Arkansas AQUAFARMING
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Lacey Act Challenge by U.S. Association of Reptile Keepers has Implications for Aquaculture Transport Between States

Anita M. Kelly
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At the end of 2013, the U.S. Association of Reptile Keepers (USARK) filed a lawsuit against the U.S. Fish and Wildlife Service (USFWS) challenging the agency's listing of several large constrictors as injurious wildlife under the Lacey Act in 2012. When the final rule from the USFWS was issued, the constrictors could not be transported from state to state, the District of Columbia, the Commonwealth of Puerto Rico or any territory or possession of the U.S. except for special permitted situations. The USARK argued that the shipment clause of the Lacey Act did not address shipments from one state to another within the continental U.S. The courts agreed with USARK stating that the Lacey Act does not prohibit the transport of injurious wildlife between the 49 continental states (this includes the contiguous 48 states and Alaska). The following paragraphs are a few of the explanations provided by the USFWS regarding the legality of importation, transportation and exceptions to the Lacey Act as defined by the District and Circuit court rulings.

"This means that existing and future injurious wildlife listings, including those listed by Congress through statutes (fruit bats (genus *Pteropus*), mongoose, zebra mussel, brown tree snake, bighead carp), can be transported between states within the continental United States.

It is illegal to import injurious wildlife into the United States. In addition, transport of injurious wildlife between the continental United States, the District of Columbia, Hawaii, the Commonwealth of Puerto Rico, and any possession of the United States remains prohibited. This means that an injurious species cannot be transported, for example, from Guam to Hawaii or from Hawaii to Guam, from Hawaii to California or the reverse, or from the District of Columbia to Maryland or the reverse, or from Guam to U.S. Virgin Islands or the reverse. Also, designated species may not transit through the District of Columbia when being transported from Maryland to Virginia or the reverse. Similarly, designated species may not transit through Canada on Canadian soil when being transported between Alaska and another continental state, because that would involve importation from Canada, which continues to be prohibited."

It should be noted that some states have laws prohibiting the movement of invasive or injurious species into the state without a permit. Be sure to contact the state to ensure that what you are importing is legal and if you need a permit.

For more information, visit https://www.fws.gov/injuriouswildlife/pdf_files/USARK_ruling_talking_points_and_Q_A_final%20(1).pdf.

The above article is a small portion of the information provided by the USFWS in their circular entitled Implementation of the D.C. Circuit Court Decision in United States Association of Reptile Keepers, Inc, v, Zinke, No 15-5199 (D.C. Cir. April 7. 2017).

New Faculty Join UAPB Aquaculture/Fisheries Department

Anita M. Kelly
Extension Aquaculture Specialist

Four new faculty members, Dr. Grace Ramena, Dr. Dayan Perera, Dr. Jonathan Spurgeon and Dr. Nicholas Romano, have joined the UAPB Aquaculture and Fisheries Department.

Dr. Grace Ramena is an assistant professor of fish pathology. Dr. Ramena received her Ph.D. from Southern Illinois University School of Medicine, in Springfield. She has a master's degree in cell biology from the University of Illinois, and another master's in aquaculture from Acharya Nagarjuna University, India. Dr. Ramena served as a fish/shrimp pathologist for CP Aquaculture (India) Pvt Ltd for five years from 2002 to 2005. Before joining UAPB, she was a post-doctoral researcher at Washington University School of Medicine at St. Louis, Missouri.

Dr. Ramena has over ten years of research experience in international aquaculture and human diseases. At UIS, she researched the capacity of spice and herb extracts against Vibriosis, a bacterial disease that infects fish and shrimp. She also studied the progression of White Spot Syndrome Virus in marine shrimp.

As an assistant professor at UAPB, Dr. Ramena will teach graduate and undergraduate courses in fish pathology, biology of fishes, research methods, graduate seminar and related subject areas. She will mentor graduate students with their research projects. Her current M.S. student is researching how goldfish herpes virus 2 infections are transmitted in goldfish. Dr. Ramena's research focus is finding new novel therapeutic molecules that can treat columnaris disease, motile aeromonas septicemia and ich that cause huge economic losses to Arkansas fish farmers.

Dr. Dayan (Dave) Perera is an Extension aquaculture specialist working primarily on baitfish and sportfish. Dr. Perera received his Ph.D. from Auburn University, where his research focus was genetics, fish reproduction, selective breeding and hybrid catfish production. Dr. Perera obtained an M.S. from the University of Memphis where he studied ichthyology, reproductive physiology, embryology and developmental biology. His undergraduate degree was in general biology from St. Joseph's College in Colombo, Sri Lanka.

Dr. Perera has a variety of research interests including hatchery management, egg incubation systems, fish genetics and selective breeding. Before joining UAPB, Dr. Perera was a research associate at West Virginia State University (WVSU). There, he conducted research on the effects of foods and food constituents on gene expression in finfish, the effects of alternative feed ingredients on the reproductive physiology, development and performance of fishes and the development of aquaponics in West Virginia. He was also responsible for instructing and overseeing graduate and undergraduate research, securing extramural funding via federal grants, managing and maintaining the aquaculture facility at WVSU and providing expertise in recirculating aquaculture systems, hatchery management and fish farming to WVSU and the southern part of West Virginia via WVSU Extension services.

Dr. Jonathan Spurgeon is an assistant professor of habitat management and restoration, an all-new position in the Aquaculture and Fisheries Department. He earned his Ph.D. in applied ecology from the University of Nebraska-Lincoln, and both his master's and bachelor's degrees in fisheries and wildlife science from the University of Missouri. Dr. Spurgeon plans to develop aquatic habitat assessment and restoration projects statewide. His previous works include projects related to the effects of hydrology on population dynamics of fishes in large rivers, the ecological impacts of translocated native and non-native invasive stream fishes and the state of fish aging practices and their impacts on management.

Dr. Spurgeon developed teaching skills as a co-instructor and teaching assistant of several classes during his graduate studies and will be assuming lead-instructor roles at UAPB. He plans to develop an all-new course in aquatic habitat management and restoration in the coming months which will provide students with a unique skill-set offered nowhere else in Arkansas.

Dr. Nicholas Romano is an associate professor of Aquaculture. Born in West Virginia, Dr. Romano earned his Ph.D., master's and bachelor's degrees in aquaculture from James Cook University in Townsville, Australia. After completing his Ph.D. in 2010, Dr. Romano worked as a research assistant at James Cook University in Townsville, Australia, a post-doctoral researcher at the Universiti Sains Malaysia in Penang, Malaysia, and most recently as a senior lecturer at the Universiti Putra Malaysia in Serdang, Malaysia working on projects related to the osmoregulation, physiology and culture of economically important fishes and crustaceans. While on these assignments he developed and managed commercial-scale aquaculture production and research facilities.

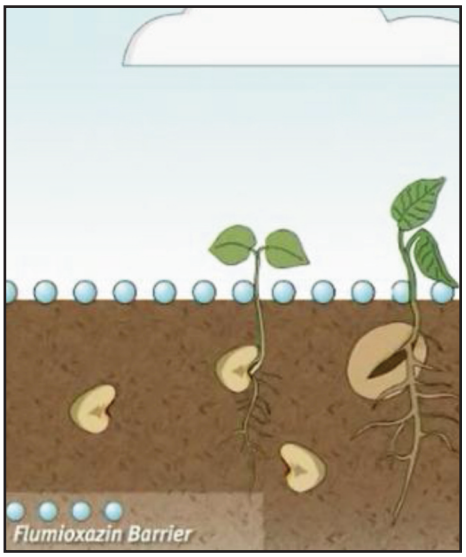
Dr. Romano's research interests are focused on integrating research into aquaculture in pursuit of expanding cost-effective and sustainable production. Components of this pursuit include aquaculture engineering, breeding, larviculture and nursery culture, nutrition, farm management, disease management and more. Dr. Romano has taught undergraduate and graduate courses on principles of aquaculture, advanced aquaculture and nutrition, experimental design and scientific writing in aquatic sciences and farm practices while serving as primary- and co-adviser to many students ranging from bachelor's to Ph.D. Dr. Romano will begin teaching engineering and construction of aquaculture facilities, advanced aquaculture and hatchery management at UAPB while complementing aquaculture Extension efforts across the state.

Flumioxazin as a Potential Pre-emergent Treatment for Submersed Aquatic Weeds

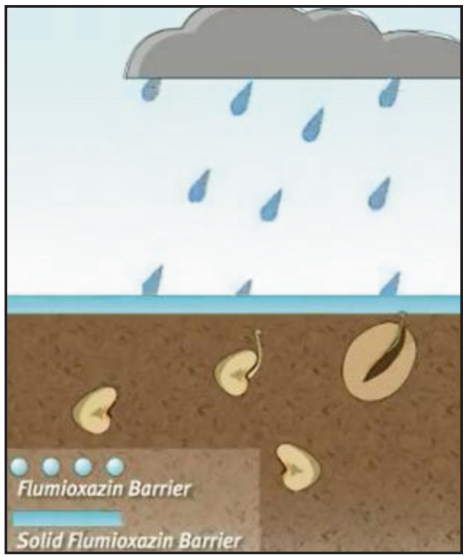
George Selden
Aquaculture Extension Specialist

Flumioxazin is a contact herbicide approved for aquatic use under the trade name Clipper. It is also approved for use under the trade name Valor as control and suppression of certain weeds near cotton, dry beans, field corn, soybean, peanut, sugarcane, sweet potato, and fallow land, and to maintain bare ground on non-crop areas of farms. There is also evidence that this product can be applied to the bare ground; it will form what the manufacturers call a "solid flumioxazin barrier" if activated by rainfall or overhead activation.

There have been anecdotal reports that this also works for pond bottoms before filling. This product was applied in a 20 foot band around four, 8-acre baitfish ponds in early May on the Coldstream farm in Paragould, Arkansas. These ponds were checked regularly throughout the summer and no growth of submersed aquatic weeds (excluding algae) was reported.



Flumioxazin applied to ground.



Chemical being activated by water, forming a barrier to weed growth.

Demonstration pond three weeks after chemical application followed by filling. No submersed plant growth and a healthy phytoplankton bloom.

Upcoming Events

Catfish Farmers of America
February 15-17
Memphis, Tennessee
This is the 50th annual convention of the Catfish Farmers of America. For more information visit http://www.catfishfarmersofamerica.com/events/.

Aquaculture America 2018
February 19-22
Las Vegas, Nevada
The Annual Conference and Exposition of the United States Aquaculture Society. For information contact the conference manager at (760) 751-5505.

European Aqua Congress
June 18-19
Paris, France
"Advanced Technology of Aquaculture and Marine Biology." This conference attracts some of the top speakers and vendors from around the world, focusing on cutting edge techniques and technologies. For more information, visit https://euroaquacongress.conferenceseries.com/.

AQUA 2018
August 25-29
Montpellier, France
The Annual International Conference and Exposition of World Aquaculture Society. For information contact the conference manager at (760) 751-5505.

148th Annual Meeting of the American Fisheries Society
August 19-23
Atlantic City, New Jersey
For more information visit http://afsannualmeeting.fisheries.org.

Aquaculture/Fisheries Field Day
October 4
UAPB Aquaculture Research Station
Biannual showcase of current research important to producers, state and federal agencies and interested individuals.
For more information contact Casandra Byrd at (870)575-8123

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Is Your Water Tank Decreasing Your Herbicide's Effectiveness?

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Herbicide treatments sometimes fail. Assuming that the selected herbicide is effective on the target plants, a treatment failure is often due to some form of dilution. This can occur because of underestimated treatment area or pond volume, or incorrect product measurement prior to application. A treatment's efficacy can also be reduced due to the quality of the water used in herbicide application rigs, tanks, buckets and mixing containers.

The best known water quality/herbicide effectiveness interaction is the impact of alkalinity on copper sulfate. At low alkalinities (<40 ppm), the use of copper sulfate crystals is likely to result in dead fish. Alkalinities above ~250 ppm will render copper sulfate applications very near useless due to the free copper becoming quickly bound to carbonate molecules before they can impact algal cells.

Another water quality parameter that can impact herbicides is pH. In general, many pesticides perform best between a pH of 5 to 6.5. Above pH 7, some herbicides can degrade and lose their effectiveness. For example, the active ingredient flumioxazin (Clipper) is very sensitive to pH. At pH 5, flumioxazin is stable, but at pH 7 its half-life is reduced to 24 hours and at pH 9 the half-life drops to 15 minutes. The active ingredient carfentrazone (Stingray) is also sensitive, but to a lesser degree. Carfentrazone is stable at pH 5, its half-life is 8.6 days at pH 7 and 3.6 hours at pH 9. The herbicide glyphosate also works best at a lower pH.

Hardness refers to the amount of positively charged minerals in water, particularly calcium, sodium, magnesium and iron. Products like 2,4-D amine and glyphosate carry a negative charge. When 2,4-D is added to water, the negative charge of the 2,4-D reacts with the positively charged minerals in the hard water, reducing the herbicide's effectiveness. If the water hardness exceeds 150 ppm calcium carbonate, you should consider using a product that removes carbonates and an acid buffer which can resist hard water effects.

Suspended solids is also a water quality parameter. Diquat and glyphosate can both be deactivated by suspended solids. Clean well water is the best choice for herbicide application water.

The active ingredients mentioned here are not the only ones labeled for aquatic use. While all herbicide molecules degrade over time, water quality factors are not the primary, or even secondary causes for their degradation. Five herbicides are broken down primarily by photolysis (fluridone, triclopyr, imazapyr, imazamox and penoxsulam), and two others are degraded primarily by bacterial action (endothall, bispyribac sodium).

In summation, testing the proposed tank water quality for an herbicide application can help to save money and increase weed control. If testing indicates that hardness, alkalinity or pH are not optimal, pH buffers or products that remove carbonates can be used prior to herbicide mixing.

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