

# PRO FLORA®

# JBL

**YOUR FREE  
COPY!**

## Perfect growth for your aquarium plants!

**Everything you need to  
know about healthy  
plant growth**

**CO<sub>2</sub> fertilisation  
at its best**

**The ideal  
plants for  
your aquarium**

**Careful!  
These fish  
eat plants**










**VORSPRUNG  
DURCH FORSCHUNG**  
AHEAD THROUGH RESEARCH





Aquarium plants are not only beautiful, they are a guarantee for a well-functioning aquarium. The more healthy plants you have in your aquarium the better it will operate and look.

### Aquarium plants have the following beneficial functions for your aquarium:

-  They remove nutrients (nitrates & phosphates), which would otherwise promote algae growth, from the water
-  They reduce the number of harmful germs by producing "antibiotics"
-  They help combat a lot of the parasites drawn to the shade, which then "infest" the plants instead of the fish
-  They produce oxygen during the day, although this can also be brought into the aquarium using a moving water surface (filter outflow, air stone)
-  They actively absorb toxins from the water (rather like medicinal herbs)
-  The microorganisms on their leaves form a microfauna for young fish to graze on
-  They supplement the food spectrum of many fish, even not fully herbivorous ones.



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# What are the factors for **perfect plant growth**?

Vigorous and healthy aquarium plant growth is never based on just one factor. It is always the interplay of light, heat, fertiliser and the staple food carbon dioxide (CO<sub>2</sub>). If just one of these factors is missing or is only minimally present as a limiting factor, the plant will always grow only as much as this limiting factor allows. The simplest

example would be light. If you supply your plants with sufficient fertiliser, CO<sub>2</sub> and trace elements, but only switch on the light for 2 hours, the lack of light will cause your plants to grow weakly. This is equally true for ALL factors, thus, a lack of potassium or CO<sub>2</sub> will cause an equal restriction of growth.

## How to achieve ideal plant growth





## The **right light** for aquarium plants

If you took a floodlight to light your aquarium, you'd not only end up with huge electricity bills, your plants would grow badly too. Strong light intensity alone is not enough! All plants (land and water) have evolved to adapt to the full spectrum of sunlight and use the energy for photosynthesis, i.e. for their food production. For photosynthesis, the plant requires the whole spectral range of sunlight (visible in the rainbow or prism) for its source of energy, plus water and CO<sub>2</sub> (carbon dioxide). From this it produces sugar (its food), and oxygen is released as a "waste product".

The JBL LED SOLAR lamps have this important full spectrum, as can be seen from their high PAR value of over 200. The PAR value indicates how much light radiation can really be used photosynthetically by the plants (PAR = Photosynthetically Active Radiation).

Added benefits: When you buy a JBL LED SOLAR NATURE you get the lamp including remote control and can choose from three different light colours at the touch of a button: cool white with 6700 K, daylight

white with 4000 K or warm white with 2700 K. Also included are the holding brackets for top assembly on your aquarium and the adapters so that you can simply remove your fluorescent tubes and install the LED in their place! The LED is so powerful that it replaces at least 2 fluorescent tubes.

If you like colour effects, such as red sunrise and sunset or blue night light, supplement the JBL LED SOLAR NATURE with a JBL LED SOLAR EFFECT.

If you prefer complete control over your lighting, a light computer (JBL LED SOLAR CONTROL) is available, and it reproduces the climate data from the original habitats in South America or Africa, along with any light preferences you create yourself. A plant adaptation programme is also included, as aquatic plants first have to get used to the stronger LED light.





### A **substrate heating** – not for heating the water!

Despite its name, the substrate heater (JBL PROTEMP b) does NOT heat the water like a heater thermostat (e.g. JBL PROTEMP S) does. It's exclusively for water circulation within the substrate.

The substrate heater consists of a cable which is laid in loops on the bottom glass plate of the aquarium and fixed with suction holders. It is then covered with substrate and/or gravel or medium fine sand (do not use with very fine sand!). The heating cable heats up and the warm water rises to the top. Colder water flows in and creates water circulation within the substrate. This leads to nutrients being ideally flushed to the plant roots and ensures strong root formation and thus healthy plant growth.





## The **right fertilisation** for aquarium plants

You may assume that with a good CO<sub>2</sub> fertiliser system, plants are well provided for. But comparing the plant diet to our human one shows that one main food is never enough: if we ate only carbohydrates, fat and protein, we'd soon suffer massive health problems caused by vitamin deficiencies and a lack of trace elements. This is also what happens to plants: they'll continue to grow (albeit slowly), but they'll show signs of deficiency: Light green leaves, leaf decay, red colour disappearing etc..

**We therefore recommend the following fertilisation:**  
(in addition to CO<sub>2</sub> fertilisation)

**For undemanding to moderately demanding aquarium plants:**



**JBL PROFLORA Ferropol liquid fertiliser.**

Apply after the weekly partial water change to the volume of water changed (10 ml/80 l). As feeding and fish excretions cause nitrates & phosphates to be present in almost all aquariums, this fertiliser is nitrate and phosphate free!



**JBL The 7 Balls nutrient depot for the plant roots.** Press one ball into the root area of STRONGLY rooting plants every six months. Plants with low root growth hardly absorb any nutrients through their roots and do not need any special root promotion.



You'll find a listing of aquarium plants on pages 26 bis 29.



## For high maintenance aquarium plants:



### JBL PROFLORA Ferropol 24

**daily fertiliser** with sensitive trace elements. Some minerals and trace elements react with the oxygen and carbonate hardness in the aquarium water and this renders them unserviceable for the plants (it's similar to rusting in metals). The daily fertiliser contains these sensitive trace elements, and adding them daily means the plants absorb them quickly, before the oxygen can have any detrimental effects.



### JBL PROFLORA Ferropol ROOT

**long-term fertiliser in tablet form for the plant roots.**

Press one tablet into the root area of the plant every month.



## When setting up a new aquarium:



### JBL PROFLORA AquaBasis Plus

Be sure right from the start: With a layer of long-term nutrient substrate (JBL PROFLORA AquaBasis Plus) under the actual substrate, you create an ideal basis for your aquarium plants for 5 years. When the nutrients from the long-term nutrient substrate have been used up, they are reabsorbed from the liquid fertiliser in the water and made available to the plants through the substrate. It's like recharging a battery.



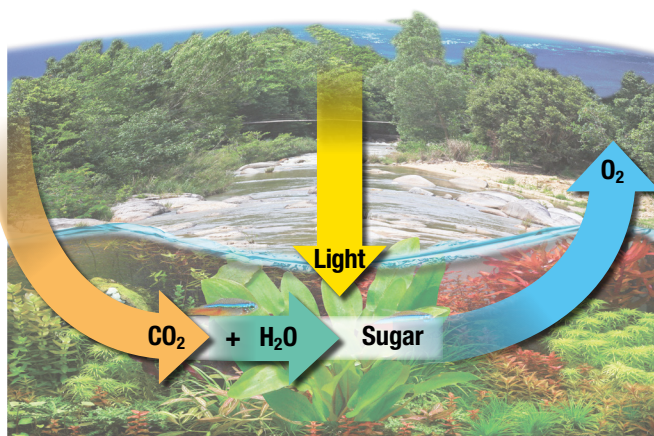


## The plants **staple food**:

### What is CO<sub>2</sub>?

Carbon dioxide (CO<sub>2</sub>) for plants corresponds to carbohydrates + fats + proteins in human nutrition, i.e. the most important „staple foods“ without which we cannot survive. However, we still need vitamins and minerals as a supplement, whereas plants only need minerals. For this purpose we have the fertilisers in the JBL PROFLOA Ferropol range. During photosynthesis, plants use light energy to bind CO<sub>2</sub> with water and turn it into sugar (their actual food). This process releases the oxygen which we humans & animals need to breathe as a „waste product“. At night plants reabsorb a small part of the oxygen to respire.

### Photosynthesis



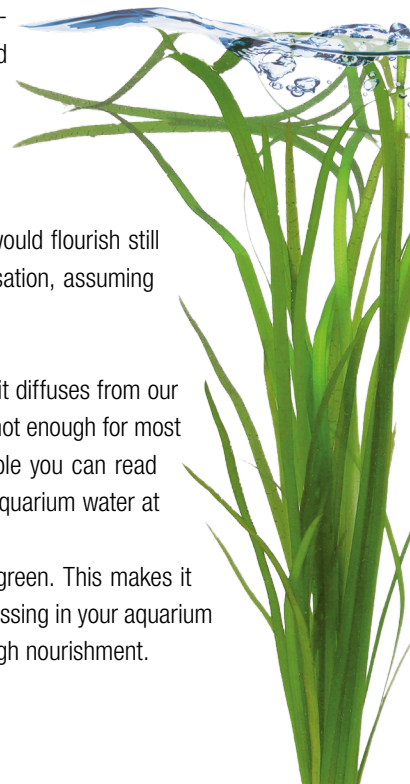
### Can you leave out the CO<sub>2</sub>?

Admittedly, even without CO<sub>2</sub> fertilisation, some aquarists have observed their plants growing. There are several reasons for this, and the needs of aquarium plants can differ as much as those of fish (discus/goldfish). Some plants, such as the Vallisneria, need very little fertiliser, little light and can survive with the CO<sub>2</sub> content of untreated water. Any high maintenance plants, such as Rotala macranda, would perish miserably if forced to share an aquarium in these conditions.

The Vallisneria, on the other hand, would flourish still further, were it to receive CO<sub>2</sub> fertilisation, assuming there is enough fertiliser and light.

CO<sub>2</sub> is dissolved in EVERY water, as it diffuses from our air into the water. Unfortunately, it's not enough for most aquarium plants. In the following table you can read how much CO<sub>2</sub> is dissolved in your aquarium water at a certain pH- and KH value.

The ideal CO<sub>2</sub> content is marked in green. This makes it easy to read how much CO<sub>2</sub> is still missing in your aquarium water to ensure your plants get enough nourishment.





# The CO<sub>2</sub> fertilisation

	KH 2	KH 4	KH 6	KH 8	KH 10	KH 12	KH 14	KH 16	KH 18	KH 20						
pH 7,8	1	2	3	4	5	6	7	9	9	10						
pH 7,6	2	3	5	6	8	9	11	12	14	15						
pH 7,4	2	5	7	10	12	14	17	19	21	24						
pH 7,3	3	6	9	12	15	18	21	24	27	30						
pH 7,2	4	8	11	15	19	23	27	30	34	38						
pH 7,1	5	10	14	19	24	29	33	38	43	48						
pH 7,0	6	12	18	24	30	36	42	48	54	60						
pH 6,9	8	15	23	30	38	45	53	60	68	76						
pH 6,8	10	19	29	38	48	57	67	76	86	95						
pH 6,7	12	24	36	48	60	72	84	96	CO <sub>2</sub> in mg/l							
pH 6,6	15	30	45	60	75	90										
pH 6,4	24	48	72	96												
pH 6,2	38	76														

Recommended CO<sub>2</sub> range:  Community aquarium: 15-30 mg/l  JBL Aquascaping 20-35 mg/l

## The correct CO<sub>2</sub> content in the aquarium

In the table, the optimal CO<sub>2</sub> content is colour-coded. As you can see, each water hardness is assigned a certain CO<sub>2</sub> value, which then determines the pH value. Although even at high hardness levels (e.g. 14 dKH) a pH value of 6.3 can be achieved by adding CO<sub>2</sub>, the amount of CO<sub>2</sub> (223 mg/l) required to achieve this is fatal for the animals in the aquarium. If an aquarist wants to achieve a low pH value of - let's

say - 6.3, it's better to first lower the carbonate hardness to 2 (e.g. by adding osmosis water). Conversely, the table also shows if there is too little CO<sub>2</sub>. If an aquarium has a KH of 5 and a pH value of 7.5, the natural CO<sub>2</sub> content is only 5 mg/l. By adding CO<sub>2</sub>, a CO<sub>2</sub> content of 16 - 32 mg/l should be aimed for, which in turn will lower the pH value to 7.0 - 6.7.





## Why is CO<sub>2</sub> so good at **combating algae**?

Plants and algae are food competitors in the aquarium. If the plants grow well, there is hardly any food left for the algae and they wither away. CO<sub>2</sub> fertilisation promotes the growth of the plants so that the algae don't stand a chance! Even in aquariums where only a few plants live (as is often the case in Malawi-Tanganyika aquariums) these few plants should be nurtured all the more intensively in order to actively combat algae growth. Incidentally, compared to the supply of nutrients, light plays a very subordinate role in algae control!



### Does CO<sub>2</sub> fertilisation mean less oxygen in the water?

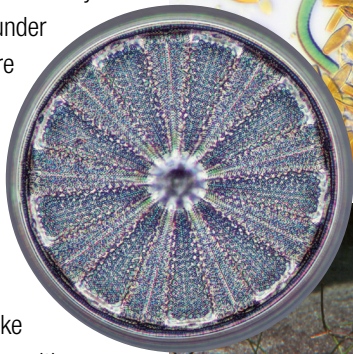
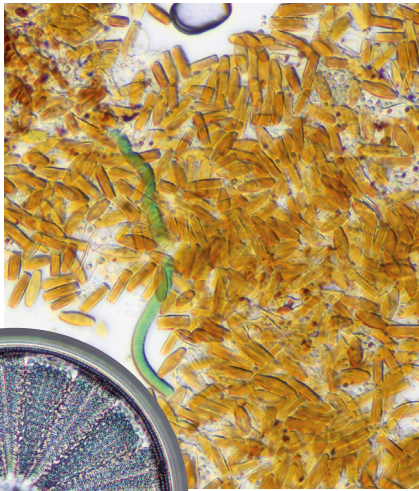
A lot of people maintain that CO<sub>2</sub> reduces the oxygen content in the water. This is not correct! Nevertheless, let's look at this interplay in more detail. If, despite adding CO<sub>2</sub>, you move the water surface a lot by using air stones or spray bars from the filter, the oxygen content in the water is increased, but at the same time the CO<sub>2</sub> is expelled again (it's like shaking a cola bottle). The calmer the water surface, the more CO<sub>2</sub> remains in the water. Both gases (CO<sub>2</sub> and O<sub>2</sub>) can be present in the water in high concentrations, for instance if the plants assimilate strongly during the day (then a lot of O<sub>2</sub> is produced) and at the same time a lot of CO<sub>2</sub> is added via a CO<sub>2</sub> fertiliser system.





## Diatoms – a special case

All algae, except blue-green algae, which are actually not algae but cyanobacteria, are promoted by high nitrate ( $\text{NO}_3$ ) and phosphate ( $\text{PO}_4$ ) levels. Diatoms are the exception. They form unsightly brownish coatings on gravel and decorations. Diatoms can only occur if the water contains silicic acid (silicates,  $\text{SiO}_2$ ). They use this substance to build their skeletons, which are - incidentally - incredibly beautiful to see under the microscope. But they're only attractive through the lens of a microscope! In most cases, the diatoms disappear by themselves once the available silicic acid has been used up. Sometimes, however, we have to take action and remove the silicates with a special filter material (JBL SilikatEx rapid). With the help of a silicate water test, you can check whether your initial water already has high silicate values (JBL PROAQUATEST  $\text{SiO}_2$ ).





## How a CO<sub>2</sub> fertilisation system **works**

With the help of a CO<sub>2</sub> fertiliser system you can increase the CO<sub>2</sub> content in your aquarium water and lower the pH value. You can choose between a "Bio-CO<sub>2</sub>" system (CO<sub>2</sub> production via a biological fermentation process) and a CO<sub>2</sub> fertiliser system with a pressurised

gas cylinder (disposable or reusable) containing CO<sub>2</sub>. The transparent CO<sub>2</sub> gas is fed through a hose into a bubble counter in which CO<sub>2</sub> bubbles can be counted and then dissolved in the aquarium water using a reactor/diffuser.

### BIO

#### The biological start (aquariums 10-110 l)

##### STARTER BIO

#### JBL PROFLORA CO<sub>2</sub> STARTER BIO SET



##### BASIC BIO

#### JBL PROFLORA CO<sub>2</sub> BASIC BIO SET



##### ADVANCED BIO

#### JBL PROFLORA CO<sub>2</sub> ADVANCED BIO SET



If you start with the JBL PROFLORA CO<sub>2</sub> STARTER BIO SET, you can expand it variably and at any time towards the BASIC BIO or ADVANCED BIO version, because all the components of the sets are available separately and are compatible with each other!

### BASIC

#### The budget start (aquariums 40-300 l)

##### U

#### JBL PROFLORA CO<sub>2</sub> BASIC SET U

With disposable CO<sub>2</sub> pressurised gas cylinder



##### M

#### JBL PROFLORA CO<sub>2</sub> BASIC SET M

With reusable CO<sub>2</sub> pressurised gas cylinder



##### V

#### JBL PROFLORA CO<sub>2</sub> BASIC SET V

Without CO<sub>2</sub> pressurised gas cylinder



You can retrofit your JBL PROFLORA CO<sub>2</sub> BASIC system at any time with a solenoid valve for night switch-off or with a CO<sub>2</sub> control unit.



The next stage of expansion is the addition of a solenoid valve that shuts off the CO<sub>2</sub> supply at night, as plants do not need CO<sub>2</sub> at night.

The most professional is the third expansion stage, in which the CO<sub>2</sub> supply is regulated by a small CO<sub>2</sub>/pH control unit. It measures the pH value of your aquarium water via a pH electrode and then regulates the CO<sub>2</sub> supply automatically.

## ADVANCED

**The smart start with night switch-off**  
(aquariums 40-600 l)

### JBL PROFLORA CO<sub>2</sub> ADVANCED SET U

With disposable CO<sub>2</sub> pressurised gas cylinder

U



### JBL PROFLORA CO<sub>2</sub> ADVANCED SET M

With reusable CO<sub>2</sub> pressurised gas cylinder

M



### JBL PROFLORA CO<sub>2</sub> ADVANCED SET V

Without CO<sub>2</sub> pressurised gas cylinder

V



If you own an ADVANCED version, the CO<sub>2</sub>/pH control unit can be retrofitted at any time. Even the CO<sub>2</sub> reactor can be expanded when changing to a larger aquarium!

## PROFESSIONAL

**The professional start with CO<sub>2</sub>/pH control**  
(aquariums 40-600 l)

### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET U

With disposable CO<sub>2</sub> pressurised gas cylinder

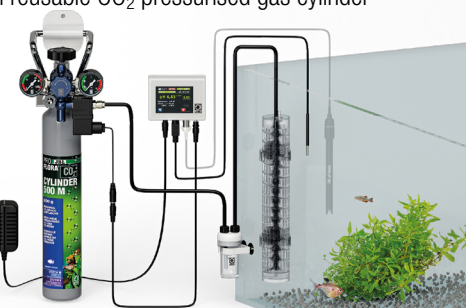
U



### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET M

With reusable CO<sub>2</sub> pressurised gas cylinder

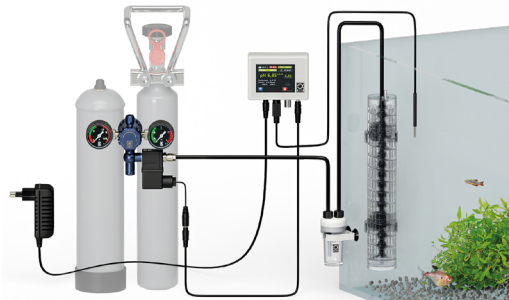
M



### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET V

Without CO<sub>2</sub> pressurised gas cylinder

V



Here it is possible to switch to a larger 2 kg CO<sub>2</sub> storage cylinder at any time. The pH electrode is not included in the set and should be purchased in factory-fresh condition (so that it does not age in the set).



## Bio CO<sub>2</sub> – First steps in CO<sub>2</sub> plant fertilisation

For aquariums between 10 and 110 litres, a biological CO<sub>2</sub> system is a good choice. Here the CO<sub>2</sub> gas is produced through a biological fermentation process lasting about 40 days. When the CO<sub>2</sub> production stops, simply add new microorganisms and the process starts again.

If you would like to try out how well CO<sub>2</sub> addition works on your aquarium plants, you can start inexpensively with the JBL PROFLORA CO<sub>2</sub> STARTER BIO SET in aquariums between 10 and 40 litres.

For aquariums between 40 and 80 litres we have developed the JBL PROFLORA CO<sub>2</sub> BASIC BIO SET, which contains a more effective gas diffuser and a professional reaction canister as well as a backflow protection.

The JBL PROFLORA CO<sub>2</sub> ADVANCED BIO SET is available for aquariums from 40 to

110 litres. In addition to the components of the "STARTER" version, this also contains a thermo casing for still more powerful and uniform bio-CO<sub>2</sub> production. Furthermore, the bio-reaction components are included 2x, so that it runs for 2x 40 days before it has to be restarted with refills.

### JBL PROFLORA CO<sub>2</sub> REFILL BIO



### JBL PROFLORA CO<sub>2</sub> STARTER BIO SET



### JBL PROFLORA CO<sub>2</sub> BASIC BIO SET



### JBL PROFLORA CO<sub>2</sub> ADVANCED BIO SET





# Basic – CO<sub>2</sub> plant fertilisation with CO<sub>2</sub> pressurised gas **storage cylinders**

The sets of the “BASIC” range contain all the components needed to visibly enhance the growth of aquarium plants with the addition of CO<sub>2</sub>. You can choose between a set with-out a CO<sub>2</sub> storage cylinder (VARIO system) in case you already have a cylinder, a set with a disposable CO<sub>2</sub> storage cylinder (U system) or a set with a refillable, reusable CO<sub>2</sub> storage cylinder (M system).

Apart from the CO<sub>2</sub> storage cylinders, all the components are identical in all three systems. A pressure reducer lowers the pressure of the storage cylinder so you can adjust it easily and precisely with a handwheel. A CO<sub>2</sub>-resistant hose is used to transport the CO<sub>2</sub> to a bubble counter that allows you to adjust the amount of CO<sub>2</sub> supplied exactly. This bubble counter contains a built-in check valve that prevents aquarium water from

flowing back into the technical equipment. From the bubble counter, the CO<sub>2</sub> reaches your aquarium through a hose, where it is fed into the aquarium water as very fine bubbles using an attractive glass diffuser. This way, your aquarium plants can absorb their main nutrient, carbon dioxide, from the water.

The JBL PROFLORA CO<sub>2</sub> BASIC VARIO (V) contains all components, but without a CO<sub>2</sub> storage cylinder.

The JBL PROFLORA CO<sub>2</sub> BASIC SET U contains all components including a 500 g disposable cylinder.

The JBL PROFLORA CO<sub>2</sub> BASIC SET M contains all components including a refillable 500 g reusable cylinder.

## For aquarists interested in water chemistry:

During the course of the day, CO<sub>2</sub> consumption leads the pH value in the aquarium to increase and this indirectly means a decrease in carbonic acid. A decrease in acidity in the water leads to an increase in pH. At night, the process is reversed: No more CO<sub>2</sub> is consumed, but some CO<sub>2</sub> is still produced by the plants in the dark phase. Thus the pH value decreases overnight. If the CO<sub>2</sub> supply is NOT stopped at night, the pH value would drop even more overnight.

(Graphic on page 16)

A night switch-off, whether by turning off the cylinder or using a solenoid valve, is therefore definitely advisable.

**JBL PROFLORA CO<sub>2</sub> BASIC SET U**



**JBL PROFLORA CO<sub>2</sub> BASIC SET M**



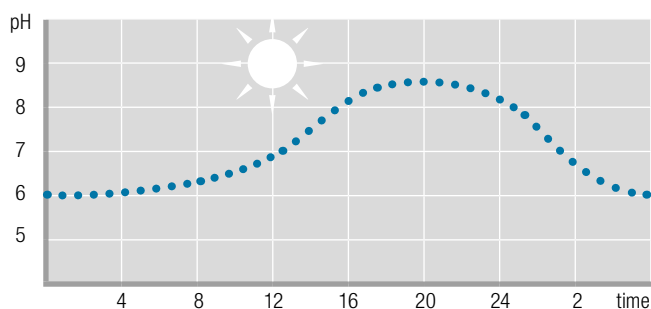
**JBL PROFLORA CO<sub>2</sub> BASIC SET V**





## ADVANCED – The advanced CO<sub>2</sub> fertilisation for **smart** aquarists

Since plants do not need/consume CO<sub>2</sub> at night, adding CO<sub>2</sub> at night is unnecessary. The JBL PROFLORA CO<sub>2</sub> ADVANCED SETs therefore contain a solenoid valve which switches the CO<sub>2</sub> supply on and off using a timer (timer not included). You can use the timer you use for your aquarium lighting. In this way, the CO<sub>2</sub> is switched on in the morning along with the light and switched off again in the evening. This saves almost half the CO<sub>2</sub> and the additional costs for the solenoid valve are recouped in no time. This ADVANCED SET is available with a disposable (U system) or refillable (M system) cylinder. If you already have a CO<sub>2</sub> storage cylinder, you can choose the JBL PROFLORA CO<sub>2</sub> ADVANCED SET V, which contains all the other components, including the solenoid valve, apart from the cylinder.



JBL PROFLORA CO<sub>2</sub> ADVANCED SET U

JBL PROFLORA CO<sub>2</sub> ADVANCED SET M

JBL PROFLORA CO<sub>2</sub> ADVANCED SET V





## PROFESSIONAL – Fully automatic is also an option

If you're looking for sophistication, try the PROFESSIONAL version. Here, the solenoid valve is not switched using a timer, but using a CO<sub>2</sub>/pH control unit.

Simply enter the measured carbonate hardness of your aquarium water (determined with JBL PROAQUATEST KH) into the CO<sub>2</sub>/pH control unit and let it calculate the correct amount of CO<sub>2</sub> for your aquarium, based on a pH measurement via a pH electrode. (The pH electrode needs to be purchased separately, as it should always be factory-fresh, and not ageing in the set). This way, the CO<sub>2</sub> plant fertilisation is fully automated and the pH value in your aquarium is always kept at the optimum level.

Here you can choose whether the set contains a disposable CO<sub>2</sub> cylinder (U system), a refillable CO<sub>2</sub> cylinder (M system) or no CO<sub>2</sub> cylinder at all (V system), in case you already have a CO<sub>2</sub> cylinder.



### For aquarists interested in water chemistry:

A small part of the added carbon dioxide reacts with the water to form carbonic acid. Since any addition of acid lowers the pH value, the addition of CO<sub>2</sub> also lowers the pH value. The pH electrode measures the current pH value of the aquarium water and the CO<sub>2</sub>/pH control unit compares it with the ideal pH value which the unit has calculated. To calculate the ideal pH value, the existing carbonate hardness needs to be measured (JBL PROAQUATEST KH) and entered, and is then taken as the basic variable. The harder the water, the more CO<sub>2</sub> would be needed to lower the pH value significantly. But then there would be more than 30-40 mg/l CO<sub>2</sub> in the water, which in turn would be dangerous for the animals. (These correlations are taken into account by the CO<sub>2</sub>/pH control unit).

	KH 2	KH 4	KH 6	KH 8	KH 10	KH 12	KH 14	KH 16	KH 18	KH 20
pH 7.8	1	2	3	4	5	6	7	9	10	
pH 7.6	2	3	5	6	8	9	11	12	14	15
pH 7.4	2	5	7	10	12	14	17	19	21	24
pH 7.2	3	6	9	12	15	18	21	24	27	30
pH 7.0	4	8	11	15	19	23	27	30	34	38
pH 6.8	5	10	14	19	24	29	33	38	43	48
pH 6.6	6	12	16	21	26	30	36	42	48	54
pH 6.4	8	15	20	26	32	38	45	53	60	68
pH 6.2	10	19	25	32	38	45	53	60	68	76
pH 6.0	12	24	31	38	45	53	60	68	76	84
pH 5.8	15	30	38	45	53	60	68	76	84	92
pH 5.6	24	48	60	72	84	96				
pH 5.4	38	76								

● ● ● The ideal range is automatically set by the CO<sub>2</sub>/pH control unit

### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET U



### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET M



### JBL PROFLORA CO<sub>2</sub> PROFESSIONAL SET V





## The **components** of the CO<sub>2</sub> fertiliser

### CO<sub>2</sub> storage cylinders

The CO<sub>2</sub> is available as a gas either in compressed form in disposable cylinders (JBL PROFLO-RA CO<sub>2</sub> CYLINDER U), in reusable cylinders (JBL PROFLO-RA CO<sub>2</sub> CYLINDER M), or as biogas produced by a sugar-yeast reaction in a reaction canister (JBL PROFLO-RA CO<sub>2</sub> BIO). By the way, don't be afraid of the high pressure in the cylinders! The cylinders have a "pressure relief valve" in case they are accidentally overfilled during refilling or left in a hot car.



JBL PROFLO-RA CO<sub>2</sub> CYLINDER U



JBL PROFLO-RA CO<sub>2</sub> CYLINDER M

### Pressure reducer

To reduce the pressure from the pressurised gas cylinder, a pressure reducer is screwed on (JBL PROFLO-RA CO<sub>2</sub> REGULATOR BASIC or ADVANCED or PROFESSIONAL). It reduces the 50-60 bar cylinder pressure to a working pressure of approx. 1.5 bar. These 1.5 bars are then dosed by a small handwheel (fine needle valve) so precisely that individual CO<sub>2</sub> bubbles can be seen and counted in the connected bubble counter. The cylinder pressure and the working pressure are indicated on pressure gauges on some pressure reducers (JBL PROFLO-RA CO<sub>2</sub> REGULATOR ADVANCED/PROFESSIONAL). These displays are not strictly necessary, as - unlike with diving cylinders with compressed air - the cylinder pressure does not slowly drop, and you do not need to be warned when the cylinder is running low. Instead, the pressure

remains at its maximum pressure and then drops to zero in a very short time. So, unfortunately, there is no slow decrease of the cylinder filling pressure.

The working pressure would only be important if it had to be adjusted and this is normally not necessary. But most people are happier having two pressure gauges giving them readings. JBL also offers a minimalist pressure reducer without a pressure gauge (JBL PROFLO-RA CO<sub>2</sub> REGULATOR BASIC). If you would like to equip your pressure reducer with a solenoid valve for night switch-off or pH control, you can buy it complete with the solenoid valve already fitted

(JBL PROFLO-RA CO<sub>2</sub> REGULATOR PROFESSIONAL).

Of course it would also be possible to retrofit an existing pressure reducer with a solenoid valve (JBL PROFLO-RA CO<sub>2</sub> VALVE). ALL JBL PROFLO-RA CO<sub>2</sub> REGULATOR types are equipped with an adapter so that they fit both reusable and JBL disposable cylinders. If you have a Dennerle pressure reducer for Dennerle disposable cylinders, you can use the JBL PROFLO-RA CO<sub>2</sub> ADAPT U-Dennerle adapter to make this pressure reducer fit JBL disposable cylinders.

Pressure reducer Type	Pressure gauge	Solenoid valve	Adapter U-M
JBL PROFLO-RA CO <sub>2</sub> REGULATOR BASIC	no	no	yes
JBL PROFLO-RA CO <sub>2</sub> REGULATOR ADVANCED	yes	no	yes
JBL PROFLO-RA CO <sub>2</sub> REGULATOR PROFESSIONAL	yes	yes	yes



JBL PROFLO-RA CO<sub>2</sub> REGULATOR BASIC



JBL PROFLO-RA CO<sub>2</sub> REGULATOR ADVANCED



JBL PROFLO-RA CO<sub>2</sub> REGULATOR PROFESSIONAL



# systems and their **features**

## Hose



JBL PROFLORA CO<sub>2</sub> TAIFUN TUBE BLACK/CLEAR

Lay the hose connections so that they are as short as possible. The shorter the CO<sub>2</sub>-carrying hoses, the faster the whole system will react when you increase or decrease the pressure on the fine needle valve. But even with short hoses your settings will always have a delayed reaction. So don't wildly turn the fine needle valve of the pressure reducer: adjust it slightly and wait a little before the bubble count in the bubble counter (JBL PROFLORA CO<sub>2</sub> TAIFUN COUNTSAFE) changes. CO<sub>2</sub> hoses also harden over time and should then be replaced. JBL offers special CO<sub>2</sub>-resistant hoses: JBL PROFLORA CO<sub>2</sub> TAIFUN TUBE BLACK/CLEAR.

## Bubble counter



JBL PROFLORA CO<sub>2</sub> TAIFUN COUNTSAFE

Since CO<sub>2</sub> gas is not visible, but we want to add it in a dosed manner, we have to make it visible. In the JBL CO<sub>2</sub> concept there are several options: JBL has the JBL PROFLORA CO<sub>2</sub> TAIFUN COUNTSAFE, a bubble counter with integrated check valve. The bubble counter is filled with water through which the CO<sub>2</sub> bubbles rise to the top. In this way they can be dosed and counted. Bubble counters are integrated in all JBL CO<sub>2</sub> diffusers (JBL PROFLORA CO<sub>2</sub> TAIFUN GLASS, TAIFUN S, TAIFUN M and TAIFUN INLINE). An additional bubble counter is only needed in cases where the diffuser is not clearly visible.

## Check valve



JBL PROFLORA SAFESTOP

In order to prevent the aquarium water from entering the hose in the direction of the technical equipment, a check valve (JBL PROFLORA SAFE-STOP) needs to be fitted as closely as possible to the aquarium, ideally directly above the water surface. The CO<sub>2</sub> gas dissolves so easily in the water that it diffuses out of the hose into the aquarium water when the bottle is empty or the supply is turned off, and is thus displaced by the water in the hose. If a JBL PROFLORA COUNTSAFE or a JBL PROFLORA CO<sub>2</sub> TAIFUN INLINE is installed in which check valves are integrated, no further check valve is required.

## Stand or wall mount



JBL PROFLORA CO<sub>2</sub> CYLINDER STAND

As the CO<sub>2</sub> gas liquefies under pressure, CO<sub>2</sub> pressurised gas cylinders must stand vertically. JBL disposable cylinders (U system) stand on their own thanks to their flat base and the 2 kg reusable cylinder (M system) has a built-in stand. However, the most commonly sold 500 g reusable cylinders (up to 6 cm diameter) have a rounded base and must either be mounted in a separate stand (JBL PROFLORA CO<sub>2</sub> CYLINDER STAND) or with a practical hanging device (JBL PROFLORA CO<sub>2</sub> CYLINDER WALLMOUNT).



JBL PROFLORA CO<sub>2</sub> CYLINDER WALLMOUNT



## The **components** of the CO<sub>2</sub> fertiliser

### Reactors/diffusers

In the aquarium, the CO<sub>2</sub> gas now needs to be dissolved in the water so that it is available to the plants as their staple food. For this purpose there are several options available: In the simplest JBL Bio-CO<sub>2</sub> set (JBL PROFLORA CO<sub>2</sub> STARTER BIO SET), an air stone is used. The CO<sub>2</sub> bubbles are of different sizes and a slight loss of CO<sub>2</sub> occurs as some bubbles reach the water surface. In the JBL PROFLORA CO<sub>2</sub> TAIFUN GLASS a connection to the water is made by a ceramic disc.



JBL PROFLORA CO<sub>2</sub> TAIFUN GLASS

The CO<sub>2</sub> is pressed through in tiny bubbles and dissolves in the aquarium water on its way to the water surface. For this reason, CO<sub>2</sub> diffusers should always be installed as low as possible below the surface. The only exception is the JBL PROFLORA CO<sub>2</sub> TAIFUN INLINE, which is integrated into the water-returning hose of the external filter. It also has a ceramic membrane through which the CO<sub>2</sub> enters the water and dissolves on its way back from the filter into the aquarium.

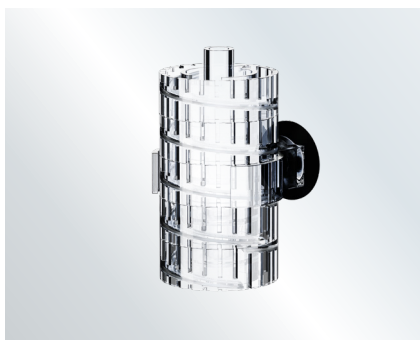


JBL PROFLORA CO<sub>2</sub> TAIFUN INLINE

In the JBL PROFLORA CO<sub>2</sub> TAIFUN SPIRAL 5 and SPIRAL 10 the CO<sub>2</sub> bubbles rise upwards like in a spiral driveway of a multi-storage car park, then dissolve in the parking garage i.e. in the aquarium water. A few bubbles still reach the top, but they hardly contain any CO<sub>2</sub>. On their way up the bubbles also absorb gases from the aquarium water (O<sub>2</sub> etc.), so don't worry about wasting too much CO<sub>2</sub>! In case you are worried, the bubble remains are collected in a chamber at the top. Both diffusers TAIFUN S and M can be extended with modules (JBL PROFLORA CO<sub>2</sub> TAIFUN SPIRAL EXTEND) if your aquarium requires more CO<sub>2</sub> or if you are changing to a larger aquarium. Their length is only limited by the aquarium height.



JBL PROFLORA CO<sub>2</sub> TAIFUN SPIRAL



JBL PROFLORA CO<sub>2</sub> TAIFUN EXTEND

### Tip: Cleaning CO<sub>2</sub> reactors/diffusers

It is sometimes quite tedious to dismantle reactors so that you can get to all parts for cleaning.

With JBL PROCLEAN POWER you can do it without any work: Simply soak the reactor overnight and the next morning all the organic contamination, such as algae, will have completely disappeared!





# systems and their **features**

## Soleniod valve/night switch-off

Since plants only need CO<sub>2</sub> for photosynthesis during the lighting phase, you can turn off the CO<sub>2</sub> supply at night. To save you having to turn the CO<sub>2</sub> bottle on and off, there are solenoid valves (JBL PROFLORA VALVE) which can be controlled by a timer. The timer then switches the light and the CO<sub>2</sub> supply on with the solenoid valve in the morning and off again in the evening. Anyone with a good head for figures will soon realise that the solenoid valve quickly recoups its cost price by saving the CO<sub>2</sub> by half. It is always installed between the CO<sub>2</sub> pressure reducer and CO<sub>2</sub> check valve or directly screwed to the pressure reducer. If you want to use a CO<sub>2</sub>/pH control unit with an automatic CO<sub>2</sub> control, you'll also need a CO<sub>2</sub> solenoid valve. This is then not switched via the timer, but via the CO<sub>2</sub>/pH control unit (JBL PROFLORA CO<sub>2</sub>/pH-CONTROL).

A CO<sub>2</sub> solenoid valve can be retrofitted to any CO<sub>2</sub> fertiliser system (except Bio-CO<sub>2</sub>) at any time. It is simply inserted into the hose directly behind the CO<sub>2</sub> pressure reducer. Cut the hose, insert the CO<sub>2</sub> solenoid valve - done.



JBL PROFLORA CO<sub>2</sub> VALVE

**Tip:**

If your aquarium is heavily planted, these plants will definitely consume a corresponding amount of oxygen at night. With an oxygen test (JBL PROAQUATEST O<sub>2</sub> Oxygen) you can check each morning how much oxygen is still present in the aquarium water after the night. If the O<sub>2</sub> level is around 4 mg/l in the morning before the light comes on, it is advisable to run an air pump such as the JBL ProSilent a200 at night, which brings oxygen into the water and at the same time expels CO<sub>2</sub> from the water (it's similar to shaking a cola bottle). By the way, thanks to its noise dampers, this air pump is so quiet that you won't even hear it at night!





## The **components** of the CO<sub>2</sub> fertiliser

### CO<sub>2</sub>/pH control



JBL PROFLORA CO<sub>2</sub>/pH CONTROL

### pH electrode



JBL PROFLORA CO<sub>2</sub> pH SENSOR SET

### Calibration liquids



JBL PROFLORA CO<sub>2</sub> CALIBRATION SET

If you want to automate the CO<sub>2</sub> supply, you can connect a CO<sub>2</sub>/pH control unit (JBL PROFLORA CO<sub>2</sub>/pH CONTROL) instead of a timer for the night switch-off. You have to enter the carbonate hardness (KH) of your aquarium water once and then the control unit calculates the matching pH value, which is adjusted by adding CO<sub>2</sub> (some of the CO<sub>2</sub> reacts in the water to form carbonic acid, which then lowers the pH value). Then the computer regulates the CO<sub>2</sub> solenoid valve and adds as much CO<sub>2</sub> as necessary until the pH value calculated or wanted is reached. The CO<sub>2</sub> solenoid valve is then closed and opened again so that the pH value remains stable. Since the pH value drops automatically at night, the CO<sub>2</sub>/pH control unit also stops adding CO<sub>2</sub> at night via the CO<sub>2</sub> solenoid valve. The pH measurement of the water is done via a pH electrode, which is NOT included in the set and needs to be purchased separately. This ensures that you do not receive an old electrode in the set, but always a factory-fresh one!

Every pH control or measuring device, including the JBL pH-CO<sub>2</sub> control unit (JBL PROFLORA CO<sub>2</sub>/pH CONTROL), requires a pH electrode (JBL PROFLORA CO<sub>2</sub> pH SENSOR SET) to measure the pH value of the water. pH electrodes age with time and must be replaced about every 2 years. Every 30-45 days the pH electrode needs to be calibrated so that it continues to show accurate values. During calibration, the functionality of the electrode is also checked so that you know when a new electrode is needed. The pH electrodes do not like the addition of medication in the water and should be placed in a glass of aquarium water during treatments.

In order for pH electrodes to permanently display correct values, they need to be calibrated (readjusted to the correct value). To calibrate pH electrodes you need liquids with a fixed pH value. The JBL set (JBL PROFLORA CO<sub>2</sub> CALIBRATION SET) contains all the liquids you need. For a routine calibration dip the pH electrode first into the JBL buffer solution pH 7.0 and then into the JBL buffer solution pH 4.0 during the calibration process displayed in the CO<sub>2</sub>/pH controller. Rinse briefly with distilled water (e.g. JBL Dest) in between and at the end - done.





# systems and their **features**

## CO<sub>2</sub> permanent test or CO<sub>2</sub> direct test?

The CO<sub>2</sub> content of your aquarium water needs to be checked because too little CO<sub>2</sub> is not beneficial for your plants and too much CO<sub>2</sub> can be very dangerous for fish and invertebrates. The correct CO<sub>2</sub> content for “normal” aquariums is between 15 and 30 mg/l. Aquascapers go to the limit of what is possible with CO<sub>2</sub> levels of 20-35 mg/l.

There are two ways to check the CO<sub>2</sub> content of your aquarium water. The permanent test

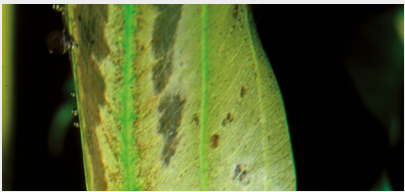
(JBL PROAQUATEST CO<sub>2</sub>-pH Permanent) shows you continuously how much CO<sub>2</sub> is dissolved in the water by means of the colour of a small indicator mounted in the aquarium. However, this permanent test reacts with a time delay of several hours. If, for example, you increase the CO<sub>2</sub> addition at 10:00 a.m., the test would not show the increased value until around 2:00 p.m. The addition of acids such as JBL pH-Minus also falsifies the display result.

The CO<sub>2</sub> direct test (JBL PROAQUATEST CO<sub>2</sub> Direct) gives an immediate and very accurate reading. Here the current CO<sub>2</sub> content is determined with a drop test.



## How can you test whether there is **too little or too much** fertiliser in the water?

To a certain extent, you can see if your plants are lacking fertilisers or minerals by looking at their growth and colour. Light green leaves, for example, indicate a lack of iron or potassium (chlorosis).



### JBL PROAQUATEST FE Iron

If the test result here is between 0.1 and 0.4 mg/l, your plants are receiving fertilisers and thus sufficient iron. With JBL PROFLOA Ferropol you can significantly increase the mineral content including iron.

As iron (Fe) is only ONE important mineral for plant growth, stagnant plant growth can still occur. Then the following tests are recommended:



### JBL PROAQUATEST K Potassium

Next to iron, potassium is the decisive mineral for vigorous plant growth. In case of potassium deficiency the plants grow very slowly and remain small. With JBL PROSCAPE K MACROELEMENTS you can increase the potassium content to 10-30 mg/l.



### JBL PROAQUATEST Mg Magnesium

The metal magnesium is, next to potassium, the most important macroelement and the test result should be between 6 and 10 mg/l. In the case of Mg deficiency, the leaf veins often protrude and the areas between the leaf veins become pale. The value can be increased with JBL PROSCAPE Mg MACROELEMENTS.

In aquariums with no or very few animals, two nutrients that are usually present in excess in “normal” aquariums can actually be present in deficiency: nitrates (NO<sub>3</sub>) and phosphates (PO<sub>4</sub>). With the two tests JBL PROAQUATEST NO<sub>3</sub> NITRATE and PO<sub>4</sub> PHOSPHATE you can check both values and, if necessary, top them up with JBL PROSCAPE N MACROELEMENTS and JBL PROSCAPE P MACROELEMENTS. This is unlikely to occur in normally stocked aquariums where the animals are also fed regularly.





## Why is there the **JBL PROSCAPE** programme in addition to the **JBL PROFLORA** programme?

An increasing number of aquarium owners are enthusiastic about "aquascaping". Aquascaping is the modelling of landscapes under water. This can be a mountain landscape or a natural habitat (biotope). Aquascapers have somewhat different requirements than the average aquarium owner: they keep more, and more demanding, plants and fewer or no fish in the aquarium. And this is where the main differences lie compared to the "normal" community aquarium: In a community aquarium, a lot of food is fed and thus certain amounts of nitrogen and phosphates is added. In a plant-dominated aquarium, these nutrients are in short supply and must be added separately (NPK fertiliser). In a community aquarium, on the other hand, such a fertiliser would lead to overfertilisation and thus be detrimental. With the help of water tests, the individual fertiliser components in the water are checked and the dosage can be precisely adapted to the aquarium.

Every aquascaper needs the right tools (JBL PROSCAPE Tools) to carry out work on the aquarium. And there are also decisive differences in the choice of substrate: aquascapers use special baked earths called SOILS. For aquascaping aquariums without invertebrates, the soils are loaded to the maximum with plant nutrients (JBL PROSCAPE PlantSoil). For aquariums with invertebrates there is a second type of soil which is identical to the JBL PROSCAPE PlantSoil, but is NOT additionally loaded with fertiliser. Aquascaping aquariums with many plants naturally need a lot of light. The control computer JBL LED SOLAR CONTROL for the JBL LED lamps has an extra programme for plant aquariums (JBL DreamScape). Aquascapes can practically never manage without a CO<sub>2</sub> fertiliser system. The CO<sub>2</sub> requirement of the many and often demanding aquarium plants is enormously high.





# How to insert plants **correctly**

Plants that you buy in a bunch are usually in a foam that is wrapped with lead tape. Remove the lead tape and foam and place the stems **INDIVIDUALLY** in the soil, a few centimetres apart, after having shortened the roots a little. A long pair of pincers (JBL PROSCAPE Tool P) makes planting much easier! Also press a fertiliser tablet (JBL Ferropol Root) into the root area of the planted stems.

In some substrates, e.g. sand, the individual stems do not hold well and float upwards again and again. Plant pegs (JBL PROSCAPE Plantis) help here, as they fix the individual stems securely in the soil.

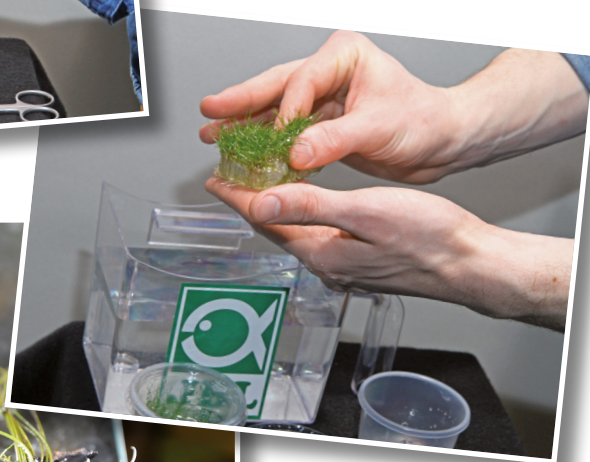
Take potted plants out of their pots and remove the “rock wool” that is stuck between their roots. You can easily hook this rock wool out with a pair of pointed scissors. The rock wool is intensely loaded with fertiliser and thus unfortunately promotes unwanted algae growth. Here too, please shorten the roots a little and press a fertiliser ball (JBL Ferropol The 7 Balls) or/and a tablet of JBL Ferropol Root into the root area.

Many pot plants are cultivated **OVER WATER** and will first shed these overwater leaves in your aquarium! Be a little patient: they will form new underwater leaves afterwards.

Vitro plants come in small containers with a transparent gel around the roots. Remove the gel as well as possible by pressing and washing it out and then place the plants in your substrate. Here, too, you can promote root formation very well with JBL Ferropol Root.

Epiphytic plants such as the java fern (*Microsorium pteropus*) are attached to the decoration (wood, stones). Here the roots are **NOT** cut off. Simply clamp the plant roots into the decoration or tie the plant with fishing line.

It is easier to simply glue the plant (JBL PROHARU UNIVERSAL; also sticks under water).

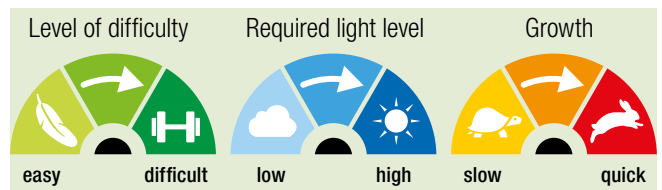




## Aquarium plants – a selection of species for your aquarium

The following plants are suitable for aquariums. We divide them into foreground, midground and background plants, as well as floating plants and epiphytes.

All plant illustrations with the kind permission of Tropica.



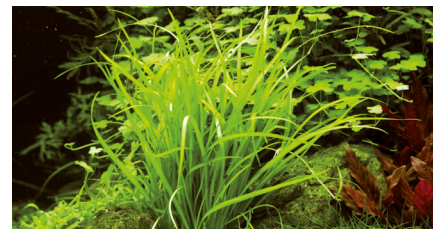
### Foreground plants



Bacopa australis 7-30 cm



Cryptocoryne parva 5-10 cm



Helanthium tenellum 'Green' 5-10 cm



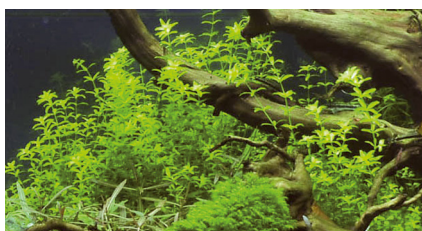
Eleocharis parvula 3-10 cm



Glossostigma elatinoides 2-3 cm



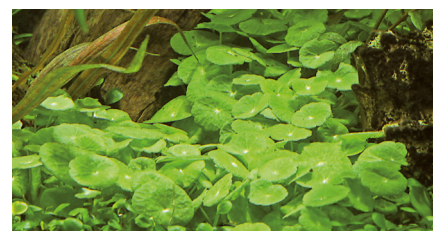
Hemianthus callitrichoides 0,5-3 cm



Hemianthus micranthemoides 5-15 cm



Hydrocotyle tripartita 3-8cm



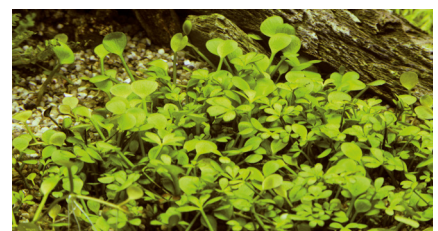
Hydrocotyle verticillata 3-7 cm



Lilaeopsis brasiliensis 4-7 cm



Lilaeopsis mauritana 5-10 cm



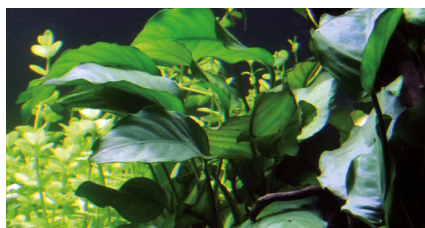
Marsilea hirsuta 2-10 cm







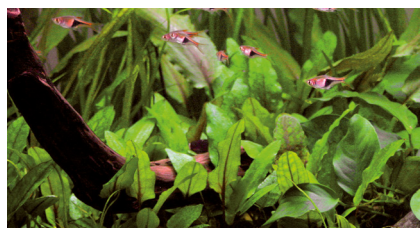
## Midground plants



Anubias barteri var. barteri 25-45 cm



Cryptocoryne beckettii 10-15 cm



Cryptocoryne wendtii 15-25 cm



Echinodorus „Auartica“ 10-20 cm



Lobelia cardinalis 20-30 cm



Micranthemum umbrosum 10-15 cm



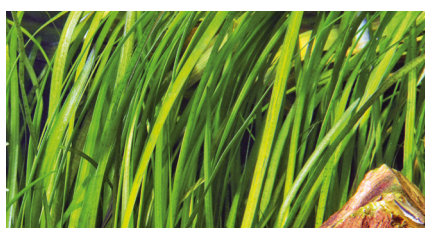
Microsorium pteropus 15-30 cm



Microsorium petropus „Narrow“ 10-20 cm



Pogostemon stellata (Eusteralis) 15-25 cm



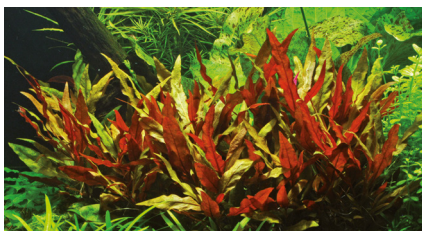
Vallisneria spiralis „Tiger“ 10-15 cm





## Aquarium plants – a selection of species for your aquarium

### Background plants



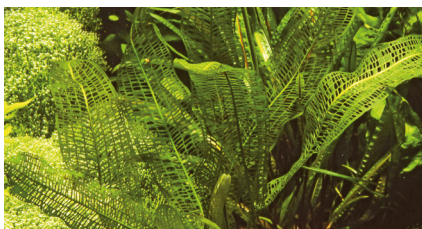
*Alternanthera reineckii* (rosaefolia) 25-50 cm



*Aponogeton bolivianus* 30-60 cm



*Aponogeton crispus* 25-50 cm



*Aponogeton madagascariensis* 25-50 cm



*Aponogeton ulvaceus* 30-50 cm



*Bacopa caroliniana* 10-30 cm



*Cabomba aquatica* 30-80 cm



*Cardamine lyrata* 20-50 cm



*Ceratophyllum demersum* 5-80 cm



*Cryptocoryne crispatula* 20-60 cm



*Echinodorus barthii* 25-80 cm



*Echinodorus bleherae* 20-50 cm





## Epiphytes (can be planted on wood and stones)



Anubias barteri var. barteri 25-45 cm



Bolbitis heudeloti 15-40 cm



Hydrocotyle verticillata 3-7 cm



Microsorium pteropus 15-30 cm



Monosolenium tenerum 2-5 cm



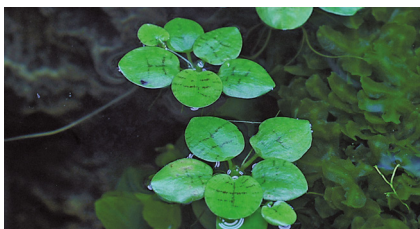
Riccia fluitans 1-4 cm



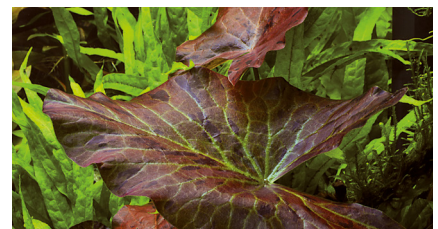
## Floating plants (for shading and as spawning ground for many labyrinth fish species)



Ceratophyllum demersum 5-80 cm



Limnobia laevigata 1-5 cm



Nymphaea lotus 20-80 cm



Salvinia auriculata 1-3 cm





**Careful!****These fish eat aquarium plants!**

There are few fish species that are really notorious herbivores. And even among these species, one individual often eats more plants than the other. Fish can be individualists too.

By adding plant food you can reduce the fish's hunger for greens, but never completely eliminate it. It is often possible to add lots of fast-growing plants which grow back faster than they're eaten!



Holes and nibble signs in plants, caused by fish



Distichodus



Silver dollars (e.g. *Metynnis argenteus*)



Leporinus species (e.g. *Leporinus affinis*)



Buenos Aires tetras (*Psalidodon anisitsi*)



Grazing fish from Lake Malawi



Grazing fish from Lake Tanganyika



A lot of Tilapia species (e.g. *Tilapia buttikoferi*)





A lot of Central American large cichlids (e.g. Heros, Uaru, Cicelichthys, Hoplarchus)



Oreochromis mossambicus



Long-whiskered cat fish (Ancistrus species)



Some Panaque species (e.g. Panaque nigrolineatus)



Hypostomus species (e.g. Hypostomus plecostomus, H. punctatus)



Glyptoperichthys species (e.g. Glyptoperichthys gibbiceps)



Liposarcus species (L. anisitsi)



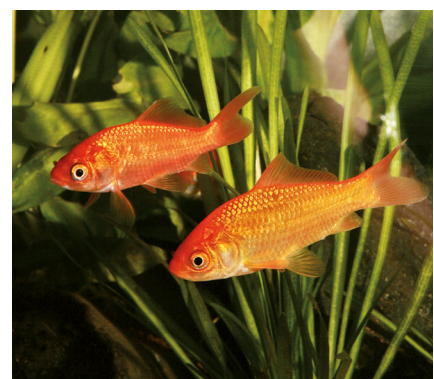
Night active Characins (e.g. Semaprochilodus laticeps)



Some loach species (e.g. Botia macracanthus)



A lot of larger barbel species



Goldfish (Carassius auratus)



## Watch and learn!

**Plant care with JBL TV –  
easy to understand, interesting, competent.**



In entertaining and easy-to-understand videos, biologist and aquarist Heiko Blessin teaches basic, interesting topics about plant care in the aquarium.

Have fun watching them!

A listing of all JBL TV info films can be found here:

[youtube.jbl.de](https://youtube.jbl.de)

Discover the JBL Themeworld Aquarium online:

[jbl.de/aquarium](https://jbl.de/aquarium)

01		6:21	<a href="https://jbl.de/qr/100663">jbl.de/qr/100663</a>	
<b>Why do aquarium plants need a CO<sub>2</sub> system?</b>				



This video explains why plants need CO<sub>2</sub> in the first place, why aquarium plants have different requirements and how to connect a JBL CO<sub>2</sub> system.

03		10:54	<a href="https://jbl.de/qr/100665">jbl.de/qr/100665</a>	
<b>How do I get my plants to grow beautifully in the aquarium?</b>				



If your plants are not growing perfectly in the aquarium, this video will help you. It explains clearly and understandably what is needed for perfect plant growth in the aquarium.

08		14:58	<a href="https://jbl.de/qr/100670">jbl.de/qr/100670</a>	
<b>Do the plants in your aquarium grow as you'd like them to?</b>				



When do plants grow best? All the factors for proper plant growth: light, LED. Tubes, fertilisation, fertiliser quantity, fertiliser checks, interaction with water conditioners, chelated iron.

19.4		15:00	<a href="https://jbl.de/qr/100939">jbl.de/qr/100939</a>	
<b>Setting up 4: inserting aquarium plants and adding the water. This is how it's done!</b>				



What can you do about plants that won't stay in the soil and keep floating up? What types of plants are there and how can you know what the different plants need?

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