

Algae Control with Barley Straw

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Algal growth during the spring and summer in farm ponds, lakes and reservoirs can pose a number of problems: in ponds used for irrigation, for example, algae can clog pumps, block filters and cause odor problems; they can also be very unsightly. But algae can also bloom in winter - that is the case, for example, for the city of Cumberland reservoirs. In fact, some of the greatest challenges managers of reservoirs must face come in the cooler months.

Blooms of algae appear to be more severe in bodies of water that have high levels of nutrients such as nitrogen and phosphorus, which can be associated with runoff from production fields. This is especially problematic where land is opened up by logging or development. Different species of algae can proliferate due to increased nutrient loading; and different species can cause taste and odor problems with the potable water supply which are difficult to deal with.

Watershed management is critical in protecting waters from landborne nutrients. Forests and riparian buffer strips take time to get to a size that will best protect the water. Thus, we need interim or alternative methods for controlling nutrients if shoreline protection cannot be reestablished.

Chemical methods have often been used, though the use of some chemicals may limit or restrict the use of water for irrigation. Chemical control can also remove the higher plants as well as the algae; once the herbicide breaks down, the algae often recolonize the water body, often quickly because there is no competition from higher plants. Thus, over time, the algae problem can get worse if such patterns continue.

Chlorination and filtration of water from reservoirs can take care of many algae species but some species can present unique problems. Anabena, for example, algae releases an oil that when chlorinated can cause major taste and odor problems in the potable water supply. Many bodies of water are managed for multiple use and therefore a great deal of consideration must be given before a method of algae control is selected. Some chemicals can be harmful to fish, while colorants are often less than aesthetically pleasing and can be quite expensive.

There is no uniform control for algae in a body of water - there are contingencies of size, use and location of the water. However, for a number of years, scientists in the United Kingdom have been examining the use of barley straw for controlling algae in a variety of fresh water systems. A number of scientific papers have supported its uses and the Center for Aquatic Plant Management is spearheading development. Though it has been recommended for use in ponds throughout the United States, there is as yet little scientific data to back up these recommendations.

When barley straw is applied to a pond, it generally takes six to eight weeks for the straw to become effective at water temperatures below 50°F. When the water temperatures are above

68°F, it only takes one to two weeks for the treatment to become effective. Once active the straw will remain effective for about six months. The chemical mechanisms are still unknown, though it appears to be through some type of phenolic compound that does not kill the algae but instead prevents growth of new algal cells, similar to a pre-emergent herbicide. The anti-algal activity is only produced when the straw is rotting in a well-oxygenated environment. The amount of straw required is based on the surface area of the pond. The volume of water seems to make no difference either in the performance of the straw.

As a rule of thumb 100-300 pounds of barley straw per acre of surface area will provide good activity against the algae. Higher rates have been shown to provide better algal control if the problem is severe; however, too much straw can deoxygenate the water. Once the water is cleared of algae, the lowest rates should provide adequate maintenance control. It is best if the straw is applied loosely so that water can move freely through. A cage similar to a crab trap would work nicely. Floats should be attached to the cage to keep it at the surface for maximum efficiency. It is also better to use multiple cages: the more contact surfaces that the barley straw extract can emanate from, the better the control.

As far as seasonal application, it would be best to apply the straw in the fall or early spring: this will give the straw a chance to rot and get ahead of the spring/summer algae blooms that cause most of the problems for irrigation ponds. To date, no negative side effects have been recorded. In fact, there have been observations of increased invertebrate populations and improvements of gill development in fish from ponds where barley straw is applied.

With regard to aquaculture systems, barley straw could be used to provide algae control: the steady control of algal growth with its use could help reduce problems with low dissolved oxygen. In addition, the control of blue-green algae that are the cause of off-flavors in fish could be a major benefit.

Data we are now collecting in Maryland will be shared in a collaborative effort with studies underway in Mississippi at the Stonesville Research and Extension Center. The hundred thousand acres of catfish ponds in Mississippi can have a severe problem with *Oscillatoria* spp. One of the cyanobacteria that causes the problems with off-flavor in catfish has been controlled with barley straw in the United Kingdom, so there appear to be promise for control in the U.S.

The cost and maintenance of barley straw practices should be minimal. So far, no negative side effects have been reported. In fact, some of the British research indicates that fish grown in impoundments with the barley straw showed improved growth. Some important issues that may need to be considered are the source of the straw, the quality of the straw bales (length of the stalk), and the method of application.

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