

## Artikel Asli/Original Article

Cytotoxic Assessment of African Catfish (*Clarias gariepinus*) Pond Farm EffluentPenilaian Sitotoksik Air Sisa Kolam Penternakan Ikan Keli Afrika (*Clarias gariepinus*)FARAH DIYANA ARIFFIN, AZHAR ABDUL HALIM, MARLIA MOHD HANAFIAH,  
NORMAH AWANG & MOHD SHAM OTHMAN

## ABSTRACT

There are various pharmaceutical substances such as antibiotics, estrogenic compounds and agricultural chemicals that have been used in the aquaculture industry to prevent and control infectious diseases and increase the productivity of cultured species. However, the accumulation of pharmaceuticals in aquaculture species ultimately threatens human health through biomagnification/bioaccumulation. This study aimed to assess the cytotoxic effect of African catfish (*Clarias gariepinus*) pond farm effluent. Water samples were taken at the African Catfish Pond Farm, Sg Kesang. The cytotoxicity assessment was performed via MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay using Chinese hamster fibroblast V79 cell line (V79). The results of the MTT assay found that African catfish pond farm effluent in February and March have a cytotoxic effect where the  $IC_{50}$  was 34% and 40%, respectively. This study conclusively found that the effluent from the African catfish pond farm could pose health risks to the Sungai Kesang consumer due to its cytotoxic characteristics.

**Keywords:** African catfish, aquaculture, cytotoxicity,  $IC_{50}$ , wastewater

## ABSTRAK

Terdapat pelbagai bahan farmaseutikal seperti antibiotik, sebatian estrogenik dan bahan kimia pertanian yang telah digunakan dalam industri akuakultur untuk mencegah dan mengawal penyakit berjangkit serta meningkatkan produktiviti spesies akuakultur. Walau bagaimanapun, pengumpulan farmaseutikal dalam spesies akuakultur akhirnya mengancam kesihatan manusia melalui biomagnifikasi/bioakumulasi. Kajian ini bertujuan untuk menilai kesan sitotoksik air sisa kolam penternakan ikan keli Afrika (*Clarias gariepinus*). Sampel air telah diambil di Pusat Penternakan Ikan Keli Afrika, Sg Kesang. Penilaian sitotoksik dilakukan melalui ujian MTT (3-(4,5-dimetiltiazol-2-il)-2,5-difeniltetrazolium bromida) menggunakan sel V79 fibroblas hamster China (V79). Keputusan ujian MTT mendapati air sisa kolam penternakan ikan keli Afrika pada bulan Februari dan Mac boleh memberi kesan sitotoksik di mana  $IC_{50}$  masing-masing adalah 34% dan 40%. Kajian ini secara ringkasnya mendapati bahawa air sisa daripada kolam penternakan ikan keli Afrika boleh mendatangkan risiko kesihatan kepada pengguna Sungai Kesang kerana ciri-ciri sitotoksiknya.

**Kata Kunci:** Air sisa, akuakultur,  $IC_{50}$ , ikan keli afrika, sitotoksikiti

## INTRODUCTION

Aquaculture is defined as the farming of aquatic organisms such as fish, crustaceans, shellfish and aquatic plants (Ottinger et al. 2016). The Department of Statistics Malaysia (2011) defines aquaculture as a production process that involves the cultivation (including harvesting) of aquatic organisms by using techniques designed to increase the production of those organisms beyond the capacity of their natural environment. Therefore, aquaculture is the culturing of aquatic organisms whether animals or plants under a controlled

environment where it serves to increase the production of aquatic organisms beyond their natural production. The aquaculture industry in Malaysia has become the 15th largest producer of aquaculture livestock in the world (Sharhan Fathi et al. 2018) with aquaculture production of 391 000 metric tons in 2018 where the total estimated value of the production was as much as RM 3.1 billion or USD 724 million (Azra et al. 2021). In 2020, the total production of aquaculture livestock increased to 400 000 metric tons with an estimated market value of RM 4.2 billion (Department of Fisheries Malaysia 2020). The increase in aquaculture

# Economic Analysis Of Effluent Control From Catfish Ponds

**Sabine Zange**



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**Economic Analysis of Effluent Control from Catfish Ponds** German A. Cerezo, Alabama Agricultural Experiment Station, Howard A. Clonts, 1994-10 20 charts and tables *Catfish Pond Effluent Control* German Arnoldo Cerezo Casado, 1993 **Sustainable Aquaculture** John E. Bardach, 1997-04-25 Nachhaltige Entwicklung ein Schlagwort unserer Tage das f r Fischwirtschaft und Aquakultur von besonderer Tragweite ist Beitr ge f hrender Spezialisten besch ftigen sich mit der Wechselbeziehung zwischen Aquakultur und Gesellschaft der Bedeutung des Fischereiwesens f r die Weltern hrung und zukunftsweisenden Ans tzen zur Entwicklung umweltvertr glicher Methoden der Aquakultur *Bulletin* ,1981 Selected Water Resources Abstracts ,1990 *Livestock and the Environment* M. L. Rowe, Linda Merryman, 1976 **Research Reporting Series** ,1972 Cost Analysis of Water Pollution Control Dennis P. Tihansky, 1973 **World Agricultural Economics and Rural Sociology Abstracts** ,1995 **EPA-600/2** ,1979 **Selected Water Resources Abstracts** ,1981 **Aquaculture and the Environment in the United States** U.S. Aquaculture Society, 2002 *Journal of Agricultural and Applied Economics* ,1994 *Miscellaneous Publication* ,1981 **Solar Energy and Nonfossil Fuel Research** ,1979 **Federal Register** ,1974-06 **Environmental Protection Research Catalog: Indexes** Smithsonian Science Information Exchange, 1972 Tilapia Culture Abdel-Fattah M. El-Sayed, 2019-10-16 Tilapia Culture Second Edition covers the vital issues of farmed tilapia in the world including their biology environmental requirements semi intensive culture intensive culture systems nutrition and feeding reproduction seed production and larval rearing stress and disease harvesting economics trade marketing the role of tilapia culture in rural development and poverty eradication and technological innovations in and the environmental impacts of tilapia culture In addition the book highlights and presents the experiences of leading countries in tilapia culture thus making it ideal for tilapia farmers and researchers who seek the most relevant research and information The new second edition not only brings the most updated information within each chapter but also delivers new content on tilapia transfers introductions and their impacts the use of probiotics and other additives in tilapia culture tilapia trade including marketing and sustainability approaches and practices such as management practices ecosystem approaches to tilapia culture and value chain analyses of tilapia farming Presents the biology of tilapia including taxonomy body shapes geographical distribution introductions and transfers gut morphology and feeding habits Covers semi intensive tilapia culture in earthen ponds tanks raceways cages recirculating systems and aquaponics Provides the latest information on brood stock management production of monosex tilapia seed production and larval rearing under different culture systems Highlights the most common infectious and non infectious diseases affecting farmed tilapia with a full description of disease symptoms and treatment measures Provides an in depth exploration of tilapia economics trade and marketing **Aquaculture Research** ,1983 Masters Theses in the Pure and Applied Sciences Wade H. Shafer, 2012-12-06 Masters Theses in the Pure and Applied Sciences was first conceived published and disseminated by the

Center for Information and Numerical Data Analysis and Synthesis CINDAS at Purdue University in 1957 starting its coverage of theses with the academic year 1955. Beginning with Volume 13 the printing and dissemination phases of the activity were transferred to University Microfilms Xerox of Ann Arbor Michigan with the thought that such an arrangement would be more beneficial to the academic and general scientific and technical community. After five years of this joint undertaking we had concluded that it was in the interest of all concerned if the printing and distribution of the volumes were handled by an international publishing house to assure improved service and broader dissemination. Hence starting with Volume 18 Masters Theses in the Pure and Applied Sciences has been disseminated on a worldwide basis by Plenum Publishing Corporation of New York and in the same year the coverage was broadened to include Canadian universities. All back issues can also be ordered from Plenum. We have reported in Volume 36 thesis year 1991 a total of 11 024 thesis titles from 23 Canadian and 161 United States universities. We are sure that this broader base for these titles reported will greatly enhance the value of this important annual reference work. While Volume 36 reports theses submitted in 1991 on occasion certain universities do report theses submitted in previous years but not reported at the time.

## **Economic Analysis Of Effluent Control From Catfish Ponds** Book Review: Unveiling the Power of Words

In some sort of driven by information and connectivity, the power of words has are more evident than ever. They have the capacity to inspire, provoke, and ignite change. Such may be the essence of the book **Economic Analysis Of Effluent Control From Catfish Ponds**, a literary masterpiece that delves deep in to the significance of words and their affect our lives. Written by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book is key themes, examine its writing style, and analyze its overall impact on readers.

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