

THE USE OF AKUAPRO™ TO CONTROL COLUMNARIS DISEASE IN CULTURED FISH



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What is Akuapro™ ?

- Commercial name for kaolin clay
- kaolinite, a hydrous aluminum silicate
- Used in making china, porcelain, cosmetics, and medicinal products – kaopectate (gastrointestinal diseases), aquaculture (food binder, contrasting agent for larval husbandry, reduce egg adhesiveness)
- Not found normally in waters used for fish culture. Its ability to disperse in water makes it ideal for use in aquaculture
- The U.S. has high-quality deposits in the Southeast in Georgia and South Carolina, found globally
- Could Akuapro™ offer any benefits to combat fish bacterial diseases such as columnaris?



Why USE Akuapro™ in aquaculture?

- ❖ **Inexpensive (initial estimate is <\$10 per 11,355 L vat treatment)**
- ❖ **Inert clay**
- ❖ **No negative effects on fish, the environment, or humans are known**
- ❖ **No risk of antibiotic resistance and no harmful chemical residues introduced into the environment or the eventual consumer product**

Why USE Akuapro™ as a treatment?

- ❖ **Akuapro™ combats bacterial infections by disrupting the bacterium's ability to adhere to the surface of host cells**
- ❖ **Its small particle size is ideal for binding tiny bacteria**
- ❖ **It can be used as a preventative to antibiotics, which are limited and expensive, are not necessary**



Possible benefits of Akuapro™ usage in aquaculture

- ✓ **Cost effective**
- ✓ **Easily available**
- ✓ **Can improve survival**
- ✓ **Can be used in vats, but use in ponds has not been tested and may not be feasible (large amounts needed; algae bloom effects)**

Commercial Application?

- ❖ **Feed training (feed habituation) in vats for sportfish**
- ❖ **Holding sportfish in vats prior to sale**
- ❖ **Pond treatments? Not likely.....**
- ❖ **Baitfish? (vats)**



Commercial Akuapro™ Study

- Possible Akuapro™ usage at production facilities
 - Feed training issues with LMB (feed training regime)
 - Post-harvest issues prior to sale when holding fish in the vats
- On-farm studies : Use of Akuapro™ in sportfish: largemouth bass, black crappie, redear sunfish, and bluegill in Arkansas
- Akuapro™ dosage: 0, 1, and 2 g/L





Commercial Level Akuapro™ Study

0 g/L



1 g/L

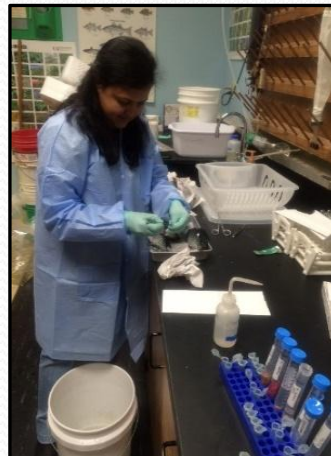


2 g/L



Commercial Demonstration

- **Fish treatment: During active Columnaris infections and in some cases as a prophylactic treatment**
- **Fish were brought to the UAPB Fish Health Services Laboratory, Lonoke before treatment and 48 hours post-treatment**
- **Fish gills/ skin were examined microscopically for the presence/absence of Columnaris**
- **Fish gill/ skin tissue samples were frozen for real time PCR analysis to confirm the presence of Columnaris**



Replicated Commercial Trial

- LMB fingerlings were obtained from a vat with an active *Columnaris* infection
- Fish were treated with 0, 1, 2 g/L for 1 hour every 96 hours for two weeks
- 3 tanks per treatment (30 fish/tank)
- Fish were sampled every 96 hours and then treated again



Akuapro™ – Costs?

- To treat a 3,000 gallon (11,355 L) vat at 1 g/L= approximately 11.35 kg
- Cost = \$0.66-0.77/kg
- Cost of one treatment assuming \$0.77/kg
 - $11.35 * \$0.77/\text{kg} = \8.74

*note: This cost may not include freight

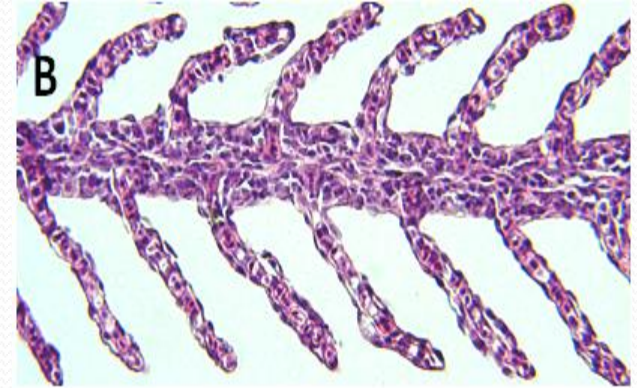
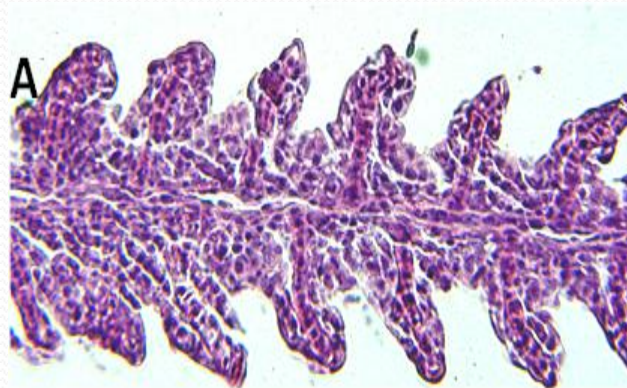


Untreated

Akuapro™

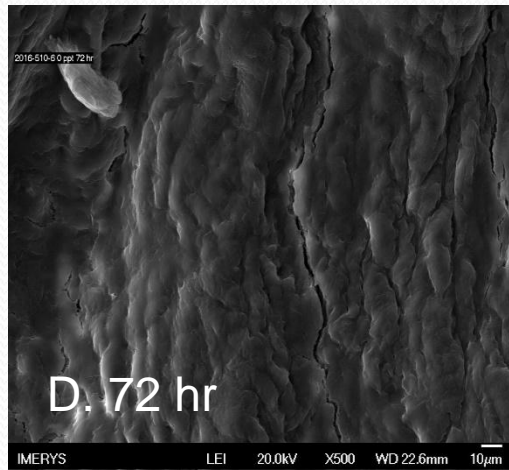
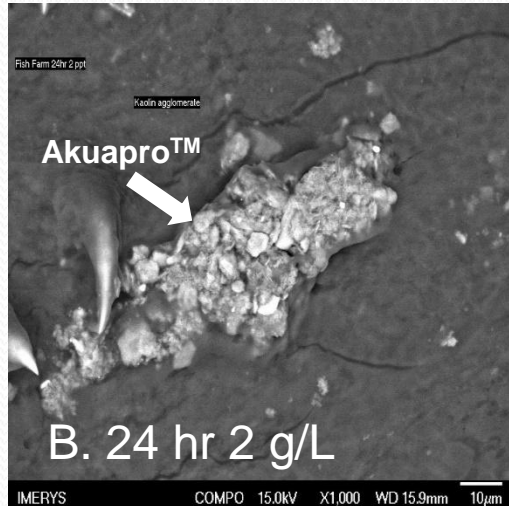
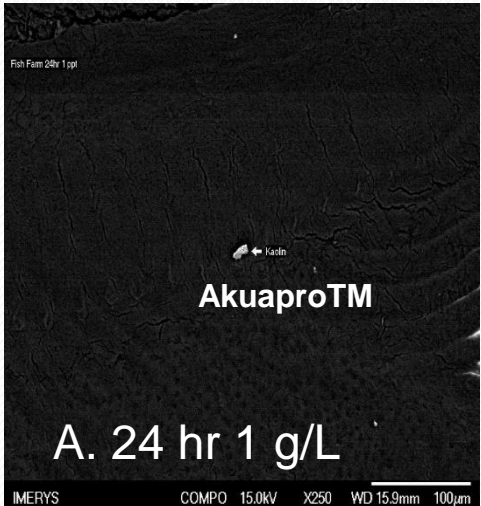


Gill Histology



Source: Beck et al. 2015

Scanning Electron Microscopy



Results

- ❖ **Akuapro™ treatment showed significant improvement in the survival**
- ❖ **Histological examinations showed that Akuapro™ -treated fish had substantially less damage to gill lamellae**
- ❖ **Scanning electron microscopy showed ability of Akuapro™ to bind bacteria on fish surface**
- ❖ **In cases of severe Columnaris infections Akuapro™ clay was not effective**
- ❖ **Real time PCR analysis showed higher Columnaris copy number before treatment and reduced number of copies after treatment**
- ❖ **There appears to be potential for use of Akuapro™ as a prophylactic treatment**

Acknowledgements



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