



Has your dam got a blue-green algae problem?

April, 1999

LC0098

ISSN 1329-8062

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What are the signs to look for?

A sudden change in water colour overnight due to a mass of vivid green algae floating to the surface

- the formation of scum which looks like green acrylic paint and leaves sky blue marks on rocks or plants around the edge of the dam, particularly on the leeward side of the dam or backwater of a stream
- scums can be green, blue-green or khaki green, and can turn brown/green or white once it is dying off
- scums may appear at dusk or dawn and disappear during the day
- there may be a strong earthy smell, or if the bloom is breaking down it may produce a strong rotting smell
- in the early stages of a 'bloom', small green flecks may appear in the water

What is blue-green algae and what conditions favour its growth?

Blue-green algae is the common name for a group of algae which have similar characteristics. When they encounter the right combination of conditions, *ie*:

- still water that is clear enough for light penetration
- the right temperature range (warm) and
- adequate nutrients (phosphorous and nitrogen) in solution in the water,

They can multiply rapidly. When the mass of algae float to the surface, a vivid green 'bloom' can appear overnight.

Why are blue-green algae a problem?

Blue-green algae in large numbers or 'blooms' can seriously reduce water quality by producing odours, thick scums and of particular concern are some species of blue-green algae that can produce toxins which are poisonous to humans and livestock. When algae decompose they may use up oxygen in water and cause fish to die.

NOT ALL BLOOMS ARE TOXIC BUT THEY SHOULD BE TREATED AS TOXIC UNTIL THE WATER HAS BEEN TESTED

What are the effects on human and livestock health?

Some species of blue-green algae produce toxins which can have serious health implications for humans, animals and birds drinking or contacting the water. Although humans are less likely to drink water heavily polluted with blue-green algae, symptoms seen in those who have include gastroenteritis, diarrhoea and vomiting.

Water affected with blue-green algae usually smells and tastes so unpleasant that people are unlikely to drink it, but should nevertheless take care to avoid skin contact.

However, in areas where there are no alternative sources of fresh water (such as along the River Murray), **steps have to be taken (e.g special carbon filtration) to make the water safe for drinking.**

AVOID SKIN CONTACT

Contact with contaminated water can cause:

- skin irritations and rashes
- swollen lips
- eye and ear irritation
- sore throat
- hay fever symptoms and asthma

Livestock

Livestock are at real risk of poisoning by blue-green algae unless alternative drinking water supplies are provided, although livestock deaths are relatively rare. In extreme cases death can occur minutes after drinking.

Of far more serious concern to farmers are the productivity losses associated with milder cases of algal poisoning which in dairy cattle has been shown to cause loss of appetite, and consequently a decline in milk yield.

But, if swallowed by livestock in sufficient quantities, blue-green algae may cause convulsions, paralysis, liver damage and skin sensitisation.

WHAT CAN BE DONE about an algal bloom?

In the short term.....

DO:

- Inspect farm dams and water troughs regularly (2 or 3 times a week) during hot, dry times of year

If you suspect you have a blue-green algae bloom:

- Isolate all people and stock from the dam or water supply
- Ensure stock have alternative water supplies
- If no alternative water supplies are available contact your local Water Authority. See below for information on water treatment
- Collect water for testing (follow sampling instructions below)
- Contact a veterinarian if livestock show symptoms of poisoning
- Send sample for testing (see below) as soon as possible
- For diverters, contact the manager of the water body from which the water is diverted.

SAMPLING PROCEDURE

Use gloves to avoid skin contact with affected water

Collect algae from the windward side of dam, so that the sample is as concentrated as possible

Collect about 1 litre of water, leaving an air gap at the top of the bottle

Label the bottle clearly with you name, address and telephone number

Contact the laboratory regarding best delivery arrangements

FOR ALGAL IDENTIFICATION AND ADVICE

ORGANISATION	LOCATION	TELEPHONE	FACSIMILE
Central Gippsland Water	Traralgon	(03) 5177 4600	(03) 5174 0103
Central Highlands Water	Ballarat	(03) 5320 3100	(03) 5320 3299
Coliban Region Water	Bendigo	(03) 5434 1222	(03) 5434 1341
Barwon Region Water	Geelong	(03) 5226 9249	(03) 5229 0242
Water ECOScience	Melbourne	(03) 9550 1061	(03) 9543 7372
Joan Powling Consulting	Melbourne	(03) 9497 4142	(03) 9344 7833
WSL Consultants	Melbourne	(03) 9429 4666	(03) 9429 2294
Microcosm Consulting	Melbourne	(03) 9571 2770	(03) 9571 2770
Murray-Darling Freshwater Research Centre	Albury	(02) 6043 1002	(02) 6043 1626

DO NOT

- Drink or swim in it
- Rinse fruit and vegetables or cook with it
- Wash clothes in it if other sources of water are available. If not, use rubber gloves to avoid skin contact
- Eat shellfish (mussels, snails, yabbies etc) or fish caught in affected water
- Spray or flood irrigate pastures, crops, vegetables, grapes or fruit with it

Boiling algal-water will not make it safe

In the longer term . . .

Best management practices

Algal blooms are caused by a combination of factors including water temperature, water flow rate, light, and nutrients, although not all of these factors are easy for us to influence or change. So, the best opportunity for controlling the problem is to reduce the amount of nutrients available in water for algae to use.

The Department of Natural Resources and Environment is working to develop useable, practical *Best Management Practices (BMP's)* which effectively reduce nutrient losses from agricultural land, while maintaining or improving farm productivity.

The BMPs which are relevant to the major industries, climatic zones and land use systems across Victoria, are currently being developed by Agriculture Victoria, in co-operation with other agencies, farmers, community groups and industry.

Controlling soil erosion

Phosphorus strongly attaches to soil particles and so can reach water bodies through soil erosion. Phosphorous in sediment is then in the water system, ready for release to become available for plant and algal growth when the water conditions are right.

Soils with high phosphorus levels need closer attention because of their potential to create higher nutrient loads. Further, the loss of such soil is a waste of fertilizer. Similarly, soils of moderate to high clay content will contribute higher nutrient levels than more coarse textured soils.

General guidelines are:

- Maintain vegetative cover at all times by trying to ensure that pasture consumption matches pasture growth and remove stock when pasture mass or cover reaches low levels
- Encourage vigorous pasture or crop growth by timely applying appropriate fertiliser types and rates

- Minimise the time soil remains exposed to wind and water by avoiding fallows, and not working up too much and ahead of planting
- Use minimum cultivation techniques when cropping or renovating pasture, such as direct drilling and stubble retention, so as to maintain soil structure and enhance soil and water conservation
- Use green manure crops and work them into the soil where appropriate
- Use cover crops between crops or, where necessary for crops that are slow to establish
- Maintain good soil structure by increasing organic matter, cultivating when moist and minimising soil compaction
- Avoid cultivating steep slopes
- Leave buffer strips of dense pasture at intervals on steep cultivated land to intercept runoff and break up long slopes of continuous cultivation
- Control and minimise water runoff by establishing surface drains or diversion banks, leaving natural drainage lines grassed, and leaving vegetated buffer strips along riverbanks and around dams.
- Build culverts, bridges or hard based stream crossings for stock and vehicle crossings
- Maintain ground cover along streambanks, preferably with a mixture of trees, shrubby plants, ground covers and native grasses
- Control rabbits and other burrowing animals which reduce vegetative cover and destabilise banks.

Streambank management

- Fence out or restrict stock access to stream banks - electric fencing is cheaper and more suitable for meandering water courses
- Provide alternative water supplies for stock

Controlling fertiliser runoff

- Use soil tests to match fertiliser application to plant nutrition requirements
- Apply fertiliser during periods of strong plant growth, so that most of it can be used effectively. Do not apply during periods of low growth or immediately preceding any predictable heavy rain
- Be careful to avoid spillage of fertiliser close to farm dams and drainage lines
- Reduce potential application to drains, streams or other water bodies by leaving an unfertilised buffer strip (of at least 10 m) adjacent to the water way
- Fertiliser applied to cultivated soil should be incorporated into the soil before irrigation or rain falls.

Controlling fertiliser runoff on irrigated land

Reducing nutrient loads from irrigated land relies on minimising runoff, minimising nutrient concentration or both

- Strategies which reduce runoff include on-farm reuse, drainage bays and accurate irrigation
- Strategies which reduce nutrient concentration include fertiliser application rate and timing, type (solubility), and placement.

Managing fertiliser use on irrigated land

Nitrogen as present in urea fertilisers can be leached into groundwater and find its way into streams and rivers, particularly where subsurface drainage schemes discharge directly into rivers and onto flood plains

- Use irrigation scheduling with knowledge of the soil's water-holding capacity
- Ensure the first irrigation is sufficient to just wash the fertiliser into the soil without any drainage. This is particularly important with urea which leaches very easily
- With subsequent irrigations (when urea will have changed to ammonia), practice normal scheduling with some leaching if required (ie for salt)
- When furrow irrigating, use fertiliser placement to reduce leaching potential.

Managing farm point sources eg dairy shed, piggery and feedlot waste

- Minimise the amount of waste that needs to be handled, by minimising the time spent by dairy cows in the shed, and the water used for wash down
- Utilise waste by irrigating pastures or crops over a wide area
- Store liquid waste in ponds in times of high rainfall, ie when it is too wet to irrigate
- Divert rainwater away from storage ponds (using diversion banks, drains) to retain maximum storage capacity
- All wastes and polluted storm water must remain on the property. This is an Environment Protection Authority (EPA) regulation.

Follow the:

1. EPA/Agriculture Victoria 'Guidelines for Conduct of Intensive Animal Industries' for the disposal of animal wastes to land
 2. Code of Practice for Piggeries - Treatment and Disposal of Effluent
 3. Milking Shed Waste Management in North Eastern Victoria
- Do not locate stockyards or dips close to streams where surface runoff is likely to drain directly into streams. To meet the EPA regulations consider re-siting yards which are already too close to streams.

References and further reading

Many reports and information sheets are available on the subject of algal blooms and nutrient management. Some of these are:

Victorian Project Team 1995. *Brochure on Blue-Green Algae*, Department of Conservation and Natural Resources, Melbourne.
Nutrient Management Strategy for Victorian Inland Waters, Government of Victoria 1995, Victorian Project

Team on Blue-Green Algae, Department of Conservation and Natural Resources, Melbourne.

Jones, GJ, 1994, *Bloom-forming Blue-Green Algae (Cyanobacteria)*. Chapter in *Aquatic Plants of Australia*, G Sainty and S Jacobs (eds), pp 264-285. Offprint booklets available.

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