

JBL

Algae - what now?

Recognize - combat - prevent
For freshwater and saltwater.



Before

After

AQUARIUM

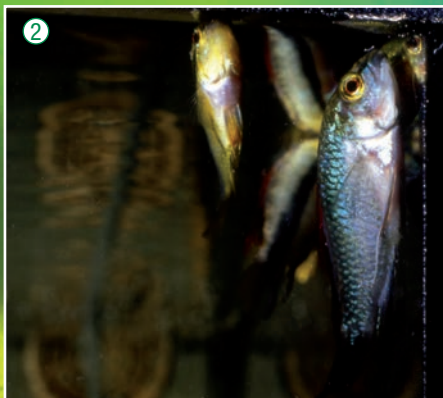


Why is algae a problem?

Algae, like all other water organisms, is at home in an aquarium and can't be completely avoided. As long as algae growth is within limits or is not obvious, there is no need to be concerned.

However, vigorous algae growth can have dramatic effects on the water (Illus. 1): algae are plants and therefore produce oxygen during the day.

If the CO_2 level in the water is no longer sufficient, algae are able to extract CO_2 from the carbonate hardness (KH). The result is a decrease in this important water parameter, which in turn leads to unstable pH levels. Now the pH level will drop steeply at night (to levels as low as 4) and increase to higher levels during the day (to levels above 10), which can mean the death of the aquarium inhabitants.



At night, however, the situation is reversed and the algae consume oxygen. Excessive algae growth may cause the oxygen content to drop to critical levels at night, endangering life in the aquarium (Illus. 2). Aeration at night is recommended in this case.

Furthermore, when exposed to light (i.e. during the day) algae, like all aquatic plants, consume carbon dioxide (CO_2). This consumption may, in certain circumstances, cause the pH level of the water to increase dramatically ($\text{pH} > 9$), creating an environment which is hazardous to life.

Finally, it should be pointed out that dead algae are broken down by bacteria in a process using oxygen. The water therefore needs more aeration when algae die!



Step 1: Recognising and combating algae

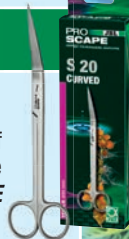
Thread algae (filamentous algae):

1. Mechanical removal: remove by twirling round a hose/bottle brush.
2. Reduce the sectors of the light spectrum which are conducive to algae: a very slight amber colouring to the water, hardly visible to the human eye, acts like sunglasses, filtering out the light which promotes algae growth. This effect is achieved by adding **JBL Tropol** to the aquarium.

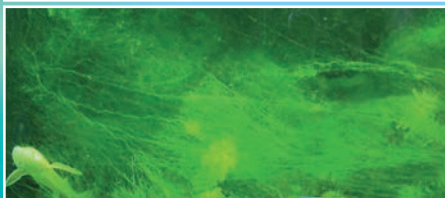


Brush algae:

1. Immediate mechanical removal of affected leaves. Cut off leaves at the base (simple using **JBL PROSCAPE Tool Scissors**).
2. Loaches of the Garra family (e.g. Garra pingi) feed on brush algae! Amano shrimp keep brush algae in check, but are not suitable to radically annihilate it.



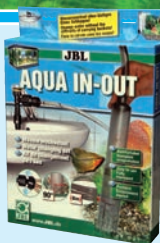
Thread algae



Brush algae



3. Plant more fast-growing plants such as hornwort, hygrophylla, water weed or ambullia.
4. Prevent algae spreading by using a UV-C water clarifier which kills algae spores.
5. Use an algacide: **JBL Algol**¹



¹ Use biocides safely. Always read the label and product information before use.

3. Clean up "messy corners" in the aquarium. When changing water always "hoover" the substrate with **JBL AquaEX** or **JBL Aqua In-Out**. Encourage plant growth: use an iron and trace element fertiliser such as **JBL Ferropol**. Limit phosphate levels with **JBL PhosExUltra** or **JBL Phos-Ex Rapid** if levels are very high.
4. Reduce current flow, decrease carbonate hardness (in hard water).
5. The most important step is to increase the CO₂ content of the aquarium water by using the JBL CO₂ system.
6. Use an algacide: **JBL Algol**¹



Step 1: Recognising and combating algae

Slime and blue-green algae (cyanobacteria):

Caution: can be mistaken for diatom!

Slime algae feel greasy and slimy and have an unpleasant smell when taken out of the water. Blue-green algae feels rough in comparison.

1. Mechanical removal (siphoning off etc.), not a long-term solution, however.
2. Improve the water quality (more frequent changes of water, reduce nitrate and phosphate levels, see page 6).

Spot algae (often young brush algae):

1. Mechanical removal from the panes using a glass cleaner (**JBL Aqua-T, Blanki, Floaty**). An excess of nutrients is often the main cause of these algae.

2

Further measures on pages 8 - 11.



Slime and blue-green algae



Spot algae



3. Either scatter **JBL FilterBoost** granulate on the floor of the aquarium or put in filter. The granulate is charged with special bacteria which break down organic nutrients (sugar, proteins etc.), which are often the cause of blue-green algae.



4. Carry out a partial change of water. Always use a substrate-cleaner (**JBL AquaEX**), instead of simply siphoning off the water.



Step 1: Recognising and combating algae

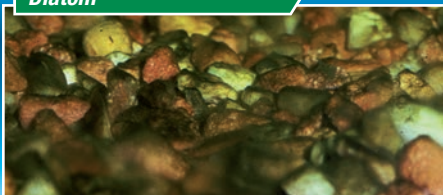
Diatom:

Caution: sometimes mistaken for slime algae! In comparison, diatom feel less slimy and more rough. Both often occur in mixed cultures (dark brown to black coating).

1. Caused by the silicate level of the water (mains / well water). Use a **JBL SilicateTest** to establish whether silicate is present. If silicate levels exceed 0.4 mg/l, a good silicate eliminator (**JBL SilikatEX**) should be used.



Diatom



2. In the event of high silicate levels in mains water, an osmosis unit can help by removing 95% of the silicate.
3. Complicated but effective: an ion exchange unit with special MP 600 synthetic resin specifically removes diatom. If the ion exchange unit is used in combination with a reverse osmosis unit, it only needs to remove residual amounts (5%) of the diatom which have "slipped through", and therefore lasts a very long time before it has to be regenerated.

Floating algae = green water (rare in an aquarium):

1. A UV-C water clarifier (**JBL PROCRISTAL UV-C**) is guaranteed to remove floating algae (green water) within just a few days.



Floating algae



Caution: a fine filter material (e.g. **JBL Symec-Micro**) is very efficient at filtering out dead algae, but also quickly becomes blocked and therefore has to be changed more frequently.

2

Further measures on pages 8 - 11.



Step 1: Combating algae in saltwater

Combating algae in saltwater:

More highly developed algae (Caulerpa, Halimeda etc.):

These "decorative algae" (also known as macroalgae) are usually desirable in a marine aquarium because they are attractive and remove nitrates and phosphates from the water. However, these algae can also become a problem if they become too overgrown as they can crowd out invertebrates. A controlled number of "higher" algae is definitely recommended.

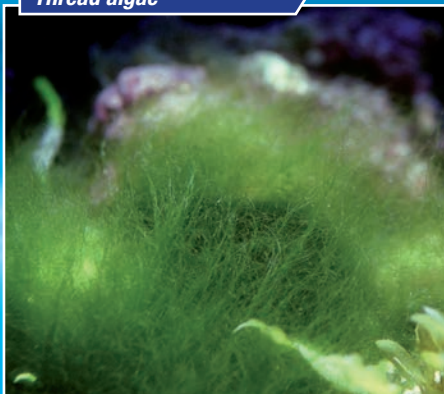
Thread algae (filamentous algae):

Slight over-fertilising with the algae nutrients nitrate ($\text{NO}_3 > 10 \text{ mg/l}$) and phosphate ($\text{PO}_4 > 0.1 \text{ mg/l}$) promotes the growth of unattractive thread algae. Often calcium reactors have been incorrectly adjusted so that CO_2 is released into the aquarium, greatly promoting algae growth. A measurable level of iron (Fe) often also leads to thread algae.

More highly developed algae



Thread algae



Step 1: Combating algae in saltwater

Diatom:

Caution: Sometimes mistaken for slime algae! In comparison diatom do not feel slimy, but rather rough. Both often occur in mixed cultures (dark brown to black coating)



1. Caused by the silicate level of the water (mains / well water). Use a **JBL SilicateTest** to establish whether silicate is present. If silicate levels exceed 0.4 mg/l, a good silicate eliminator (**JBL SilicatEX**) should be used.

Diatom



Slime algae:

Grow under both nutrient-poor as well as nutrient-rich conditions (depending on type). Introduce enemies which feed on algae such as spiny sea urchin or hermit crabs. The water quality (redox potential) and the carbonate hardness (KH) must be increased. The redox potential indicates the relationship between reducing (negative) and oxidising (positive) processes in the water in millivolts (mV) and can only be measured using a redox measuring device. The more organic material (algae, food remains, dead fish) that is broken down in the water, the lower the redox potential drops.

Slime algae



2. In the event of high silicate levels in mains water, an osmosis unit can help by removing 95% of the silicate.
3. Complicated but effective: an ion exchange unit with special MP 600 synthetic resin specifically removes diatom. If the ion exchange unit is used in combination with a reverse osmosis unit, it only needs to remove residual amounts (5%) of the diatom which have "slipped through", and therefore lasts a very long time before it has to be regenerated.

The more "dirt" removed, the higher it increases and high redox levels not only prevent slimy algae, but also other unattractive "lower" forms of algae. A redox measuring device is a highly effective tool to get a grip on algae problems. The redox level indicates the effectiveness of measures step by step: if the level increases, the measures were successful, if it decreases, the measures were inadequate.

The following measures also help: clean up "messy" corners, increase the water current, "interval" current, clean filter foam with hydrogen peroxide (H_2O_2).

Step 2: General algae-combating measures

Deprive the algae of nourishment!

No single individual factor leads to the elimination of algae problems. It is therefore essential that all the factors listed in this brochure are addressed.

Identify the nutrients available to the algae: nitrate (NO_3) and phosphate (PO_4) encourage the growth of algae in an aquarium if the following levels are exceeded:

Nitrate: 5-10 mg/l (JBL Nitrate Test)
Phosphate: 0.1 mg/l (JBL Phosphate Test sensitive)

How to eliminate nutrients:

To eliminate nitrate in the aquarium: use **JBL Bio-NitratEX** (biological long-term solution) or **JBL NitratEX**: fast immediate solution.

To eliminate phosphate in the aquarium: either use a special filter material (**JBL PhosEX ultra**) or a liquid solution **JBL PhosEX rapid**.



Nitrate-phosphate ratio

Scientific tests showed that the phosphate/nitrate ratio has a major influence on algae growth. The ideal ratio for freshwater plants is 1:32 (1 part phosphate, 32 parts nitrate).

When this range, which is between 1:15 and a maximum of 1:30, is exceeded algae growth increases considerably, particularly green algae and blue-green algae (Cyanobacteria). It therefore follows that selectively reducing a substance which is available in excess (e.g. phosphate), reduces algae growth.

Improve the quality of the water!

There are a few measures to maintain water quality and general care which must be followed:

Regular partial changes of water in the aquarium: carry out a 20% partial change of water every two weeks using a gravel cleaner (e.g. **JBL AquaEX** or **JBL Aqua In-Out**),

but only if the mains water does not contain measurable amounts of phosphate or nitrate.

- carry out changes of water and filter cleaning on different days.
- use **JBL ClearMec plus** filter material (removes nitrite, nitrate and phosphate).
- vigorous algae growth can reduce the carbonate hardness in the aquarium to zero. Carbonate hardness keeps the pH level stable. If the carbonate hardness (KH) drops below 4°dKH **JBL Aquadur** should be used to increase it to between 4 and 8.
- if the total hardness (GH) of the aquarium water is far higher than that of the mains water, this indicates that the water only needs to be regularly topped up after evaporation, rather than changed.



Step 3: Prevention is better than cure

By following steps 1 and 2 you will have algae problems under control. It is now important that preventative measures are taken in order to restrict algae growth in the future.

Competition makes life difficult:

Aquatic plants and algae (which are also plants, after all) compete for light and nutrients. However, as aquatic plants have a more effective metabolism than algae, algae usually have little chance in densely planted aquariums. The solution is to encourage plant growth and fast-growing plants! (Illus. 1)



- feed your existing plants: the basic nutrient of all plants is carbon dioxide (CO_2), which is added to the water by CO_2 fertilising systems (**JBL ProFlora CO_2 -System**). (Illus. 3)
- In addition to the basic nutrient, CO_2 , plants also require minerals and trace elements, which are vital to healthy growth. Mineral deficiency can lead to light green/transparent leaves (Illus. 2). Use a basic liquid fertiliser (**JBL Ferropol**) each week and after every change of water.
- Delicate and sensitive aquatic plants require nutrients which cannot be

The following measures have been proven to promote vigorous plant growth:

- as you have probably already set up your aquarium, a long-term nutrient substrate is not an option. If you are setting up a new aquarium, a long-term nutrient substrate (**JBL AquaBasis plus**) is ideal for perfect plant growth right from the start.

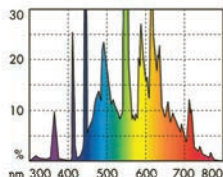


given weekly as a long-term supply of fertiliser. The daily fertiliser **JBL Ferropol 24** also provides plants with these vital trace elements, which would be made ineffective by the oxygen in the water if given as a weekly "long-term" supply.



Step 3: Prevention is better than cure

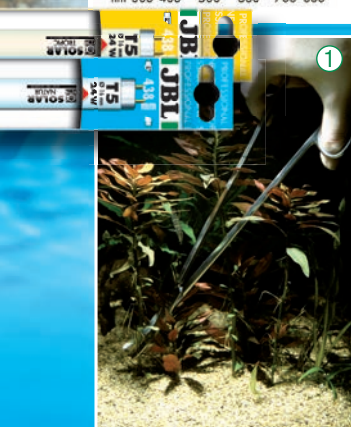
Lighting should consist of full-spectrum tubes such as **JBL SOLAR Tropic/Natur**, which promote plant growth. The spectrum of full-spectrum tubes is more similar to natural sunlight and therefore better for the photosynthesis of plants than the spectrum in other types of fluorescent tube, (two-strip or three-strip tubes), as scientific experiments have proven.



Reddish, and in particular, blue shades of light tend to encourage the growth of algae – so caution here! If nutrients are pre-

- improve the diet of the fish: plant-eaters need vegetable matter (e.g. **JBL NovoVert/JBL Spirulina**) and predators need fish protein (e.g. **JBL Grana-Cichlid/JBL NovoTanganjika**). The wrong food leads to increased pollution of the water, as the food cannot be completely digested and utilised.

- use phosphate optimised food: JBL food is not produced from high-phosphate fishmeal, but from pure proteins from aquatic animals. Change to JBL granules e.g.



sent, direct sunlight promotes the growth of algae and should therefore be avoided.

Reduce the amount of nutrients available for algae:

- remove dead plant and algae residue as these release stored nutrients again (nitrates and phosphates). Very simple to do this using **JBL PROSCAPE Tool Scissors** (Illus. 1)



JBL NovoGranoMix or flakes such as **JBL NovoBel**.

- Use the aquarium sunglass effect: humin in **JBL Tropol** gives the water a very light and barely noticeable color, which nevertheless constitutes a very effective protection against the growth of algae. (Illus. 2)



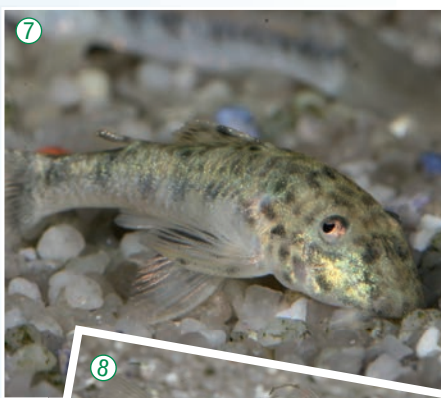
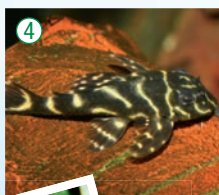
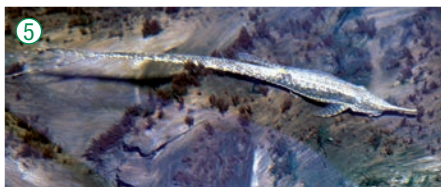
Step 3: Prevention is better than cure

Live helpers against algae:

Long-term measures against algae, which have the added advantage of looking attractive, are invertebrates and fish which keep algae "in check". The following have proved to be good algae-eaters:

Fish:

Wide-mouthed sisoroid catfish (*Chaetostoma spec.*) (1), doctor fish (*Garra spec.*) (2), dwarf sucking catfish (*Otocinclus spec.*) (3), some *Peckoltia* plecos (4), *Farowella gracilis* (5) (catfish), Siamese algae-eater (*Crossocheilus oblongus*) (6), pitbull plecos (*Parotocinclus jumbo*) (7) and pongo characin (*Parodon spec.*) (8).



Shrimp:

The Amano shrimp (*Caridina multidentata*) (9) are considered the best consumers of algae amongst the shrimp.

Caution: many fish consider shrimp to be delicacies!

Sea slugs and snails:

Many types of slugs and snails (10) are excellent algae-eaters. Care should be taken, however, that they do not become too prolific.

Note: loaches and puffer fish eat slugs and snails.

Your JBL specialist retailer will be happy to advise you.



You will also find further JBL guide booklets about the fields of Aquarium and Terrarium under www.JBL.de.



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