

Algae Control Aquaculture

The treatment of (fish) ponds on an environmentally friendly manner with the usage of LG Sonic ultrasonic algae control technology. LG Sonic's ultrasound technology reduces algae up to 90% and prevents the growth of new algae. The environmentally friendly ultrasonic sound waves provide a long term solution for a healthy ecosystem.



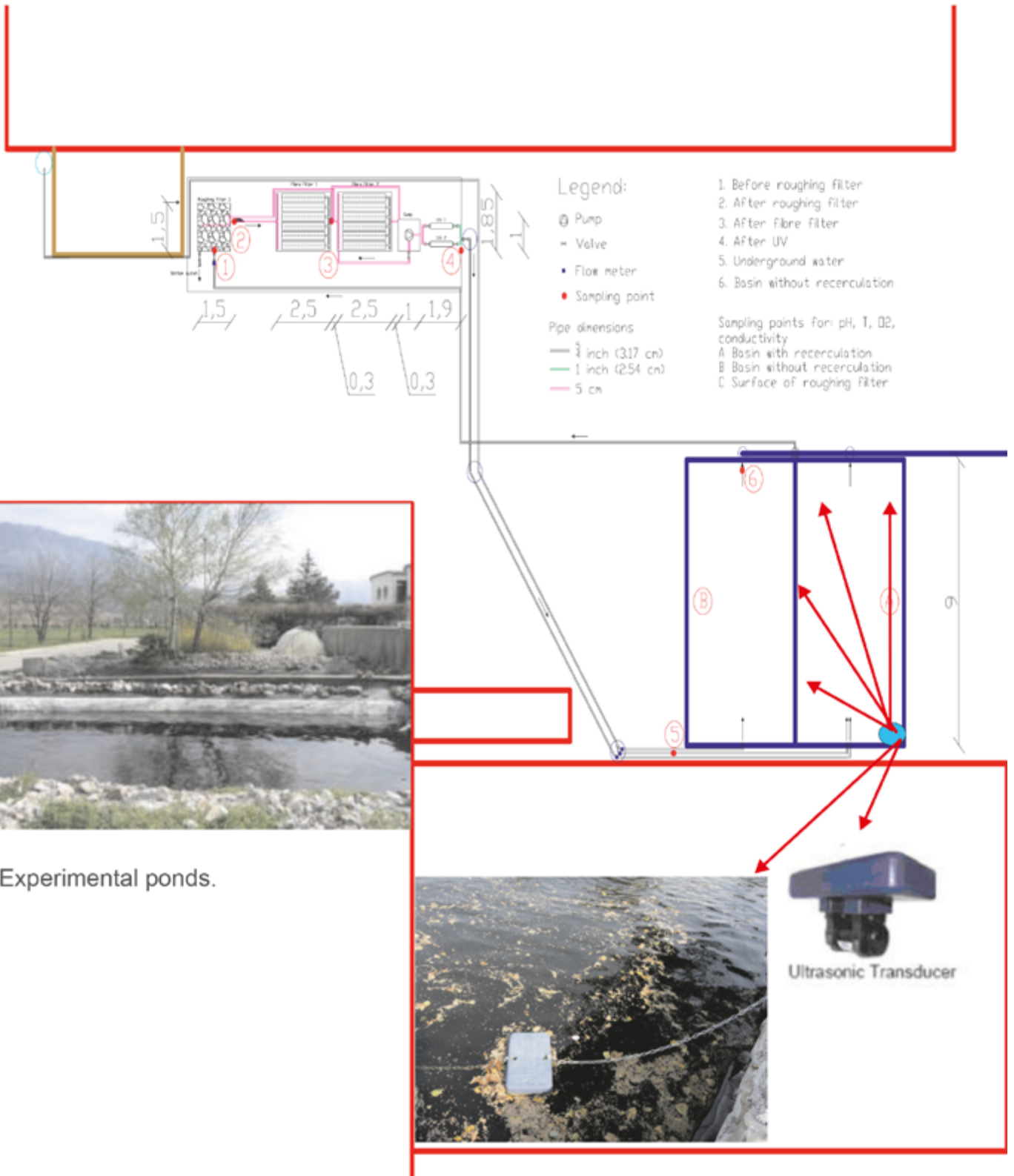
Aquaculture, or aqua farming, is the cultivation of aquatic organisms, such as fish or shrimps, in a controlled environment. Where this happens in a closed water container, algae may occur that pollute the water and may damage the organisms grown. Many of the traditional methods to fight algae are either insufficient, cumbersome, environmentally unfriendly, or all of these. LG Sonic uses ultrasound to control algal growth efficiently without these negative side effects.

Green water algae are tiny, single celled organisms that cause the pond to resemble 'pea soup'. This is the result of a vast population of algae feeding off excess of nutrients (especially phosphorus and nitrogen) in your aquaculture container. It becomes impossible to see deeper than about 2cm from the water surface. In addition, if there is no aeration available and/or there are too much poisonous algae (cyanobacteria or blue green algae) in the water, the health of your fish or other aquatic populations will suffer. Therefore the green water algae can seriously damage the aquatic organisms by poisoning or suffocating them. Fighting algae can be a tiring task. Draining the water container and filling it with fresh water only helps for a short period and might even cause more severe algal problems by shifting the algal population to faster growing algae. This is caused by having disturbed the previous water ecology system present. As algae multiply at very high rates your clear water can literally turn green overnight. As the algae are so small that they can pass right through a pond filter, or will be accumulating so intensively that they (especially filamentous algae) will cause blockage of your filter, additional methods are needed. Known algaecides fight algae, but will harm the fish and aquatic plants in the container. The newest ultrasound techniques provided by LG Sonic will help you establish a healthier, cleaner environment in your fish pond.



Figure 1: Experimental field in Slovenia: Ajdovščina

The Installation



Results Part 1: Algae

Reference pond

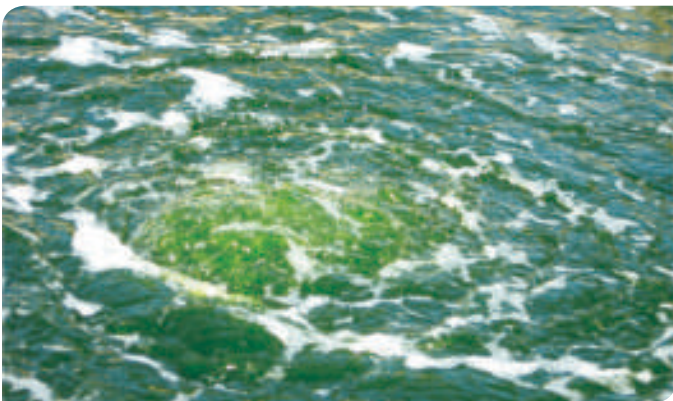


Algae are suspended in the water.

LG Sonic treated pond

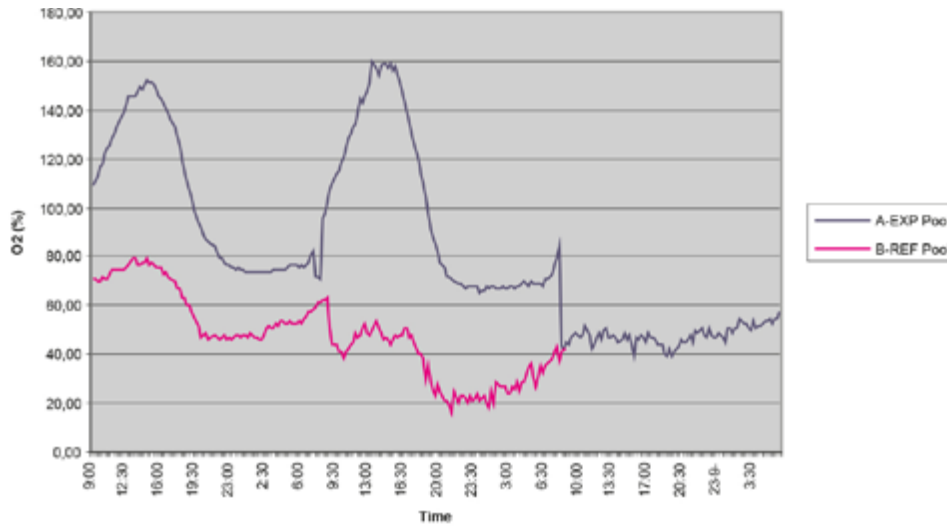


Algae are at the bottom of the pond

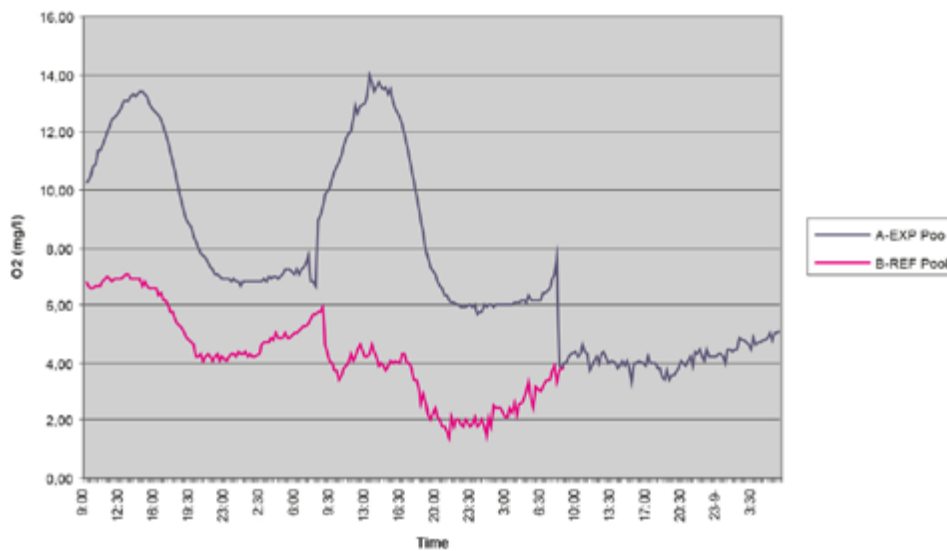


Reference pond water (left) and LG Sonic treated pond water (right)

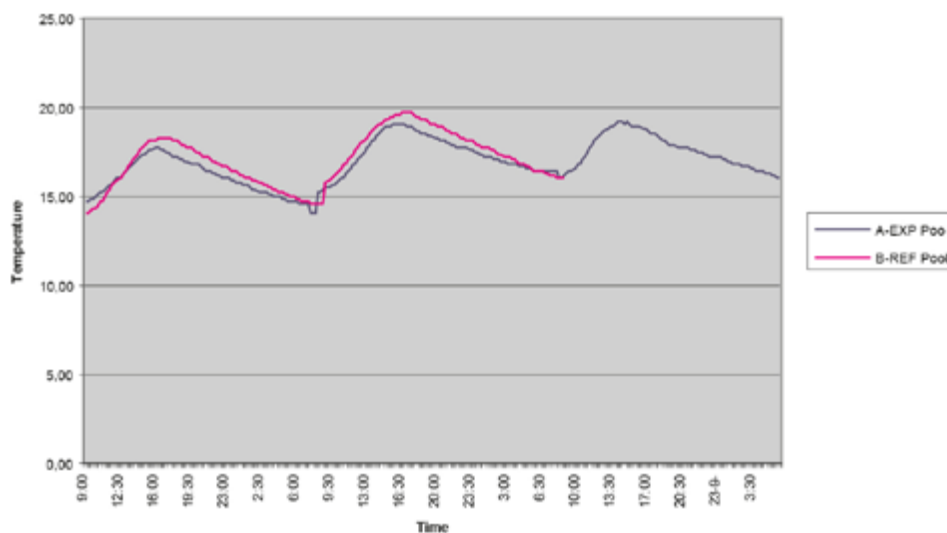
Results Part 1: Algae



O2 % Monitoring



O2 mg/l Monitoring

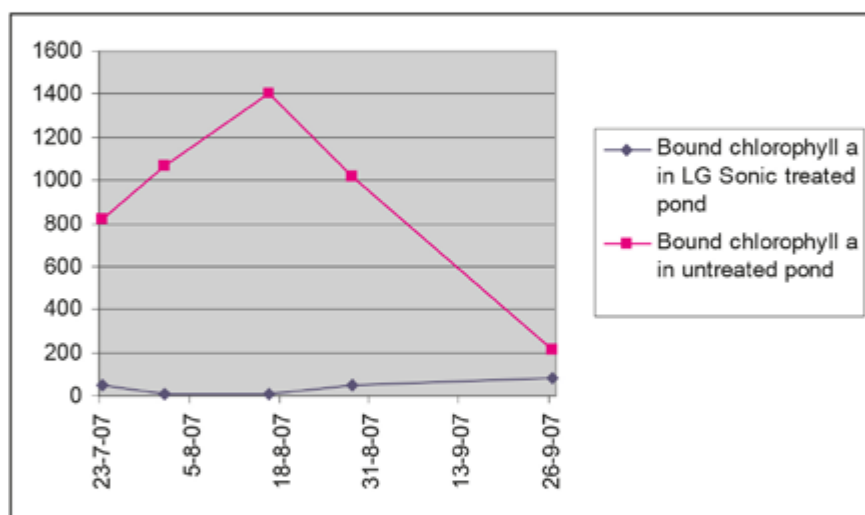


Temperature was stable during the test

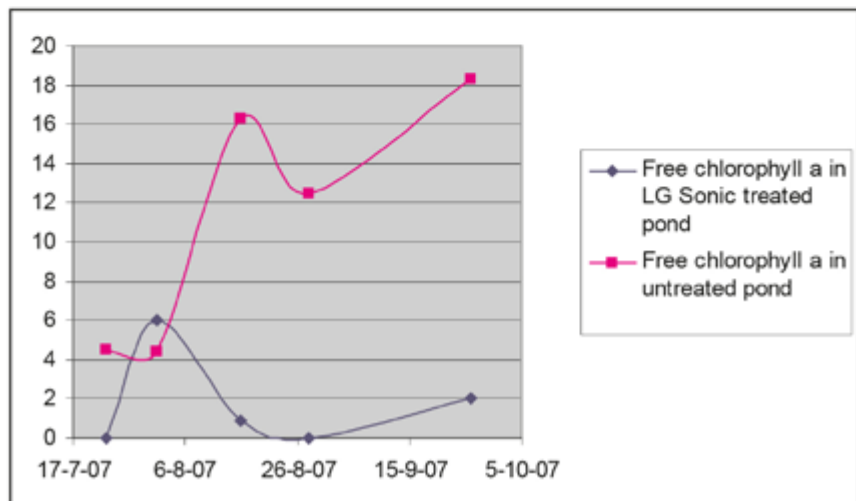
Results Part 1: Algae

Chlorophyll a measurements

| | LG Sonic [®] treatment | | no treatment | |
|-----------|----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| | free chl. a [mg/m ³] | bound chl. a [mg/m ³] | free chl. a [mg/m ³] | bound chl. a [mg/m ³] |
| 23.7.2007 | 0 | 53,0 | 4,5 | 817,8 |
| 1.8.2007 | 6,0 | 10,6 | 4,4 | 1069,5 |
| 16.8.2007 | 0,9 | 7,8 | 16,3 | 1401,9 |
| 29.8.2007 | 0 | 50,0 | 12,5 | 1013,4 |
| 26.9.2007 | 2,0 | 82,4 | 18,3 | 210,3 |



Levels of bound chlorophyll a in both ponds



Levels of free chlorophyll a in both ponds

Results Part 2: Fish Monitoring

| 2007 | Basin A LG Sonic® | | Basin B Reference | |
|-----------------------|----------------------|-----------|----------------------|-----------|
| | 15th May | 29th Oct. | 15th May | 29th Oct. |
| Weight/fish (kg)ᵖ | 0.74 | 1.86 | 0.64 | 1.36 |
| Total weight (kg)ᵖ | 17 | 43 | 19 | 41 |
| Mass growth (%)ᵖ | | 152 | | 115 |

Fish in the LG Sonic treated tank could grow to a higher biomass and grow faster.



Results Part 2: Fish Monitoring



LG Sonic treated pond

Algae have formed a sediment on the bottom of the pond. Biofilm and algal layers were easy to remove.



Untreated pond

Pond lining was covered with biofilm which was hard to remove even after scrubbing the lining.



The untreated pond (right) contains a thick layer of biofilm even after cleaning. The LG Sonic® treated pond could be cleaned easily.

Conclusion

A difference could be seen within 1 week of LG Sonic treatment. Algae in the LG Sonic treated pond were at the bottom of the fish pond. At the other hand, the water that has not been treated is very green. Some Phd.'s in fishery biologist tested the behaviour of the fish (strain: *Cyprinus c. carpio* Linnaeus 1758) in both ponds.

The results: no significant changes in the fish behaviour were detected. The oxygen level in the pond with LG Sonic treatment was slightly higher than the one without LG Sonic treatment.

Algae

The algae in the pond with the LG Sonic device were at the bottom of the pond. They were weakened and the water became clear. The algae in the LG Sonic® treated pond die slowly (many were still alive but weakened at the bottom of the pond). Chlorophyll molecules are good protected within their cellular body and thus are still able to do photosynthesis. Because of the relatively shallow (about 0,80 m) and very clear water they will still get enough sunlight. In this way they provide themselves with enough nutrients they synthesize, this might help in their own nourishing, thus causing them to die slowly. But, because the algae formed a sediment on the bottom of the pond, they are much easier to be removed. The fish in the LG Sonic treated pond can detect their food much easier because of the clear water. Certain stress, the fish normally encounter, in green water fishponds is not available in the pond with LG Sonic treatment. The fish in the LG Sonic treated pond are also a little bit heavier and the oxygen levels in the LG Sonic treated pond is slightly higher than in the reference pond.

Biofilm

Regarding fouling and biofilm formation on surfaces of the two ponds: When cleaning the ponds, the surface of the pond in which LG Sonic® has been used, is much cleaner than the reference pond. The pond in which LG Sonic is much easier to clean than the reference pond. Biofilm formation in the LG Sonic® pond seems to be much lower than in the reference pond. The original colour of the material (black) that has been used to cover the bottom of the pond can be seen clearly in the LG Sonic. At the other hand, the colour of the lining in the reference pond is now greyish. The original colour (thus, black) in the reference pond could not be recovered with the cleaning method which has been used.

This experiment has been performed in collaboration with:

- University of Portsmouth
www.port.ac.uk
- University of Catania
www.unict.it
- Universität für Bodenkultur Wien (Boku)
www.boku.ac.at