COOPERATIVE EXTENSION PROGRAM
University of Arkansas at Pine Bluff

Arkansas Aquafarming

University of Arkansas at Pine Bluff, United States Department of Agriculture, and County Governments Cooperating

Vol. 21, No. 2, Fall 2004

Extension Contacts

Larry Dorman
Extension Fisheries Specialist
870-265-8055/870-489-1115
ldorman@uaex.edu
Martha Fitts
Extension Assistant
870-265-8055
mfitts@uaex.edu
Andy Goodwin
Extension Fish Pathologist
870-575-8137/870-540-7811
agoodwin@uaex.edu
David Heikes
Extension Aquaculture Specialist
870-575-8143/870-489-1083
dheikes@uaex.edu
Wes Neal
Assistant Professor, Small Impoundments
870-575-8136
wneal@uaex.edu
Melanie Newman
Extension Associate
501-676-3124
mnewman@uaex.edu
Steeve Pomerleau
Research Associate (Aquaculture Verification)
870-575-8139/870-692-3709
spomerleau@uaex.edu
Jo Sadler
Extension Fish Health Specialist
501-676-3124/870-489-1544
jsadler@uaex.edu
George Selden
Extension Aquaculture Specialist
870-512-7837/870-540-7805
gselden@uaex.edu
Nathan Stone
Extension Fisheries Specialist
870-575-8138/870-540-7810
nstone@uaex.edu
Hugh Thomforde
Extension Aquaculture Specialist
501-676-3124/870-692-3398
hthomforde@uaex.edu
Jeremy Trimpey
Research Associate, Aquaculture Verification
870-575-8140
jtrimpey@uaex.edu

Web address:
www.uaex.edu/aqfi/

That's New in Pond Management?

Wes Neal, Assistant Professor, Small Impoundments

Pond Management Website Up and Running

You can now find the answers to many of your pond questions online! Our new web site is being developed to provide easy access to pond management expertise for anyone who has access to the internet. At this website, you can find information on all aspects of pond management including earthen pond construction, permits, stocking, management, species selection, fish identification, habitat and vegetation control. You can also download up-to-date publications and management resources and find information on fish suppliers near you.

To access the website, follow the links on the Aquaculture/Fisheries Center main page, or type http://www.uaex.edu/wneal/pond_management/ in your web browser. Use the menus to locate topics of interest. If you don't find answers to your questions, check the *Specific Topics* links. If you still cannot find the information you need, call or send us an e-mail. Contact information is located at the bottom of the site's homepage. You will receive a quick response to questions, and the site will be updated for future users with similar questions.

New, Revised Extension Publications

Anglers of all ages frequently fish Arkansas farm ponds, which represent a significant portion of the state's water resources. Properly managed ponds can provide excellent fishing opportunities to a large number of anglers at a reasonable cost. However, it takes careful planning and wise management to maintain high-quality fishing in a pond year after year.

A growing number of resources are becoming available that make information on managing ponds for better fishing more accessible. The Cooperative Extension Program at UAPB has recently released a new edition of *Farm Pond Management for Recreational Fish* (MP360) and a first edition of *Recreational Fishing in Small Impoundments: Alternative Management Options* (MP447). These two publications are available free through the UAPB Cooperative Extension, Arkansas Game and Fish Commission (AGFC) or your local county Extension office.

Aquaculture/Fisheries Field Day

Nearly 300 fish producers, aquaculture industry suppliers and others participated in the 2004 Field Day to hear the latest research and Extension efforts at UAPB. Co-hosted by the USDA-ARS Aquaculture Systems Research Unit at UAPB, the field day provided a variety of demonstrations, talks and poster presentations.

Ted McNulty, State Aquaculture Coordinator, was recognized by the Aquaculture/ Fisheries Center for his many contributions to the Center (upper right, with Center Director Dr. Carole Engle). For a copy of the field day abstracts, contact Cassandra Hawkins-Byrd at (870) 575-8123, or cbryd@uaex.edu.

New Aquaculture/Fisheries Center Faculty

Jo Sadler

G'day! I am **Jo Sadler**, one of the latest recruits of the UAPB Aquaculture/ Fisheries Center, based at the Fish Health Diagnostics lab at Lonoke. I come from Australia where I have worked as a fish health manager for commercial producers of Atlantic salmon and rainbow trout. I also have work experience with shellfish and shrimp.

For my doctoral research I examined problems associated with the commercial production of all-female triploid Atlantic salmon in Tasmania. I have worked with many large-scale culture systems including earthen ponds, recirculating hatchery systems, flow-through tank systems, sea cages and static marine tank systems. My last job was with the team which prepared comprehensive aquatic animal disease emergency plans for all Australia.

In my new role I join your Extension Program for diagnostic and educational services to Arkansas fish producers. You might wonder what inspired me to make the big move to Arkansas from the other side of the globe? Was it the diversity of the thriving aquaculture industry here? The warm and friendly people? Their fantastic accents? Or the southern lifestyle? I think it was a combination of the above. I look forward to meeting you. Contact me at jsadler@uaex.edu, (501) 676-3124 (office) or (870) 489-1544 (cell).

Jeremy Trimpey

Jeremy Trimpey works with the bait-fish research verification program. Originally from Pennsylvania, Jeremy has a bachelor of science degree in wildlife/fisheries from Frostburg State University.

In May of 2004, he graduated from the University of Arkansas at Pine Bluff with a master of science degree in aquaculture/fisheries. His thesis work involved the evaluation of the UAPB in-pond grader for food-sized channel catfish. Jeremy can be reached at jtrimpey@uaex.edu or (870) 575-8965.

Use of Firearms for Control of Bird Depredation

George Selden, UAPB Extension Aquaculture Specialist
Thurman W. Booth, USDA Wildlife Services, State Director

Bird predation is a continuing problem for fish producers. It is estimated that fish-eating birds cause Arkansas catfish farmers' annual losses of $2.3 million. Fortunately, Wildlife Services assists fish farmers in developing bird control programs and obtaining depredation permits.

If control by lethal means becomes necessary, here is some advice and rules that the permit holder might want to keep in mind. Under most depredation permits, birds can only be taken by shooting with firearms. The species to be controlled will determine which size of steel shot to use in shotguns. Shells with size BB or BBB shot work best for cormorants and pelicans, while shells containing #2 steel shot are more appropriate for most herons and egrets. Smaller birds, such as the snowy egret and little blue heron, can be controlled successfully using shells with #4 steel shot. The use of a non-toxic shot is required in shotguns. Rifles are also authorized on most permits. The permit holder should also remember that any violation of the Migratory Bird Treaty is punishable with a fine of up to $10,000.

As safety is of paramount importance, it might be good to remember the Ten Commandments of Firearm Safety (borrowed from the Remington Arms Company).

1. Always keep the muzzle pointed in a safe direction.
2. Keep the firearm unloaded when not in use.
3. Don't rely on the gun's safety mechanism.
4. Be sure of your target and what's beyond it.
5. Use proper ammunition.
6. If your gun fails to fire when the trigger is pulled, handle with care.
7. Always wear ear and eye protection when shooting.
8. Be sure the barrel is clear of obstructions before shooting.
9. Don't alter or modify your gun. Service it regularly.
10. Learn the mechanics and handling characteristics of your firearm.

If the permit holder has any problems of other questions, contact Wildlife Services at 501-324-5382 or 870-673-1121, or any UAPB Extension aquaculture specialist.

Baitfish Research Verification Program

Jeremy Trimpey
Research Associate

The first baitfish research verification program (BRVP) was initiated this year, and results are already coming in. The goal of the BRVP is to intensively monitor juvenile golden shiner production on a commercial farm where research-based management protocols are implemented. There are three cooperating producers in the program this year from Greene, Lonoke and Prairie Counties. Each producer has two ponds in the program and has agreed to raise juvenile shiners by our standard protocol - transfer eggs from a hatchery, fill ponds with well water, stock fry between 500,000-1,000,000 per acre on a morning when pH is below 8.5, provide at least 0.5 hp/ac aeration, and feed 5–25 lb/ac twice a day.

Harvest events have occurred throughout the summer, and one of the verification ponds is completely harvested. A yield of 636 lb/ac was obtained after 62 days at a size of 3,300 head/lb with a 69 percent survival rate. These fish had a mean length of 24 $\pm$ 4 mm and mean weight of 0.12 $\pm$ 0.12 g. These fish are much smaller than those grown at UAPB which had a mean weight of approximately 0.5 g (Dr. Nathan Stone, University of Arkansas at Pine Bluff). However, fish in this particular verification pond were stocked at about three times the recommended density due to space constraints on the farm. Additionally, feeding rates reached 30 lb/ac, but were fed only three times per week.

More detailed information and up-to-date data from the BRVP can be found on the Aquaculture Research Verification web site at www.uaex.edu/aquaculture. Please let me know if you would like to be a cooperator in future BRVP trials.

New Fish Disease Horror Stories

Andy Goodwin, Extension Pathologist

Recent outbreaks of exotic fish diseases have again emphasized the importance of protecting your farm from the introduction of new diseases. UAPB specialists began to actively promote biosecurity (a term that became suddenly popular following 9/11) when koi herpes virus (KHV) was first discovered on the west coast. KHV is a very contagious and devastating disease of common carp and koi.

Introduction of this disease into new populations of fish can lead to mortality of up to 98 percent. There is no treatment for the disease. The only way to avoid it is to not bring infected fish onto your farm. Since its first discovery in 1996 the virus has been diagnosed in dozens of cases nationwide and reseaarchers and specialists are aware of many more. These have hit back yard ponds, koi distributors and even a farm producing common carp as bait. The disease has devastated common carp foodfish production in several Asian countries. The first KHV cases were in Europe or Israel, and the disease was distributed in live fish shipments. Fortunately, even though Arkansas is a leading koi producer, KHV has never been found on a fish farm in the state.

In the spring of 2002, the UAPB Fish Disease Laboratory diagnosed the first case of Spring Viremia of Carp (SVC) virus in North America. This is a very serious disease of common carp and other cyprinids. It is also a disease heavily regulated by international agreement. The East Coast farm where the first infections were discovered was quarantined for almost two years while the infected fish were destroyed and the farm completely disinfected. Since 2002, the virus has been found in wild and farmed fish in five states. In July of 2004, UAPB again found SVC virus, this time on a Missouri fish farm that had recently received a shipment of koi from a northern state. Both of these farms, and a holding facility in a third state where the fish were held temporarily, are under quarantine. The current isolates of the virus are most likely coming into the U.S. with ornamental fish from China. There has never been a case of SVCV in Arkansas.

The Golden Shiner Virus (GSV) was described in the 1970s. Work recently completed at UAPB has shown that this virus is really Chinese Grass Carp Reovirus, an important disease of grass carp in China. Work at UAPB has also shown that the virus may be carried by fathead minnows. This virus was probably imported from China in shipments of grass carp and other cyprinid fishes.

Other areas of aquaculture are equally vulnerable to exotic diseases. Farmers in several states, including Arkansas, are experimenting with the inland production of marine shrimp. There have been recent outbreaks of shrimp viruses, Taura Virus and White Spot Virus, on farms in Texas and Hawaii. These viruses have devastating impacts on production. Once introduced, they can only be controlled by destroying infected animals and disinfecting farms.

In the catfish industry, farmers have long considered diseases to be “everywhere” and to be spread so quickly by birds or other animals that biosecurity measures were hopeless. While current production practices do make biosecurity difficult, catfish farmers should

Continued on page 4

recognize that they are not immune to exotic diseases. Recently, there has been a report of a new catfish herpes virus in Italy and there are continued reports of European catfish iridoviruses. All of these viruses have the potential to be devastating if introduced into the U.S. channel catfish industry.

There are many more examples of exotic fish diseases introduced into the U.S. by imported aquatic animals. The largemouth bass virus (LMBV) that killed big bass in many southeastern reservoirs in recent years was apparently first introduced into central Florida. The virus is present in Arkansas but has never been detected in farmed fish. The gill grub *Centrocestus sp.* has spread with exotic snails and produced tremendous problems in tropical fish grown in Florida and in wild fish living in habitats warm enough for the snails to thrive. The Infectious Salmon Anemia (ISA) virus has cost the northeast salmon industry millions of dollars. There are many examples, and even more in other countries where imported diseases have had devastating effects on wild and cultured fish.

In Arkansas, good biosecurity practices by Arkansas bait and ornamental fish farmers have prevented the introduction of diseases like KHV and SVCV that would be devastating both because of the mortality they might cause and because of their impact on the state's marketing position.

It is important that all fish farmers follow good biosecurity practices. Biosecurity guidelines are posted on the Extension web site at www.uaex.edu/biosecurity/producer/fish_farms.asp, or are available from the specialists listed on the front page of this newsletter.

Upcoming Events

Florida Aquaculture Association Annual Meeting
November 5-6, 2004. Hillsborough Community College, Ybor City Campus, Tampa, Florida. The Saturday sessions will include disaster recovery assistance. See http://www.flaa.org/pages/fallConference.html or call (863) 293-5710

Aquaculture America 2005
January 17-20, 2005. Marriott Hotel, New Orleans, Louisiana. The World Aquaculture Society, U.S. Chapter, will sponsor this event in collaboration with the National Aquaculture Association and others. See http://www.was.org/meetings/ConferenceInfo.asp?MeetingCode=AA2005 or call (760) 432-4270. Early registration ends December 9, 2004.

Arkansas Aquaculture 2005
January 20-22, 2005. Annual educational meetings. Jointly sponsored by the Catfish Farmers of Arkansas and the Arkansas Bait and Ornamental Fish Growers Association. Grand Hotel, Tunica, Mississippi. For registration information contact Bo Collins at (501) 673-4059.

Fish Farming Trade Show
February 3-4, 2005. Regional trade show and conference. Annual event. Washington County Convention Center, Greenville, Mississippi. The event is sponsored by Catfish Farmers of Arkansas, Catfish Farmers of Mississippi, Alabama Catfish Producers and Louisiana Catfish Farmers Association. Contact Mike McCall, (601) 714-5327.

Mid-Continent Warmwater Fish Culture Workshop
February 7-9, 2005. Blue Springs, Missouri. The workshop is primarily intended for public fish hatchery employees. It will be held in conjunction with the Missouri Aquaculture Association Annual Meeting, which will take place on February 9, 2005. For details see http://www.moaa.pond.org/newsletters/4.4/volume4_issue4.htm or contact Tommie Crawford at (660) 438-4465.

Arkansas Bait and Ornamental Fish Producers
February 10, 2005. Lonoke Agricultural Center, Lonoke, Arkansas. Annual educational meetings. For more information contact Hugh Thomforde at (501) 676-3124.

Texas Aquaculture Association Annual Conference and Trade Show
February 8-11, 2005. Texas A&M University, Corpus Christi, Texas. For more information go to http://www.texasaquaculture.org/id3.htm or call Michael Masser at (979) 845-7473.

Catfish Farmers of America Annual Convention
February 24-26, 2005. New Orleans. Contact Mike McCall for more details, (601) 714-5327.

Boston Seafood Show
March 13-15, 2005. Boston Convention and Exhibition Center. Recommended by Carole Engle. See http://www.bostonseafood.com/ or call (207) 842-5504.

Chelated Copper Compounds-- No Advantage Over Copper Sulfate

Andy Goodwin, Extension Pathologist

Copper sulfate is commonly added to ponds to kill algae or to control protozoan fish parasites. When copper sulfate dissolves in the pond, it breaks down into copper ions and sulfate ions. It is the copper ions that are presumed to be toxic to algae, parasites and fish.

In ponds that have a high pH and alkalinity, copper ions quickly react with other ions in the water and form insoluble compounds that are no longer effective. At low pH and alkalinities, the copper ions stay in the water for such a long period that it is difficult to kill algae and parasites without also killing the fish.

To solve these problems, several companies have introduced "chelated" copper products. Other farmers have relied on homemade approaches like mixtures of copper sulfate and citric acid. The chelating chemicals bind to the copper ions and keep them from precipitating out when the alkalinity is high. This means that the copper in chelated forms should be more toxic to fish, algae and parasites at high alkalinity than plain copper sulfate. This is a good thing because it means that copper treatments could be effectively used in high pH, high alkalinity water. In low pH and alkalinity water, the chelating compounds are supposed to bind to the copper ions and make them less toxic so that copper can be safely used.

There has been surprisingly little work that compares the effectiveness of chelated compounds to plain copper sulfate at high and low pH and alkalinities. In a 1993 study published by David Straus and Craig Tucker, they tested the toxicity of plain copper sulfate and a chelated product (Copper Control® by Argent) at a variety of alkalinities. They found that at very low alkalinity (16 ppm) the chelated copper and copper sulfate were equally toxic to catfish. This shows that the chelation was not protecting the fish from copper toxicity at low alkalinity. At all other alkalinities tested (76, 127, and 240 ppm) the chelated compound was less toxic than copper sulfate alone. This means that it takes more of the compound to kill fish (and presumably algae and parasites) than would be required if plain copper sulfate was used. Thus, the chelated copper is not more effective at high alkalinity than plain copper.

The Straus and Tucker data show that at alkalinities of 76-240 ppm, it takes almost twice as much of the chelated compound to be effective. These findings were published more than 10 years ago, but farmers are still interested in chelated compounds and many believe that even though these compounds are more expensive than plain copper sulfate, they are better at high and low alkalinities.

In the last few years, UAPB Extension Specialists have been reporting considerable interest in the chelated copper product EarthTec® and in a homemade copper sulfate:citric acid mixture. We did a study to look at the toxicity of these compounds to channel catfish, at pH 7.2 and low alkalinity (35 ppm), and at pH 8.2 and high alkalinity (150 ppm). Our results using these two compounds were very similar to those of Straus and Tucker. At low alkalinity, the three forms of copper (2 chelated and plain copper sulfate) had an identical toxicity to catfish. That is, 1 ppm of copper ions in the form of copper sulfate has the same toxicity as 1 ppm of copper ions in EarthTec or with citrate. The chelation does not make the copper safer at low alkalinity. In the high alkalinity experiments, the chelated copper was less toxic than copper sulfate. Thus, 1 ppm of chelated copper was less effective than 1 ppm of copper in copper sulfate. From our data, we conclude that there is no advantage to using chelated copper compounds. However, there is still a small possibility that chelated compounds differ in some characteristic that might affect their ability to kill parasites or algae, but not their toxicity to fish. A collaborative research project at UAPB and SNARC will compare chelated copper compounds and copper sulfate for the treatment of Ich.

It is interesting to compare the cost of different forms of copper. Remember that the active ingredient is copper ions, and that the copper ions in a chelated product are only worth more if the chelating chemicals help the copper to be more effective than the copper ions that come in simple copper sulfate.

The work done by Straus and Tucker and here at UAPB do not demonstrate that there is a difference between the two copper forms. Currently, copper sulfate sells for about $32 for a 50 lb. bag. Copper sulfate pentahydrate is 25 percent copper by weight, so the 12.5 lbs of copper ions in a 50 lb bag cost about $2.56/lb. Aquaculture suppliers currently charge about $675 for 30 gallons of EarthTec that is 5 percent copper ions by weight and weighs 10 lbs/gallon (per manufacturer's website www.earthsciencelabs.com). Thus, 30 gallons contain about 15 lbs of copper ions costing $45/lb.

Drugs and Chemicals Legal for Use in Aquaculture -- Part 2

George Selden, Extension Aquaculture Specialist

This is the second part of a review of drugs and chemicals legal for use in aquaculture. All legal aquaculture drugs and chemicals fall into the following nine categories. The first four categories were covered in a previous issue of *Arkansas Aquafarming*.

1) Approved drugs. Approved drugs carry national labels that describe specific legal uses in fish.
2) Drugs that can be used under an investigational new animal drug exemption (INAD). The INAD drugs are used in a limited fashion by participants in formal studies of drug effectiveness. These participants may be farmers, but there are many legal and record keeping responsibilities.
3) Drugs that are not approved but of a low regulatory priority. Low regulatory priority drugs are not formally legal, but the government has allowed their use for certain purposes. Although FDA is not aware of safety problems associated with the specific uses of these substances, their uses have not been shown to be safe and effective in well-controlled scientific studies.
4) Extra-label use. Many drugs may be legally used on fish with a veterinarian's prescription. This is "extra-label" use. The veterinarian must assume liability for all residue concerns and environmental impacts.
5) "Action Deferred." Copper sulfate and potassium permanganate are not officially of low regulatory priority, but regulatory action is deferred pending the outcome of research investigating their safety and effectiveness.
6) Pesticides with national aquatic labels. These include herbicides, chemicals for the free swimming stages of parasites, and snail killers.
7) Pesticides with regional or temporary labels. These include registration of pesticides under Special Local Needs (SLN 24c) or Section 18 Emergency Exemptions.
8) Fish Toxicants.
9) Vaccines.

This issue will cover items 5 to 9, "Action Deferred" chemicals through "Vaccines." Regulations constantly change. This article must serve only as a guideline. In aquaculture, as in all agriculture, *the label is the law*. You may only use drugs or chemicals if your intended use matches the label *exactly*. If your intended use differs, contact the UAPB Fish Diagnostic Laboratories for advice before purchasing or using the chemical. It is not legal to substitute one brand of a chemical without an aquaculture label for a brand that is specifically labeled for use in fish culture. For example, an unapproved brand of formalin must not be substituted for an approved brand.

Determine, first, that you correctly identify an aquatic plant. If you are not certain about the identification of the plant, seek help. For further information, consult the current yearly edition of *Recommended Chemicals for Weed and Brush Control*, MP-44, from the University of Arkansas Cooperative Extension Service.

A 24c Special Local Needs label is a way to obtain registration for a chemical that would be impossible otherwise. Many chemical companies will not spend the required money to register a chemical for a small niche market. In order for a 24c to be approved, the pesticide must already have a national EPA registration for other uses, there must be a sponsor willing to pay the $2,000 annual fee, the manufacturer must agree to the 24c, and (if it is for food fish) there must be a legal residue limit in the fish flesh. If the state approves the addendum, it is sent to the EPA for final approval.

A Section 18 is a temporary measure to allow a chemical to be used in an emergency situation. As with other chemicals, only approved brands may be used. When using chemicals under 24c or section 18 be sure to have a copy of the supplemental label, and follow all instruction on the main and supplemental labels.

The USDA licenses biologics for the prevention, diagnosis and treatment of animal diseases.

Safe and Legal Chemical and Drug Use

Why is it important to correctly follow drug or chemical use directions? One obvious reason is economic. All drugs and chemicals cost money. Use them only when needed. If used properly, they prevent significant economic losses. If the dosage is less than needed, reapplication may be necessary. If dosage is greater than needed, wastage occurs, and can cause unwanted side effects, including stress and toxicity problems, as well as environmental damage. Using too much or too little could result in fish fatalities and loss of marketable product.

If a particular chemical is not used properly, its label or its low regulatory priority status may be withdrawn and future use would be against the law A good example of this is Diuron in catfish ponds. It must be approved yearly, so if the Arkansas Plant Board feels that the required reporting is not taking place, it may choose not to renew the Section 18 approval, and catfish farmers would loose this effective tool in controlling off-flavor.

Public perception of the safety of food is very important. If public trust is broken by the presence of harmful chemical residues in food, or some other scandal, the public may chose to avoid a particular product. Decreased demand would damage the industry. If harm comes to consumers through a misuse of a drug or chemical, the farmers may be held legally and financially liable.

Chemical or drug misuse could also have legal ramifications. Since the government regulates all these materials, not following label or recording rules breaks the laws and the operator may face jail, fines, or other penalties. At the very least, unnecessary legal bills may result.

If a farmer selects a chemical or drug to use in a pond that contains food fish, make sure that it is *approved* for food fish use. If a material is labeled for use only in the culture of bait and ornamental fish, then it is against the law to use it for food fish.

Follow dosages and application procedures closely This is for the safety of the applicator, the safety of the animal, and for the future of the industry.

Continued on page 7

5) "Action Deferred" Chemicals

Copper Sulfate	External parasiticide.
Potassium Permanganate	External parasiticide.

6) Pesticides with national aquatic labels

Copper complexes and copper sulfate	Excellent control of all algae, including chara or nitella
Acid blue and acid yellow (Aquashade)	Herbicide. Controls aquatic plants by reducing light penetration.
Diquat	Excellent or good control of most submersed (underwater) weeds, some floating weeds, some emersed (above water) weeds and good control of filamentous algae, chara and nitella
Endothall	Excellent control of most submersed weeds, good control of filamentous algae, chara and nitella. There is a 3-day withdrawal period before fish can be eaten if endothall is used.
Fluridone (Sonar)	Excellent control of submersed weeds, most floating weeds, and good or excellent control of some emersed weeds
Glyphosate	Excellent or good control of most emersed weeds.
2,4-D	Excellent or good control of all emersed weeds (with a few exceptions), excellent or good control of several floating and submersed weeds
Dimilin	For anchor parasite (Lernaea sp.): National label for bait and ornamental fish only

7) Pesticides with regional/temporary labels

Baytex (Bayer)	Dragonfly larvae: Arkansas 24c. For bait and ornamental fish only. This is the last year that this product is legal. The last date to purchase Baytex was 6/30/04. The last day for legal use is 11/30/04. All unused, unopened product must be returned by 12/30/04. Possession and use of Baytex after this date is prohibited.
Bayluscide 70 (Bayer)	Snails: Arkansas 24c. For bait and ornamental fish only
Dylox 80 (Bayer)	Predaceous zooplankton: Arkansas 24c. For bait and ornamental fish only
Diuron 80 (Drexel)	Control of plankton blooms. Arkansas 24c. For bait and ornamental fish only
Diuron 80 (Drexel) or "Nautilus" (Griffin LLC) in catfish	Approved under a Section 18 Emergency Exemption for the control of off-flavor. The EPA considers this exemption on a yearly basis. This exemption can be withdrawn at any time. Use is only permitted during the months stipulated. It is a restricted use pesticide and all use *must* be reported to the Arkansas Plant Board.

8) Fish Toxicants

Rotenone	Kills all fish. Water will detoxify 2-4 weeks after application. Exact time is dependent upon water temperature. Restricted use.
Antimycin A (Fintrol)	Selective fish toxicant. Can be used in catfish ponds to selectively kill scaled fish.

Continued on page 8

COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
UNIVERSITY OF ARKANSAS
P.O. BOX 391
LITTLE ROCK, ARKANSAS 72203

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

PRESORTED STANDARD
POSTAGE AND FEES
PAID
USDA
PERMIT NO. G268

9) Vaccines

Aeromonas Salmonicida Bacterin Biojec	Furunculosis (salmonids)
Aeromonas Salmonicida-Vibrio	Furunculosis, vibriosis (salmonids)
Aeromonas Bacterin Autogenous Bacterin	Bacterial diseases (fish)
Vibrio Anguillarum-Ordalii Bacterin	Vibriosis (salmonids)
Vibrio Anguillarum-Ordalii-Yersinia Ruckeri Bacterin	Vibriosis, yersiniosis (enteric red-mouth disease) (salmonids)
Yersinia Ruckeri Bacterin	Yersiniosis (enteric red-mouth disease) (salmonids)
Vibrio Salmonicida Bacterin	Vibriosis (salmonids)
Vibrio Anguillarum-Salmonicida Bacterin	Vibriosis (salmonids)
Aeromonas Salmonicida Bacterin	Furunculosis (salmonids)
Autogenous Bacterin	Bacterial diseases (fish)
Edwardsiella Ictaluri Bacterin	Enteric septicemia (catfish)
Vibrio Anguillarum-Ordalii Bacterin	Vibriosis (salmonids)

Hugh Thomforde
Dr. Hugh Thomforde
Extension Aquaculture Specialist
Technical Editor

Debbie Archer
Debbie Archer
Communications Specialist
Copy Editor

County Extension Agent

Arkansas Aquafarming is published twice a year.
The purpose is to advance aquaculture production in Arkansas by providing reliable, practical, timely information.