue-green blooms last for two or three weeks. Variations in air and water temperatures, total sunlight and wind velocity influence bloom development. Because these factors vary from year to year, the occurrence of blooms cannot be accurately predicted.

Does the presence of a blue-green algae bloom always mean the water is contaminated?

Researchers consider between 30 and 50 per cent of blooms are harmless because they contain only non-toxic species of freshwater blue-green algae. Blooms containing even one species of toxic blue-greens will be poisonous and potentially dangerous. Samples have to be analyzed in a laboratory to determine if a particular bloom is toxic.



What are algal toxins?

Some blue-green algal blooms are more toxic than others so all blooms should be treated with caution. One of the first signs of toxic blue-green algae in a body of water is the presence of stressed, sick or dead wildlife, waterfowl or livestock along the shoreline. Blue-green toxins are the naturally produced poisons stored in the cells of certain species of blue-green algae. These toxins fall into various categories. Some are known to attack the liver (hepatotoxins) or the nervous and respiratory systems (neurotoxins); others simply irritate the skin. These toxins are usually released into the water when the algal cells rupture or die.

One group of toxins produced and released by blue-green algae are called microcystins because they were isolated from *Microcystis aeruginosa*. Microcystins are the most common of the blue-green toxins found in water, as well as being the ones most often responsible for poisoning animals and humans who come into contact with toxic blooms. Microcystins are extremely stable in water because of their chemical structure, which means they can survive in both warm and cold water and can tolerate radical changes in water chemistry, including pH. So far, scientists have found about 50 different kinds of microcystins. One of them, microcystin-LR, appears to be one of the microcystins most commonly found in water supplies around the world. For this reason, most research in this area has focused on this particular toxin.

How likely am I to drink water contaminated with blue-green algal toxins?

Relatively few incidents of human poisoning have been reported. People don't usually drink water contaminated with blue-green algae because of the scum and the accompanying smell (fresh blooms smell like newly mown grass; older blooms smell like rotting garbage). But, people could accidentally swallow contaminated water while swimming. If your water comes from a source that is prone to blue-green algal contamination (dugouts, for example), you should monitor the water for bloom formation.

What should I do if I come into contact with blue-green toxins?

If you swallow contaminated water, you may experience headaches, fever, sore throat, dizziness, stomach cramps, nausea, diarrhea and vomiting. These symptoms may last for several days. If you swim in contaminated water, you may get itchy and irritated eyes and skin, as well as other hay fever-like allergic reactions. If you suspect you might have come into contact with algal toxins and are experiencing any of these symptoms, rinse any scum off your body and consult your physician immediately.

Can cyanobacterial toxins kill me?

Although many people have become ill from exposure to freshwater blue-green algae toxins, death from algal-contaminated drinking water is unlikely to occur given that water resources are usually effectively managed to control taste, odour and other algae-related problems. It's possible that extended exposure to low levels of toxins could have long-term or chronic effects in humans.

Are children more vulnerable than adults?

Children are at greater risk than adults of developing serious liver damage should they ingest high levels of toxins, mostly because of their comparatively lower body weight. Younger children may be less careful when drinking algal contaminated water

Should I let my pets or my livestock drink water containing blue-green blooms?

If livestock or other domestic animals have no other source of drinking water, they may be poisoned by drinking water from open water bodies, such as lakes or ponds, contaminated with toxic strains of blue-green algae.

The most common poisonings occur among cattle. In some cases, wind may blow the algae floating on the surface towards the shoreline. Some livestock may wade out into the lake beyond the bloom before they drink, and they may not be affected. Young livestock usually drink closer to the shore and are more likely to be poisoned. Animals are not more sensitive than people to the effects of the toxins; they are simply not as concerned with the way water looks or smells before they drink it. Death is usually caused by damage to the liver or to the nervous system, depending on which toxins were predominant in the water.

Can I cook using water with blue-green algae in it?

Boiling water does not remove toxins from the water. As it is impossible to detect the presence of toxins in the water by taste, odour or appearance, you must assume that they are present until testing is completed.

Can I use water contaminated with algal toxins for washing?

If there is a safe source of water available, don't use contaminated water for washing clothes or dishes. If no alternative supply is available, use rubber gloves to avoid direct contact with the water. Bathing or showering in water contaminated with algae or algal toxins should be avoided, as skin contact with the algae can lead to skin irritation and rashes.

Can I eat fish from water contaminated with algal toxins?

Toxins can accumulate in the tissues of fish, particularly in the viscera (liver, kidney, etc.), and in shellfish. Levels in the tissues depend upon the severity of the bloom in the area where the fish or shellfish are caught or collected. Caution should be taken when considering the consumption of fish caught in areas of a water body where major blue-green algal blooms occur; in particular, the internal organs of the fish should not be eaten.

Can water containing blue-green algae blooms be used for recreational activities?

Unlike controls available with a drinking water source contaminated with blue-green algae, there are very few options available once these algae accumulate in water used for recreational activities, such as swimming, boating, wind surfing and fishing. Blooms in recreational bodies of water are usually associated with unpleasant odours and offensive appearance on shorelines as the scum accumulates and decays. Although blue-green toxins are probably not absorbed through the skin, they can cause skin irritation. The toxins, if present, can be absorbed from the water via ingestion or can become airborne and be absorbed via inhalation. Individuals should avoid swimming and other water-related activities in areas with dense blooms.

How do water treatment plants deal with blue-green algae?

Most municipal water treatment plants do not regularly look for blue-green toxins in the water supply. However, because blue-greens have strong smells and tastes and interfere with certain water treatment processes, most municipalities with a history of blooms monitor their surface water supplies for these algae. Once blue-green algae are detected in the water supply, treatment plants can remove them in a number of ways. Conventional water treatment facilities can remove the cells by adding chemicals that bind them together. As the cells clump together, they become heavier and fall to the bottom of the reservoir or tank, where they can be easily filtered out. While this method will remove the algae cells, it will not remove potentially harmful toxins. These can be removed using certain oxidation procedures or activated charcoal filtration. Further research in this area is required. Generally speaking, chemicals (such as copper sulphate) or any other treatment method that causes the cells to break down and release their toxins should not be used.

Are blue-green algae blooms a new problem?

The earliest reliable account of a blue-green bloom dates back to the 12th century. In 1858, a member of Henry Hind's exploration expedition noted that the waters of Saskatchewan's Qu'Appelle Valley lakes were "made extremely disagreeable by the great quantities of algae covering the whole surface and reaching to some depths". The toxic effects of blue-green algae on livestock have been recognized for more than 100 years. Since blue-green bloom formation seems to be linked to nutrient-rich water bodies, and these are naturally found in southern Saskatchewan, the problem is not likely to go away in the near future.

Other information is available from:

Saskatchewan Agriculture http://www.agriculture.gov.sk.ca/Blue-Green_Algae_FAQs