

**DURABILITY AND EFFECTIVENESS OF COCONUT  
FRONDS FROM DIFFERENT GROWTH DISTANCE  
FROM THE SEA AS ATTRACTORS FOR FISH  
AGGREGATING DEVICES (FADs)**

**HAFINUDDIN**

**MASTER OF SCIENCE  
UNIVERSITI MALAYSIA TERENGGANU**

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## **DEDICATION**

This thesis is dedicated to my parents, Mamak (Salmiyah binti Sulaiman Abu) and Ayah (Hasaruddin bin Abdul Rahman), and also to my wife, Indah Sari Dewi and my son, Muhammad Hafy Rajasa.

## ABSTRACT

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfillment of the requirement for the degree of Mater of Science

### **DURABILITY AND EFFECTIVENESS OF COCONUT FRONDS FROM DIFFERENT GROWTH DISTANCE FROM THE SEA AS ATTRACTORS FOR FISH AGGREGATING DEVICES (FADs)**

**HAFINUDDIN**

**SEPTEMBER 2014**

**Main Supervisor : Prof. Hj. Sakri Ibrahim, Ph.D.**

**Co-Supervisor : Mohamad Rauhan Wan Hussin, Ph.D.**

**Assoc. Prof. Wan Muhamad Amir Wan Ahmad, Ph.D.**

**School : Fisheries and Aquaculture Sciences**

Traditional fishermen use coconut fronds (*Cocos nucifera*) as attractors in fish aggregating devices (FADs) to attract and aggregate fish in the sea. The durability of coconut frond attractors has become an important criteria to minimize the maintenance cost and also to protect the amount of fish around FADs. However, information on how coconut trees from different locations affect the durability of coconut fronds and its impact on fish quantity is still lacking. In addition, the hypothesis explained that the existence of fish around floating objects (FADs) could be related to the habit of spawning aggregation in FADs. Therefore, the present study is aimed to investigate the durability level of coconut frond attractors for FADs by obtaining the coconut fronds from distances of 500 m, 1,000 m and 1,500 m from the coast. Coconut fronds with different distances from the coast were used to observe the change in fish quantity around FADs. The study also examines the potential of coconut frond attractors as substrates for fish eggs. The experiment involving FADs was conducted at nine locations between lat 5°35' N long 103°00' E in coastal waters off Terengganu, along the east coast of Malay Peninsula. Besides immersion in the sea, the coconut fronds were also immersed in the sea water tank. To observe durability, leaves were taken every two weeks until the leaves were totally rotted. SCUBA diving was to obtain the leaf samples from a depth of 15 m in order to identify the durability of coconut fronds while leaves from 6 m, 12 m and 18 m were taken to verify the presence of fish eggs on attractors. Underwater camera was also used to support the observation in SCUBA diving. In addition, scanning electron microscopy was used to observe the anatomy of leaves, such as cuticle and epidermis thickness, as indicators for the durability of leaves. Meanwhile, to predict the fish quantity around FADs, a fish finder was used. Significance level of data was analyzed with ANOVA test. The results showed that there was no significant difference between coconut fronds with different distances and immersion periods to durability of natural attractors. Similar with durability, fish quantity was unaffected by coconut frond attractors from different distances. This study also showed that fish eggs was absent in coconut frond attractors. But there was the presence of squid eggs in capsule type attached on the FADs.

## **ABSTRAK**

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Sarjana Sains

### **KETAHANAN DAN KEBERKESANAN DARI PELEPAH DENGAN JARAK BERKEMBANG YANG BERBEZA DARI PANTAI SEBAGAI BAHAGIAN PEMIKAT UNTUK UNJAM**

**HAFINUDDIN BIN HASARUDDIN**

**SEPTEMBER 2014**

**Penyelia Utama : Prof. Hj. Sakri Ibrahim, Ph.D.**

**Penyelia Bersama: Mohamad Rauhan Wan Hussin, Ph.D.**

**Prof. Madya Wan Muhamad Amir Wan Ahmad, Ph.D.**

**Pusat Pengajian : Sains Perikanan dan Akuakultur**

Nelayan tradisional menggunakan daun kelapa sebagai pemikat pada unjam untuk memikat dan menggumpul ikan di laut. Tahap ketahanan pemikat daun kelapa telah menjadi salah satu faktor yang penting yang menentukan mengurangkan kos penyelenggaraan serta untuk melindungi kuantiti ikan di sekitar unjam. Namun, maklumat tentang daun kelapa daripada lokasi yang berbeza yang memberi kesan kepada tahap ketahanan daun kelapa dan impak kepada kuantiti ikan masih berkurangan. Tambahan pula, hipotesis menyatakan bahawa kemunculan ikan di sekitar unjam berkait rapat dengan perkumpulan semasa bertelur. Oleh itu, penyelidikan ini bertujuan untuk mengkaji tahap ketahanan daun kelapa dari jarak 500m, 1,000m dan 1,500m daripada pantai. Daun kelapa daripada jarak yang berbeza dari pantai telah digunakan untuk mengkaji perubahan kuantiti ikan di sekitar unjam. Selain itu, memeriksa potensi pemikat daun kelapa sebagai substrat untuk telur ikan. Kajian unjam telah dijalankan pada sembilan lokasi antara 5°35' N, 103°00' E di sekitar perairan Terengganu, pantai timur Peninsula Malaysia. Selain daripada rendaman dalam air laut, daun kelapa juga direndamkan dalam tangki air laut. Untuk mengkaji tahap ketahanan, daun kelapa telah diambil setiap dua minggu sekali sehingga daun kelapa rosak keseluruhannya. Selam Scuba telah dijalankan untuk mengambil sampel daun daripada 15m untuk mengenal pasti tahap ketahanan daun kelapa manakala daun daripada 6m, 12m dan 18m telah diambil untuk mengkaji kemunculan telur ikan pada bahagian pemikat. Kamera bawah air juga digunakan untuk menyokong pemerhatian daripada selam scuba. Tambahan pula, imbasan mikroskop elektron telah digunakan untuk memerhati anatomi daun seperti ketebalan kutikula dan epidermis, sebagai penunjuk tahap ketahanan daun. Sementara itu, untuk meramalkan kuantiti ikan di sekitar unjam, alat pencarian ikan telah digunakan. Tahap yang ketara daripada data telah dianalisis dengan ujian statistik. Hasil daripada kajian telah menunjukkan tiada ketara yang berbeza antara daun kelapa daripada jarak yang berbeza serta masa perendaman terhadap tahap ketahanan daun pemikat semulajadi. Seperti tahap ketahanan, kuantiti ikan juga tidak dipengaruhi oleh pemikat daun kelapa daripada jarak yang berbeza. Kajian ini

menunjukkan tiada telur ikan yang muncul pada pemikat daun kelapa. Tetapi telur sotong telah diperhati pada pemikat daun kelapa.