extension
ALABAMA A&M & AUBURN UNIVERSITIES

Using Diuron to Control Off-Flavor in Catfish

► **Some naturally occurring algae in catfish ponds, if not controlled, can cause problems with fillet flavor. Diuron is one method to reduce these bothersome algae.**

Some blue-green algae produce odorous compounds that can cause a muddy or earthy off-flavor in catfish. Using diuron is one method for controlling the algae and ensuring a good-tasting fish.

Dense algal blooms consisting predominantly of cyanobacteria (commonly referred to as blue-green algae) often occur in catfish ponds during the summer in Alabama. Unlike the desirable green algae blooms, cyanobacteria provide little oxygen to pond water, and some species produce toxins that can kill a substantial number of fish (figure 1). If that is not bad enough, some cyanobacteria also produce odorous compounds that can cause off-flavor in catfish (figure 2). Consumers describe the off-flavor fish as muddy or earthy tasting. Producers and processors must therefore make sure the fish are on flavor before harvesting them.

Catfish processing plants have specially trained taste testers who sample fish from a pond to detect off-flavor. If the fish are off-flavor, harvest is delayed until the off-flavor compounds are gone. An estimated 50 percent of catfish can be off-flavor at any time, causing an economic burden to farmers. Not being able to sell fish until they are on-flavor also delays the growth of subsequent crops of fish and increases production costs since the fish still need to be fed. It also disrupts cash flow and increases the chance of losing fish to disease or predation. Alternatively, if off-flavored fish do make it to market, the adverse reaction by consumers can negatively affect market demand, reducing profits for all segments of the industry. Predicting when blue-green algae produce off-flavor compounds is impossible, and the time required for purging those compounds from catfish is unpredictable.

Controlling Cyanobacteria

Catfish producers usually manage cyanobacteria by stocking production ponds with threadfin shad, which consume planktonic algae, or by using copper-sulfate-based algicides. Unfortunately, commercial orders of threadfin shad can also contain gizzard shad, which look similar to threadfin shad when small, and if present, will outcompete the threadfin shad. The shad population quickly becomes mainly gizzard shad, which provide poor control of blue-green algae.

Figure 1. Fish kill in a commercial catfish pond. (Photo credit: Bill Hemstreet).

The use of copper-based compounds also has several drawbacks, primarily that the amount of copper required to control cyanobacteria blooms is very close to the amount that is toxic to fish. Additionally, copper-based compounds are rather short-lived in catfish ponds and accumulate in pond sediment. Producers need alternative chemical control methods, but the approval process through the Environmental Protection Agency (EPA) can take several years. Fortunately, there is a regulation that allows approval for use in emergencies.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIRFA) provides an alternative for agriculture producers when new pests arise for which there is no approved method of control. Section 18 allows for the granting of an emergency exemption registration of a pesticide for a limited time in an emergency or crisis or when a nonroutine situation exists. The state or federal agencies request these emergency exemptions, but

the EPA approves them. From 1999 to 2008, the EPA granted a Section 18 emergency exemption allowing catfish producers to use diuron (3- [3,4-dichlorophenyl]-1,1-dimethylurea) to manage cyanobacteria-related off-flavors in catfish aquaculture ponds. Because diuron is a broad-spectrum herbicide with a 40-year history of safe use in terrestrial agriculture, it was approved by the EPA for use in catfish aquaculture ponds. Diuron is effective against cyanobacterial blooms at a lower concentration than copper sulfate compounds in that it has a wide safety margin between the effective rate and the rate that is toxic to fish, and it decomposes by microbial activity and does not accumulate in pond sediment.

While the Section 18 emergency exemption for diuron is no longer available, FIFRA Section 24(c) is another avenue for agriculture producers to pursue. This section allows a state to provide registration for a new end-use pesticide (or added use to a currently registered product) for an existing or pending pest problem. Since off-flavors are the result of various blue-green algae, diuron met the requirements for a Section 24(c) special local needs label.

Since 2008, a FIFRA Section 24(c) special local needs registration for qualified catfish farmers is available through an agreement between the Catfish Farmers Registration Corporation and DuPont. Having this registration enables Alabama catfish farmers to buy and use Karmex DF or Direx 4L to control cyanobacteria that cause off-flavor. To qualify for its use, Alabama catfish farmers must meet all three of the following requirements:

- Have a current Alabama private applicator permit
- Have signed and submitted the Catfish Farmers Registration Corporation Acknowledgement and Release form
- Have membership in the Catfish Farmers of America

Figure 2. Cyanobacterial bloom on a catfish pond in Alabama. The bright green algae around the edges is typical of these blooms..

Using Diuron to Control Cyanobacteria

As with all restricted chemicals, the label is the law. Karmex DF is applied at a rate of 0.5 ounces per acre-foot of water. If using Direx 4L, add 0.8 ounces per acre-foot. Measure the correct amount of Karmex DF or Direx 4L and place it in a 5-gallon bucket. Add pond water to the bucket and mix it thoroughly. Turn on the aerator. Pour the mixed solution into the pond on the outflow side of the aerator. Continue to aerate the pond for 1 hour after adding the solution. Do not treat ponds that have average daily temperatures below 60 degrees F.

No matter which brand you use, it can only be applied every 7 days and cannot exceed 9 applications per year. If you are using Karmex DF or Direx 4L, you must have in your possession the FIFRA 24 (c) special needs label. For more information on how to obtain the label for using diuron, contact the Alabama Fish Farming Center at (334) 624-4016.

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