CFAES

SCHOOL OF ENVIRONMENT AND NATURAL RESOURCES

GRADUATE EXIT SEMINAR

AFROZA NAZNIN

Assessment of reproductive capacity of triploid Zebrafish (*Danio rerio*) and the effect of a fish-waste diet on growth, survival, and fertility

Better understanding of the physiology, ecology, genetics, and nutrition of fish can enhance sustainable fishery management and aquaculture production. The use of model organisms can help to develop scientific knowledge and thoroughly investigate the biology of over 25,000 described fish species and over 212 farmed species. The zebrafish (*Danio rerio*) is a well-established model organism in the experimental biology community to study genetics, toxicology, medical sciences, and aquaculture. Triploidy (3N), the condition of having three sets of chromosomes in comparison to a normal genome, diploid (2N), can be induced through physical shocks during meiotic cell division or by combining gametes from diploid and tetraploid parents. Previous studies on triploid zebrafish have indicated male-biased sterility and abnormal gonad development, with the exception of one study where investigators obtained adults possessing gonads. Sterile triploids are the desired sex for domesticated fish species production to avoid backcrossing to wild populations. Additionally, the exponential growth of the global population, combined with urbanization and industrialization, has led to a surge in fisheries and aquaculture production. However, this production growth has also resulted in a substantial issue of fish-waste. Improper disposal of fish-waste can lead to aesthetic problems, odors, oxygen depletion, and the introduction of diseases or degradation of the ecosystem. In addition to the environmental implications, there are economic considerations at play. The increasing prices of fishmeal and oils, commonly used in aquaculture feed, further emphasizes the need to utilize fish by-products effectively. This study assessed the fertility of triploid zebrafish by backcrossing and sibling crossing in different strains and investigated the effects of fermented fish-waste-based diets on the growth, survival, and reproductive ability of zebrafish. Results showed that in some strains, fertile offspring had been produced and successfully spawned and produced progeny. However, no offspring survived more than ten days post-fertilization. The findings of the diet study indicate that fish-waste-based diet holds potential as a substitute for fish meal protein which can reduce the cost of aquaculture production, but further research is needed. These future studies could involve increasing the feeding frequency or conducting ad libitum feeding to provide a comprehensive comparison with the commercial control diet, Otohime.

Advisor: Dr. Konrad Dabrowski

Friday, July 14, 2023
1:00 P.M.

Location: Kottman Hall 370