UNIVERSITI PUTRA MALAYSIA

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This project reports is submitted in partial fulfilment of the requirements for the degree of Bachelor of Agriculture (Aquaculture)

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CERTIFICATION OF APPROVAL

DEPARTMENT OF AQUACULTURE

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This is to certify that I have examined the final project report and all corrections have been made as recommended by the panel of examiners. This report complies with the recommended format stipulated in the AKU 4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia.

Signature and official stamp of supervisor

_____

Assoc. Prof. Dr. Che Roos Bin Saad

Date :

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ABSTRACT

The effect of zeolite added in diet of *Oreochromis* sp. was investigated in the present study. Zeolite was added in the diet at varying level, 0% (T1), 0.5% (T2), 1.0% (T3) and 1.5% (T4) and fed to fish for 12 weeks. Growth performance of the *Oreochromis* sp. was observed in term of weight gain, body length, specific growth rate, food conversion ratio and survival rate. Proximate analyses were also conducted at the end of the study to compare the body composition of the fish among treatments. The results of the study showed that the average body weights of fish in the treatments T1, T2, T3 and T4 were 40.36±17.51 g, 34.09±16.78 g, 40.07±18.61 g, 38.66±18.42 g respectively and similarly average total lengths were 12.44±1.82 cm, 12.12±2.63 cm, 12.57±2.30 cm, 12.37±2.29 cm respectively. However, there was no statistical difference among treatments for all parameters of growth performance ($P>0.05$). The body composition showed there were statistical different ($P<0.05$) on protein, lipid and ash among treatments. T1 (55.68±1.44%) showed the highest percentage of protein followed by T3 (55.46±0.77%), T4 (55.19±1.12%) and T2 (53.31±0.7%). Thus, this study showed the growth rates of *Oreochromis* sp. were not affected by different concentrations of zeolite in feed.

ABSTRAK

Kesan penambahan zeolite di dalam diet *Oreochromis* sp. telah dijalankan di dalam kajian ini. Zeolite telah di tambah di dalam diet dengan berbagai kepekatan 0% (T1), 0.5% (T2), 1.0% (T3) dan 1.5% (T4). Kajian telah dijalankan selama 12 minggu. Prestasi pertumbuhan *Oreochromis* sp. telah dilihat dari segi pertambahan berat badan, perubahan panjang badan, kadar pertumbuhan khusus, nisbah penukaran makanan, dan tahap kebolehan hidup. Analisis proksimat juga telah dijalankan di akhir kajian untuk membandingkan komposisi badan ikan antara rawatan. Keputusan daripada kajian telah menunjukkan purata berat badan ikan di dalam rawatan T1, T2, T3 dan T4 adalah menepati 40.36±17.51 g, 34.09±16.78 g, 40.07±18.61 g, 38.66±18.42 g dan purata kepanjangan ikan masing-masing adalah 12.44±1.82 cm, 12.12±2.63 cm, 12.57±2.30 cm, 12.37±2.29 cm. Walaubagaimanapun, tiada perbezaan yang nyata ($P>0.05$) antara rawatan untuk semua parameter prestasi pertumbuhan. Komposisi badan telah menunjukkan terdapat perbezaan nyata di antara protin, lemak dan abu dalam setiap rawatan. T1 (55.68±1.44%) telah menunjukkan peratusan tertinggi untuk protein diikuti T3 (55.46±0.77%), T4 (55.19±1.12%) dan T2 (53.31±0.7%). Jadi, kajian ini menunjukkan bahawa kadar pertumbuhan tidak dipengaruhi oleh perbezaan kepekatan zeolite di dalam makanan.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS/ LIST OF SYMBOLS

FAO	Food and Agriculture Organization
MOA	Ministry of Agriculture
Å	Angstrom
°C	Degree Celcius
%	percentage
m^2/g	meter square per gram
mm	millimeter
P	protein
DO	dissolved oxygen
pH	power of hydrogen
NH_3	ammonia
g	gram
cm	centimetre
pcs l^{-1}	pieces per litre

CHAPTER 1

INTRODUCTION

Fisheries are divided into Capture fisheries, Aquaculture fisheries, Ornamental fisheries and Recreational fisheries (FAO, 2012a). Capture Fisheries and Aquaculture Fisheries are the food production sectors. According to FAO (1989), Aquaculture fisheries are defined as farming of aquatic organism including fish, molluscs, crustacean and aquatic plant.

Currently, aquaculture becomes popular among farmers. It is one of the food productions sector for family, country and global. The global production of Capture fisheries is higher than Aquaculture fisheries (FAO, 2001). Aquaculture is rising rapidly and has high demand over the years. Thus, it is estimated that the production from aquaculture will be closed to the production of Capture fisheries (Brander, 2007). Besides that, the capture fisheries faced the problem of over-exploitation, and environmental degradation. Thus, the fish production will be declined over the year. Thus, people will have to depend on aquaculture production in the future (FAO, 2012b).

Fish culture had been a tradition in Southeast Asia since 2000 years ago. Fan Li wrote the first treatise on fish culture about 800 BCE. By 1368 BCE, the Ming Dynasty began the promotion of fish farm to support the live fish market. Today, China dominates the fish market (FAO, 2012d). Fish culture is introduced as

source of protein, recreational fishing, aquatic weed control, and research purposes (El-Sayed, 2006).

The Malaysian government encouraged the farmers to culture fish as written in third 'Dasar Pertanian Negara' (DPN3). One of the objectives of DPN3 is to increase the food production sector. Red Tilapia is one of the species encouraged to be cultured (MOA, 2010). The Red Tilapia has certain attributes that make them became ideal candidates for fish culture. It has high market price. The growth rate is faster and the life cycle is shorter. It can be tolerance with wide range of environmental condition such as salinity, pH, temperature, dissolved oxygen and etc. It also has high resistance toward stress and diseases. Red Tilapia feed on low trophic level and also on artificial feed immediately after yolksac absorption (El-Sayed, 2006).

Usually, farmers always faced same problems such as inefficient culture management, which affect the production level. In addition to that, the effluent from the fish culture is high which will pollute the neighbouring environment. The manure, fertilizer, and feed applied to the culture will further affect the water quality. The deterioration of water quality results in the stressful of culture species. The stress will lead to poor growth rate, prone to disease, increase mortality and decrease production (Boyd and Tucker, 1998).

Zeolite is an alternative way that can be used to handle water quality problem in fish culture. Zeolite is a natural mineral that contain alumina and silicate. This

mineral reacts with sodium and water to produce sodium aluminosicilate ($Na_{12}[(AlO_2)_{12}(SiO_2)_{12}]27H_2O$) (James and Sampath, 1999). The essential building block of the zeolite is a tetrahedron of four oxygen anion surrounding the small silicon and aluminium ion. It has tetrahedral framework structure with unique intercrystalline pore-channel system at the middle. The water can move in and out from channel easily which make the zeolite become rigid. The arrangements of these ions make the zeolite into a 3-dimensional crystalline structure (Jacobsen *et al*., 2000; Egeblad *et al.*, 2008).

Wernette *et al*. (2003) quotes that zeolite is also known as inorganic electrides. It serves as counteranions to alkali anion. Aluminosilicate zeolites can trap electron by either ionizing radiation or exposure to sodium vapour. The functions of zeolite are as a molecular sieve, catalyst, catalyst supports and adsorbent. It has been used mainly in detergent industry, aquaculture pond, and nuclear waste effluent treatment (James and Sampath, 1999; Schlienger *et al*., 2011). Zeolite has acidic properties, high surface area and thermal stable. This material can increase its basicity by ion exchange (Besser *et al*., 1998).

The present study aims to determine the effectiveness of the zeolite in tilapia culture. The objective of the experiment is to determine the growth rate of fish fed with diets containing zeolite at different concentrations

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