REQUEST FOR PRE-PROPOSALS

Please Copy and Distribute to All Interested Parties

The USDA-NIFA Southern Regional Aquaculture Center solicits response from qualified multi-state teams interested in participating in the regional project:

Evaluating Plant Extracts as Antibiotic Alternatives for Aquaculture

SRAC's Board of Directors has authorized up to $375,000 for a 3-year project on *Plant Extracts as Antibiotic Alternatives*. This project will be developed using the "comprehensive method" where a team of multi-state scientists having demonstrated records of expertise in the subject complete a single pre-proposal that addresses all project objectives. One proposal will be selected for funding based on review by a committee of scientists not involved in any of the proposals that are submitted.

Background

FDA-approved antibiotics available for use in U.S. food fish aquaculture are limited in number. The use of these antibiotics in commercial aquaculture increases the selective pressure on antibiotic-resistant bacteria, posing a significant threat to the sustainability of the U.S. catfish industry. With a limited arsenal of available drugs for producers and no promising new drugs on the horizon, the continued use of these antibiotics will inevitably lead to a reduction in their effectiveness. As a result, there is an urgent, industry-defined need to identify alternative methods for mitigating bacterial infections without relying on antibiotics. The swine and poultry industries are actively exploring the use of generally regarded as safe (GRAS) plant-derived compounds, as substitutes for antibiotics to treat bacterial diseases in their animals. Plant extracts are cost-effective for mass production, making them suitable for aquaculture. However, given the diversity of such compounds, systematic screening is needed to identify those compounds or products with the greatest potential in terms of efficacy and cost effectiveness.

Objectives

1. Evaluate using *in vitro* methods the effects of specific purified plant extracts and/or commercial products against common pathogenic bacteria that afflict fish farming (*Aeromonas hydrophila*, *Edwardsiella ictaluri*, *E. piscicida* (formerly *E. tarda*), *Flavobacterium coviae* (formerly *F. columnare*), *Vibrio cholerae*, etc.).
2. Determine optimal administration protocols for the most efficacious extracts and/or products identified under Objective 1.

Experimental Approach

Both *in vitro* and *in vivo* approaches will be used to characterize the effects of candidate plant extracts including GRAS compounds and commercial products on prominent bacterial pathogens that adversely affect warmwater fish. Evaluations will be conducted to assess the inhibition of

growth of major bacterial species, as well as the molecular effects on virulence factors and quorum-sensing genes that facilitate cell-cell communication. Plant products identified to have antagonistic effects on pathogenic bacteria will be further assessed in feeding trials with channel and hybrid catfish. Such trials must be conducted under controlled conditions to assess palatability and effects on fish growth and production efficiency. In addition, the efficacy of individual products in mitigating morbidity and mortality associated with specific bacterial pathogens will be determined using standardized and approved challenge protocols.

How to Respond

Pre-proposals must address all objectives. Preference will be given to pre-proposals that show a high degree of collaboration and coordination among participants. To meet the criterion for a regional project, the pre-proposal must include collaboration from scientists in two or more states or territories in the Southern Region (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, U.S. Virgin Islands, and Virginia).

The pre-proposal must include a one-page vita for each participant and a proposed budget for each participating institution or organization. Pre-proposals, vitae, and budgets that are not in the proper format will not be considered. (See "Guidelines for Writing a SRAC Pre-Proposal (Comprehensive)" file attached or contact Kristen Thompson with the SRAC office at 662-686-3269.)

Send an electronic copy of the pre-proposal in Word format to Jimmy Avery, SRAC Director as an email attachment (jimmy.avery@msstate.edu) by **July 20, 2024**. Proposals received after that date will not be considered.