Algae in ponds and lakes

Graham Paul returns with another opportunity for you to earn more BASIS points

The term 'Algae' translates as 'seaweed' in Latin and describes a large group of organisms that can be found in saltwater, freshwater, in soils and in a wide variety of other habitats.

Algae exist as single celled or multicellular organisms that vary in size from microscopic to macroscopic – marine seaweeds are actually complex forms of macroscopic algae and some can grow to 50m in length. Most algae are able to trap the sun's energy by photosynthesis.

The classification of algae is too complex for the scope of this article and like many academic topics is subject to frequent changes. For example, detailed study of the so-called 'Blue-green algae' has resulted in them being re-classified as Cyanobacteria – a phylum of bacteria-like organisms that are photosynthetic.

For the purpose of this article we shall concentrate on those types of algae that cause problems in amenity situations, factors encouraging their development and methods of control.

Algae can cause a variety of problems in water with appearance being high on the list in amenity situations, where water bodies, such as ponds and lakes, are an important part of our natural attractive landscape. Filamentous algae produce a thick mat that floats on the surface of ponds and lakes. These mats, which are sometimes referred to as 'blanket-weed' or 'cott', are particularly unsightly and will also cause problems in blocking outlets, pumps and sluice gates where water is used in irrigation or processed for drinking.

They make navigation difficult for waterfowl on static water and on slow moving waters in canal systems and can restrict gaseous exchange at the surface with consequent reduction in water oxygen levels that can harm fish and other aquatic creatures.

A group of macroscopic algae known as the Stoneworts (Chara spp. and Nitella spp.) are often mistaken for varieties of rooted, submerged aquatic weeds. Stoneworts are highly developed forms of algae that have branches arranged in whorls and can grow to 1m in length.

They will often form large masses, floating below the surface of the water. The plant can become encrusted with salts extracted from the water and when handled has a 'brittle' feel – hence the name.

Cyanobacteria are unicellular organisms that can grow in large numbers under the right conditions, producing an algal bloom that some people refer to as 'pea soup'! In a static body of water this will cause the dissolved oxygen to become depleted, with consequent harm to any vulnerable aquatic life.

Although Cyanobacteria are no longer classified as 'true algae' there is a group we refer to as the 'Green water algae' that includes many single celled species with the ability to produce a green algal bloom in slow moving or static water.

MAIN ABOVE AND INSET ABOVE: Filamentous algae – known as 'blanket-weed' or 'cott'

Causes of algae problems in water

The main cause of algal development in a body of water is an excess of dissolved nutrients (nitrates and phosphates) usually leached from nearby land. Like higher plants, algae need the same growth stimulants; a supply of nutrients, warmth and light.

Strategies to Control Algae.

There are no longer any chemicals available to control algae in water in Europe. However, dealing with the problem is a simple matter

of taking steps to deny the algae one or more of these growth stimuli.

Logically the first step is to consider ways of removing excess nutrients from the water. In the long term we should try to identify the source of nutrients leaching in to the pond or lake and attempt to correct this.

This will be simpler if the source of pollution is under the same ownership as the pond or lake.

There are many golf courses where the water features are polluted by fertiliser applied to other parts of the course. It may be possible to reduce the amount of fertiliser applied to the land nearby and so minimise the nutrients leaching into the water.

Alternatively, conventional fertilisers could be replaced by products with controlled release characteristics.

Over the years fertiliser manufacturers have developed a variety of techniques for extending the release period of their products to achieve a reduction in clipping yields as well as cutting down on nutrient leaching.

Some products employ a nitrification inhibitor to increase the period of nitrogen availability while others use organic nutrition sources that cause a delay in nutrient release while microbial degradation takes place to unlock the plant foods and make them available to the plant.

In principle, the use of controlled release fertilisers aims to put much lower amounts of nutrient onto the ground, since there will be less wastage through leaching.

Probably the best type of controlled release mechanisms for reducing leaching are the products employing a polymer coating where the nutrients are released in response to temperature alone (e.g. 'Multigreen' from Headland Amenity).

In periods of prolonged rainfall the micro-pores on the surface of the coated granules will react to the cold rain by closing up, preventing further release from the nutrient core.

After the rain, surface temperature on the granule will rise and re-open the pores allowing nutrient release to resume.

Controlled release fertilisers are more expensive than conventional feeds but they do have other benefits that can reduce labour and machinery maintenance costs, which may help to balance the case for using them to improve the quality of a water features nearby.

The next strategy to consider is the removal of nutrient from water

Bloom caused by Cyanobacteria – photograph by kind permission of Mike Hopwood - wightfishing.co.uk

Multigreen 20-0-32 – coated prill magnified

using specially selected species of bacteria that thrive in nutrient-rich water.

There are several manufacturers that can supply bacterial cultures in freeze dried forms (e.g. 'Lake-Pak' from Becker Underwood and 'Pro-Crystal' from Everris.

They are usually packaged as measured doses in water soluble sachets to make application very simple.

These products can only be used from late spring onwards, when the water temperature is sufficient to sustain the growth and proliferation of the bacteria they contain.

A minimum temperature of 10°C and water pH within the range of 6 to 8 will provide ideal conditions for these bacterial based products to work.

Refer to product manufacturer's literature for rates of use and re-treatment recommendations, as these can vary with the product.

It will be necessary to measure the approximate volume of the water requiring treatment to determine how much product is needed.

Aeration of the water is beneficial for the development of bacteria so, if possible, use an aerating fountain to enhance the effectiveness of these products.

Measure the temperature – minimum 10°C

Measure the volume of water body

The traditional method of removing nutrients from water involves the placement of barley straw bales or 'sausage shaped' bunds (made by netting barley straw with the type of machine they use to wrap real Christmas tree at the garden centre) - at strategic points in the pond or lake. Barley straw rots in the water, releasing substances that inhibit the growth of algae. It doesn't actually destroy algae already growing in the pond; instead, it prevents the reproduction and spread. The breakdown and decomposition of barley straw in the water is thought to release a number of chemicals that react together in the presence of sunlight

ABOVE: Pond treated with 'Lake-Pak' and 'Blackout' 2hrs after application
RIGHT: The same pond 2 weeks after application.

to produce hydrogen peroxide – a chemical known to inhibit most species of algae. This is a gradual process that is very temperature dependent; accelerating as the water warms. Once the barley straw treatment becomes effective, it will inhibit algae growth until the straw is almost completely decomposed. As a general rule, the effect of barley straw treatment lasts for about six months.

This method probably works out cheaper than using bacterial treatments but the lake or pond will suffer from an untidy mess left by fragments of rotting straw.

The next method at our disposal is the use of water colorants that filter out the wavelengths of light that are essential to algae for photosynthesis.

There is a choice of either blue or black – both produce effective results. They are available in liquid or water soluble sachets. The liquid products are applied from the water's edge whilst water soluble packs can be thrown out to the middle of a large pond or small lake. The colorants will disperse evenly after a few hours. The use of colorants will also reduce light availability for the growth of submerged weeds as well as algae. Only products that have been developed specifically for algal control in water should be used, as these will have been tested for safety to fish and waterfowl.

Water colorants will work earlier in the season than freeze dried bacteria and their use will tend to cause a slight increase in water temperature as a result of the coloured material absorbing some of the sun's energy. It therefore makes sense to use colorants in combination with bacterial products as an integrated programme.

CLAIM YOUR BASIS POINTS

SELF ASSESSMENT

Use the questions below to check your understanding of this topic. Readers can claim Two BASIS points if the questions are answered correctly, by filling in the form at: www.sherriff-amenity.com/technical.asp?newsid=21

Circle the correct answer(s)

1) Which group of Algae were re-classified as Cyanobacteria?
a) Filamentous Algae
b) Blue-green Algae
c) Stoneworts
d) Unicellular Algae

2) What is the main cause of Algal problems in ponds and lakes?
a) Insufficient sunlight getting into the water.
b) An excess of dissolved nutrients in the water(nitrates and phosphates)
c) High mineral deposits in the water
d) The lack of chemicals used for their control

3) What is the minimum water temperature recommended when using bacteria to remove excess water nutrients?
a) 10°C
b) 15 °C
c) 8° C
d) 18.8°C

4) When using the traditional barley straw method of removing algae in water, how long may we expect the effect to last?
a) 6 years
b) 18 days
c) 6 months
d) 18 months

5) What chemical is thought to be responsible for controlling Algae using the barley straw method?
a) carbon dioxide
b) methane
c) ethanol
d) Hydrogen peroxide