

(R11) Managing Polluted Lakes

Naturally, Efficiently and Cost Effectively

Is So Simple ^{v2}



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How is all this nutrient digested?

Bacteria

- Without existing probiotic bacteria, leaves would be piled so high we would not be able to walk the streets.
- Without existing probiotic bacteria the lakes would be full of leaves.
- Without bacteria, waste would accumulate.

Why aren't the existing bacteria working effectively today?

Bacteria's Requirements

- **Oxygen**
- **Moisture**
- **Food**
 - **To be effectively clean lakes, bacteria must be selected to remove Nitrogen (N), Phosphorous (P) and muck – Carbon (C).**
 - **Muck is composed of sugar, cellulose, starches, polymers, enzymes, fats, oils, proteins and other organics.**
 - **Nitrogen comes in several forms (NH_3 , NO_2 , NO_3 and N_2) but need to be converted to NO_3 and N_2 for lake health.**

Oxygen

- **With high nutrient levels, oxygen is used quickly and lakes turn to anaerobic which results in the by-product of muck.**
- **Anaerobic forms of bacteria are often pathogenic bacteria which multiply in low oxygen conditions.**
- **Adding additional friendly aerobic bacteria removes organics from the water resulting in higher oxygen levels.**
- **Bottom aeration speeds up the process aerobic decomposition**

Nutrient Utilization

- **Bacteria are composed of approximately 50% C, 14% N and 3% P.**
- **Bio-Zyme, the bacteria we use is formulated with 5 probiotic bacteria utilizing C and 3 bacteria changing the form of N.**
- **Bio-Zyme therefore, plays an essential role using these elements in their cell walls, amino acids, enzymes and energy.**
- **All Bio-Zyme bacteria use C, P and N, so the specific bacteria's primary role is somewhat irrelevant.**

What happens to the nutrients and sediment?

- All Bio-Zyme bacteria use these nutrients or elements as components to live and multiply, passing these elements from protozoa that eat the bacteria to fish and up the food chain.
- The results are improved fisheries, reduced muck, eliminated tussocks, reduced anaerobic bacteria, cleaner, healthier lakes and lower P that slow (starve) weed growth.

Bio-Zyme for Golf Courses

- **Golf courses, usually high in nutrients, are a prime user of Bio-Zyme.**
- **Bio-Zyme reduces the muck, reduces the P and creates a healthier water system.**
- **It does not kill or injure algae or plants but with fewer nutrients in the water it lowers the trophic status of the lake, making the environment less favorable for nutrient loving plants.**
- **Superintendents claim water containing Bio-Zyme cleans their irrigation systems and improves turf by reducing the organic material in their soil, improving air exchange in the soil.**

Why Bio-Zyme

- **About 11 brands of bacteria were tried in my experiments over the last 40 years.**
- **All the types I have tried worked. Most are effective at many times the recommended rates.**
- **Bio-Zyme worked better at a much lower rate and cost.**
- **In larger systems our Bio-Zyme bio-generators further reduce cost by incubating the bacteria billions of times then returning them to the water.**
- **Bio-Zyme has a great deal of support data.**
- **Bio-Zyme is used in about 20,000 lakes.**
- **Typically between 4 and 17 inches of muck are removed in the first year.**

What to expect as a management strategy for Bio-Zyme in the present and future:

- Concerned lake managers look to what is best for the future not just for immediate results. Bio-Zyme works slowly and initially is often an added expense. More expensive algaecides need to be used initially because inexpensive copper treatments kill bacteria and are to be avoided.**
- Cleaner, more manageable, healthier lakes and possibly improved turf and irrigation systems are of future value.**
- Bio-Zyme keeps the management prices stable by reducing the amount of herbicide use and their increasing costs in the future.**
- Reducing herbicide, improving fisheries and enhancing the environment is a valuable and achievable goal.**