



Biological treatment of water for lakes, ponds, lagoons

..."through the combination of micro-organisms fixed on a mineral support of vegetal origin".

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ALGO

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INTRODUCTION

For a number of years, a series of unfavourable factors have influenced the general condition of our lakes, lagoons and ponds. The main causes are as following:

- ◆ Accumulation of organic material on the bottom which decomposes to form silt.
- ◆ Since the dredging of this silt is less and less practised, a serious imbalance develops between the inter-relationship of the thickness layers of water and silt/sludge.
- ◆ Regular and massive arrival of water containing very large quantities of nitrates and phosphates. This causes the phenomenon of eutrophisation. This is an over fertilisation of the water which will favour the development of unicellular and filamentary algae. During warm and sunny weather this growth is very rapid and water becomes greenish, bluish-green and nauseating.

Prior to recommending the treatment which enables the rehabilitation of a lake or pond, it would be useful to examine the different factors which determine its balance. They are the physical-chemical factors of water.

These factors control the functioning of the aquatic ecosystem. They are extremely complex in their inter-relationship with plants and animal community which constitute this ecosystem. These factors combined produce the conditions in which fish can survive.

1 - OXYGEN.

This is indispensable for fish to live, and a drop in its concentration (<5 mg/L) would be devastating and result in the death of numerous species.

The renewal of oxygen is mostly provided by the respiration of aquatic plants, who in the presence of light, absorb CO₂ gas and release oxygen, this is the phenomenon called photosynthesis. The accumulation of silt or the accidental dumping of organic matter are unfavourable factors as they will consume much of the oxygen.

2 - TEMPERATURE.

Temperature only comes in as a limiting factor as it concerns the oxygenation of the environment. Cold water permits to dissolve and hold much more oxygen in contrast to much warmer water. A reduction in water volume (to the detriment of the silt) results therefore in a much faster temperature increase of the whole (ensemble) which is devastating, particularly in summer.



3 - pH.

Generally there is no problem whatsoever at pH 6 - 8. However, in the case of abnormal accumulation of aquatic vegetation, these will discharge large quantities of carbonic acid gas at night, which will lower the PH to dangerous levels

4 - MINERAL SALTS AND ORGANIC MATTER.

They are indispensable and constitute the basic nourishment for the food chain of the aquatic ecosystem. Calcium is by far the most important mineral for aquatic life.

Nevertheless an excess of organic matter coming from the decomposition of organic material results in an excess of nitrate and phosphate which will unbalance the ecosystem and provoke eutrophisation.

5 - LIGHT.

Light is the prime source of energy for lakes, pond's, lagoon's, river's....

The more its water is filled with sediments and organic matter, the less photosynthesis will be efficient, and therefore less oxygen will be provided.

6 - THE AQUATIC VEGETATION.

Aquatic plants play an essential role in the oxygenation process of water. They are also at the base of the aquatic food chain for fish. Their reasonable growth will also be a function of the balanced presence of mineral salts.

DBug ALGO SIGNIFICANCE

As a result from the above, we can see that 4 important factors will determine the optimal conditions to achieve biological equilibrium in the aquatic environment.

- * The clarity of the water which favours photosynthesis.
- * The temperature which when not too high, favours the transfer of oxygen.
- * The PH - It should provide a buffer to keep this in optimal condition.
- * Calcium and micro-elements for the waters biosphere.

DBug ALGO RESPONDS PERFECTLY TO THESE DEMANDS

- ♦ During the application a physical flocculating action rapidly occurs on the suspended micro-particles. One notices a clearing up of the water, favouring photosynthesis.
- ♦ The selected and adapted bacteria in **DBug ALGO** will favour the degradation of the silt thereby increasing the volume of clear water. This will allow maintaining the lowest water temperature possible, even in spring.
- ♦ The most important element in **DBug ALGO** by volume is calcium associated with a number of micro-elements. Because of this there will be a buffer effect on the pH and a favourable action not only on the whole of the biosphere, but also on the reproductive process of the silt liquefying bacteria.

The complete action of **DBug ALGO** can be resumed as follows:



" the clearing up of the water and the resulting increase in photosynthesis favours the production of dissolved oxygen provoking a new aerobic phase beneficial to the purification of the water, the degradation of organic matter and to the activity of the aquatic fauna".

The biological equilibrium of the aquatic ecosystem is re-established.

BIO-FIXATION

The idea of adding micro-organism adapted to certain specific tasks is not new in contemporary biology. After the period of using naturally occurring flora (from roman times to present day) now appears the era of pre-selection of micro-organism in the fight against pollution.

Based on this principle, a number of techniques have appeared in various countries to put pre-selected, pre-conditioned, pre-adapted and pre-activated bacteria to work. This is called BIOAUGMENTATION.

Unfortunately, these selected bacteria, introduced in an unfriendly environment, are very vulnerable to the phenomenon of predation/competition, and therefore only have a very time limited effect. The evolution necessary to optimise these techniques have since been made and are referred to as BIOFIXATION.

In our case, we place a number of pre-selected micro-organism on a support selected for its physical-chemical qualities, the LITHOTHAME CALCANEUM from GLENAN. This is a carbonate of calcium from marine origin, rich in micro-elements and whose porous aspect does not identify with the crystalline form of calcium carbonate.

Chemical analysis

PH	9,4	calcium (Ca)	32,6	Magnesium (Mg)	3,80
		in CaO	45,6	in MgO	6,30

Physical aspects

Specific surface after grinding: for 1 to 2 mm = 5 m²/g

“The practise of BIOFIXATION prevents all aggressive treatment and the rupture between the stages of production and utilisation”.

Our micro-organism originate from natural stock (genetically non-modified, class 1) and were selected primarily due to their enzymatic activity on certain compounds. The aim is to start and speed up the degradation of the long carbon chains so that the colonies already naturally present in the environment are further stimulated to continue with the breakdown of the silt.

**“BIOFIXATION IS AN ALLIANCE BETWEEN BIOLOGY, PHYSICS
AND CHEMISTRY”**



DBug ALGO INTRODUCTION:

DBug ALGO is a light grey granular product, and is made up of the following:

- ◆ a support of natural algae
- ◆ a mixture of pre-selected bacteria\
- ◆ a nutritional additive
- ◆ micro-elements
- ◆ flaking agents

DBUG ALGO METHOD:

During the application, the particles of **DBug ALGO** precipitate organic matter suspended in water to the bottom. The micro-organisms lodged in the pores of **DBug ALGO** will degrade these pollutants, and allow the mineralisation of the sludge, releasing mineral salts into the water which will then help to stimulate the growth of bottom vegetation. These, under influence from light and heat increase the production of oxygen dissolved in the water, which then stimulate the aerobic population in the liquid phase.

DBUG ALGO APPLICATION

Each case is individual and dependant on a number of factors such as:

- ◆ Situation of the water body.
- ◆ Size and volume.
- ◆ Relationship between water and silt.
- ◆ Turbidity (cloudiness)
- ◆ PH
- ◆ Nitrates and phosphates, content, etc...

The method, the frequency of application and the recommended rates of application are therefore related to the results observed during the preliminary examination of the water body.

DBug ALGO must be spread uniformly over the water surface. Where there are areas populated by aquatic plants which must be preserved, it is recommended to reduce the dosage in those areas.

DBUG ALGO rates of application: (In general, the following dosages apply)

- | | |
|------------------------|------------------------------|
| - Initial application | : 1500 kg to 3000 kg hectare |
| - Maintenance | : 1000 kg/ha |
| - Petrochemical sludge | : 10.000 kg/ha |

In some particular cases (heavy storm, intense heat,...) one or two further applications may be recommended and/or required.



*** OVERDOSING IS HARMLESS TO BOTH HUMANS AND AQUATIC FAUNA AND FLORA. ***

DBug ALGO times of application

- The best times are: - from September to October
- from March to May/June

NOTE: It is always useful to make a chemical and ecological analysis of the site, or to collect the available information

DBug ALGO METHOD OF USE:

DBug ALGO must be spread out over the surface and dosed according to:

- initial state of the water
 - the depth
 - the presence of current and the water temperature
 - orientation

Depending on the type of pollution present, we deliver several types **DBug ALGO**, varying in granular size, micro-organism and nutrients.

1 - Still water (lakes, ponds...)

- **DBug ALGO** is spread out over the water as regularly as possible, at a rate of ± 2 tons/ha.

2 - Flowing water (rivers, canals...)

- **DBug ALGO** is slowly released from small barrages which are made at intervals in the stream.

The DBug ALGO treatment occurs in several stages:

- Rapidly in the first stage: precipitation of the organic matter to the bottom.
- Over several weeks in the second stage: mineralisation of the sludge and re-equilibrium.

DBUG ALGO ADVANTAGES:

- ◆ Rebalances the aquatic environment.
- ◆ Clarifies the water, and stimulates photosynthesis.
- ◆ Increases the bacterial activity for digestion of organic matter.
- ◆ Intensifies the mineralisation of sludge through bio-chemical action.
- ◆ Neutralises nauseating smell (eg: Hydrogen sulphate)
- ◆ Stimulates the development of aquatic plant life and fish, due to better oxygenation.
- ◆ Regulates the PH.
- ◆ Reduces progressively the symptoms of eutrophysation and of dystrophysation



DBug ALGO PACKAGING:

In bags of 25 kg, on pallets of 1050 kg and 1500 kg.

DBug ALGO can be stored up to one year.
It must be kept in a cool and dry place.

APPLICATION AND METHODOLOGY

1. Examination of the water level

- situation of the water
- depth and relief of the water
- dimensions and relief of the neighbouring ground
- Source of foodstuffs (origin of arrival of water)
- level of sediments

2. Analysis of water

- pH
- phosphorus content
- nitrates content

3. Analyses of the sediments

- content of dry matter,
- content of mineral matter,
- content of organic matter
- phosphorus content (as P₂O₅),
- hydrocarbons content (if necessary).

4. Spreading over the surface

Determined according to the dimensions of the basin and according to the level of the sediments, possibly according to the current.

5. Dosage

First application: 1000 to 3000 kg/ha

Annual maintenance: 500 to 1000 kg/ha

Treatment of Hydrocarbons: 10.000 kg/ha

An overdose is inoffensive for man and fish

6. Implementation

The product is with dosed on the surface of the water. Avoid treating in the areas populated by ornamental plants to be preserved.