

Managing blue-green algae in farm dams

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Water R&D Unit Orange

Farm dams are vulnerable to blue-green algal blooms, as are the coastal and inland dams and rivers of NSW. A blue-green algal bloom is a rapid increase in the number of blue-green algae, and usually, but not always, occurs in summer months.

This Primefact is designed to help farmers prevent and control the growth of blue-green algae in their farm dams.

What are blue-green algae?

Blue-green algae, or cyanobacteria, are the most ancient of all photosynthetic organisms. Some produce poisons harmful to humans and possibly fatal to domestic animals and fish: neurotoxins, liver toxins and skin allergens.

How do I know if my dam contains blue-green algae?

- A blue-green algal bloom discolours the water, so that the surface looks like green acrylic paint.
- An unpleasant odour may be noticed.
- As the algae concentrate and mature, some forms of surface scums which are vulnerable to wind effects may appear at different places on the dam at different times. The blue-green algae may disappear and reappear on subsequent days, or accumulate on the downwind edges of the dam.

If you observe any of these signs, especially an iridescent green, or otherwise suspect the water contains blue-green algae, you should not touch or use it in any way until the algae have been identified.

There are no simple tests you can do to check for algae toxins. Boiling or disinfectants will not make

the water safe, although activated carbon filtration can absorb the toxins from the water.

How does blue-green algae affect livestock?

If you suspect that you have blue-green algae in your dam you should immediately remove all animals from the paddock or fence off the dam to exclude stock.

Animals have died after drinking water that is contaminated with blue-green algae. You need to prevent animals from drinking contaminated water and provide alternative supplies.

Blue-green algae can release either neurotoxins which can kill animals within hours of ingestion or liver toxins that can kill animals within 24–72 hours of ingestion.

Affected animals will have:

- breathing difficulties
- muscle twitches
- salivation
- weakness
- a rapid pulse
- depressed and weak
- photosensitisation – any white areas of skin, particularly around the head, may become swollen and reddish.

Livestock may refuse to drink water containing toxic algal blooms, hence risk becoming dehydrated, and when they do drink the contaminated water they will often develop scours. As a consequence, in dairy cows there may be a sudden drop in milk production and in poultry a sudden drop in egg production.

All animal species are at risk of poisoning, as are insects such as honey bees. Domestic pets such as dogs may die when they try to lick algal scum off their coat. Algal blooms can kill fish indirectly by reducing the level of oxygen in the water.

Sun-dried algal scum can remain toxic to animals for up to five months.

Can I use water containing blue-green algae for irrigation?

Take care if you need to use water contaminated by blue-green algae for irrigation. Because many toxins are very slow to break down, human and animal health may be threatened if contaminated water is applied directly to crops and pastures.

Do not directly use water that has blue-green algae present on plants being grown for human consumption, particularly for spray-irrigated salad and leafy vegetables, because dried algal cells on the leaves can remain toxic for several months.

In addition, algal blooms can clog syphons, filters, valves and sprinklers.

If you have to use blue-green algae contaminated water for irrigation, thoroughly wash and rinse fruit and vegetables with clean, uncontaminated water before eating.

Should I use an algicide?

Previously, copper sulfate was recommended as a treatment for algae, but this is no longer a recommended product.

Prevention of algal blooms is preferred to chemical control and is discussed later in this Primefact.

If you must use an algicide, exclude all animals for at least three weeks after its use, because the water can remain toxic for that period.

Currently in NSW, Coptrol Aquatic Algicide, Cupricide Algicide, Cupricide 110 Algicide and Copcide Algicide are approved for the control of blue-green algae, green algae, diatoms and flagellate algae. They must be used in strict accordance with their label conditions and directions. All products contain copper as mixed complexes and are registered for use in farm dams, rice paddies and irrigation conveyance systems. They must not be used in rivers, streams, creeks, wetlands, lakes or billabongs, and water treated with these products must not be allowed to spill into these water bodies.

The conditions of use for these chemicals further prevent their application when birds are feeding on algae or in water containing fish. As with all chemicals, read the instructions before use, wear the appropriate safety equipment, and always adhere to withholding periods on labels or permits.

Do not use copper based products to treat drinking water used by farm animals that have a history of grazing Paterson's curse, heliotrope or ragwort. Increased intake of copper through treated drinking water may lead to copper poisoning and death.

What triggers blue-green algae growth?

Excessive phosphorus

An excessive level of the nutrient phosphorus promotes the rapid growth and multiplication of blue-green algae. The main sources of phosphorus in farm dams are phosphorus attached to eroded soil particles and phosphorus from stock manure washed into dams.

Water quality in the farm dam will be affected by muddiness and silting as a result of soil erosion within the catchment or fouling by stock and other animals. There is evidence that carp can root out water plants and will stir bottom and bank sediments during feeding, increasing the muddiness of the water. This destruction of plants and release of nutrients can promote blue-green algae.

Warm water

Warm water temperatures encourage blue-green algae to flourish under calm summer conditions and to grow rapidly when water temperatures exceed 18°C. Solar heating results in warm lighter surface water over the colder lower water.

This causes two distinct layers to form (this is called thermal stratification). The algae flourish in the warm surface water, and the reduced oxygen levels at the bottom assist the release of phosphates from sediments into the water; these feed the algae.

More rarely, toxic blue-green algae have occurred in NSW during winter in high nutrient content waters.

Few predator animals

Another trigger for blue-green algae is a low level of zooplankton. Zooplankton are microscopic

animals that live in water and feed on algae. Under normal conditions, zooplankton help to keep algal levels under control.

How can I prevent blue-green algae blooms?

Manage nutrient input

Improved management of nutrients is the key long-term strategy for the control of blue-green algae in farm dams. If the nutrient levels of the water remain high, blue-green algae will continue to be a problem in spite of the use of other control methods.

- Nutrients, particularly phosphorus, which is present in fertilisers and manure, should be carefully managed in the dam catchment area.
- If possible, fence out stock and divert stockyard and sheep camp run-off away from the dam. Establish gravity-fed troughs for drinking water.
- Use irrigation scheduling techniques to eliminate run-off from irrigated agricultural land. If there is any surplus water, it should be recycled.
- Buffer strips of vegetation (perennial grasses and trees) can be placed in the in-flow areas of the dam to help stop nutrients and eroded soil from entering farm dams. Long grass, shrubs and trees are needed to slow water flows, intercept nutrients and prevent erosion. This area should be fenced from stock.
- It is very important to control soil erosion to stop soil particles moving into farm dams. Soil particles have phosphorus stuck to them, particularly after phosphate fertiliser has been applied.
- Avoid excessive use of fertilisers.
- Domestic use of washing powders and detergents containing phosphate and septic effluent are other potential sources of phosphorus which may need to be controlled.

Remove carp

Carp should be removed by netting or other means.

Mix water layers

The mixing of the warm and cold water layers is recommended for deep water dams. Artificial aeration can be beneficial in shallow dams to maintain healthy bottom sediments and high oxygen levels in still water conditions. A small compressor with an attached perforated hose in

the deepest area of the dam can remove the hot water layers.

Remove phosphorus by dosing

Dosing is only appropriate for farm dams.

Do not apply the treatment to streams or billabongs or other natural waterways.

Farm dams can be protected from blue-green algae by dosing with alum and gypsum. These chemicals work by removing phosphorus (the most important nutrient for blue-green algae) from the water.

Ideally, dosing should be carried out before summer, and certainly before a bloom has developed.

The recommended dose is 50 kilograms of alum and 50 kilograms of gypsum for each megalitre of water. Because of variations in water quality and algae, it is advisable to conduct a preliminary trial in a 44-gallon drum to establish the correct dosage.

Dosing procedure (farm dams only)

Add the granules of alum crystals to the water and mix well. You could perhaps use a boat with an outboard motor to mix in the crystals.

Let the water stand for a few hours, and add the gypsum granules.

Let the water stand for at least 24 hours, or until it clears. If it does not clear within two days, add 25 to 50 per cent of the recommended dosage of alum and gypsum to promote settling.

After dosing, check the pH of the water with a swimming pool testing kit. The pH should be in the range 6–9. If it is not, allow the water to stand two days and check again.

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