



## WATER RESOURCES RESEARCH GRANT PROPOSAL

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Toxicity of Azadirachtin Insecticide to Selected Saltwater and Freshwater Species In the South-Eastern United States"

Duration: September 1, 1996 to August 31, 1998

Fiscal year 1996 Federal funds: \$ 36,500

Non-Federal funds allocated: \$ 85,376

Investigators and Affiliations:

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Congressional District of university performing the research: 6(LSU) and 4(U Ark)

### **Statement of the critical regional water problems:**

This project addresses two problem areas considered high priority for research in the South Atlantic-Gulf Region: water quality and aquatic and environmental protection. It is a study of the toxic effects of naturally-derived pesticides, originating from agricultural runoff, on aquatic species that are ecologically as well as economically important. The azadirachtins, pesticides from the neem tree, are believed to inhibit insects by preventing molting and growth. Because of this activity, it is expected that similar negative effects will also result to aquatic species, including crustaceans that molt by a mechanism similar to that of insects. Literature on the effects of neem on aquatic animals is limited but there is some evidence that neem preparations are toxic to molluscs and fish and can also affect human fertility.

An understanding of the effects of azadirachtins on aquatic species is important' in regions wherever agricultural runoff water provides a habitat for their growth. This is apparent where runoff waters accumulate in slowly draining waters such as marshes, swamps, ponds, lakes and reservoirs. In addition, depending on the dose and stability of these compounds, their effects may also be relevant in bayous, rivers, estuaries, salt marshes, brackish waters or even coastal areas. The South-Eastern United States, especially the region near the Atlantic and Gulf Coasts. is particularly susceptible to the effects of agricultural runoff due to the large quantity of surface water that flows from north and west. The negative ecological effects are far-reaching considering the importance of the aquatic species that may be affected.

**Statement of the results, benefits and/or information:**

Within the first year of the study acute toxicity studies will be carried out using the selected species of 1) mollusca: freshwater snails, mussels (*Mytilus edulis*), oysters(*Crassostrea virginica*), 2) crustaceans: barnacles (*Ballanus* sp.), grass shrimp, blue crab (*Callinectes sapidus*), copepods, freshwater shrimp (*Macrobrachium ohio*), white shrimp (*Peneus citiferus*), red swamp crayfish(*Procambarus carkii* and 3) fish (fathead minnow, blue gill sunfish (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus salmoides*). These species cover a wideranging group of aquatic animals, both saltwater and freshwater species. Crustaceans will be studied for acute toxicity as well as for any affects on molting or growth. The fish and molluscs will be studied because of their importance in aquaculture, marine fisheries and ecological importance in this region. In year two, cell culture bioassays will be used to measure pesticide stability, develop methods to inactivate toxicity and test the possible removal of toxic fractions from the crude pesticide preparation.

This will give us information to better understand any direct effects of both pure azadirachtin and the crude neem pesticide (contains many other terpenoid compounds in addition to azadirachtin). We will learn about the sensitivities of various species to the pesticides allowing us to know which organisms will make the best bioindicators of pollution. The second phase of the study is designed to improve our understanding of bioactivity stability and to search for methods to reduce the ecological impacts of neembased pesticides.