CONTENTS

LIST OF ABBREVIATIONS

ABBREVIATION	NAME
DO	Dissolved oxygen
EC	Electric conductivity
CLAR	Central Laboratory for Aquaculture Research
G. fish farm	Governmental fish farm
µg/g	Micro gram per gram
ND	Not detected
O. P	Ortho Phosphorus
Phyto.	Phytoplankton
Sal.	salinity
SD	Secchi Disc
Shad. Azz. fish farm	Shader Azzam fish farm
T. Alk	Total Alkalinity
TDS	Total dissolved solids
T. Hard	Total Hardness
T. P	Total Phosphorus
Zoo.	Zooplankton

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ABSTRACT

In a study to biocontrole of keratinolytic fungi, the percentage of fungal flora community was higher in Shad. Azz. fish farm and Lake Manzala than G. fish farm and Private fish farm and was higher in spring and summer seasons than autumn and winter seasons. Lowest percentage was recorded in Private fish farm and in winter season. Several fungi were isolated and assay for keratinolytic activity; *Penicillium commune*, which had the highest keratinolytic activity was selected for further experimental studies. Several experiments were carried out to investigate the effect of some environmental as well as nutritional factors on the potentiality of *Penicillium commune* to grow and produce keratinase enzymes. It is cleared that the best environmental conditions and nutritional factors for highest growth and keratinase production were 7 days as incubation period at 6 pH-value and 30 ºC in 50 ml of the medium by using 2 ml inoculum of tested fungus and addition of starch and yeast extract to the medium as carbon and nitrogen sources by the concentration of 0.6 g respectively. Purification of keratinase enzyme was carried out by salting out using ammonium sulfate ($(NH_4)_2SO_4$) at 80% saturation and then dialyzed against sucrose crystals then fractionation by sephadex G-100. Enzyme activity and protein content in each fraction were measured. Fractions which showed highest protein and keratinase activity were collected and analyzed by sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS–PAGE) which indicated that the molecular weight of the keratinase enzyme was 60 kDa. For biocontrole of *Penicillium commune* growth we used ZnO nanoparticles; we found that ZnO nanoparticles has no any effects on the fungal growth in comparison to the control.

Water analysis (physical, chemical and biological characteristics of water) and heavy metals residues; iron (Fe), copper (Cu), zinc (Zn),

cadmium (Cd) and lead (Pb) in water were carried out at the 4 locations. The results obtained revealed that: ammonia, nitrate, nitrite, and phosphorus were higher in Shad. Azz. fish farm, followed by Lake Manzala then the two fish farms in Abbassa. The harmful phytoplankton was significantly higher in Lake Manzala than other sites, but chlorophyll "a" was high in the private farm in Abbassa than other sites. This is due to the applied management system only. Also pollutant concentration of iron, zinc, copper, lead and cadmium were in the same direction. The study recommends the prevention of the use of sewage water in aquaculture.

AIM OF WORK

- Isolation of keratinolytic fungal flora from lake Manzala and some fish farms.
- Determination of fungal species which has the most keratinolytic effect.
- Investigation the effect of some environmental as well as nutritional factors on the potentiality of fungi to grow and degrade the keratinaceous substrate in order to produce keratinase enzyme.
- Purification of keratinase enzyme produced by fungi and detecting its molecular weight.
- Use of nanotechnology technique to biocontrol of keratinolytic fungal flora.
- Evaluation of water quality of some production fish farms in different locations and Lake Manzala areas.

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Impacts of Some Environmental Conditions on Water Quality and Some Heavy Metals in Water of Different Aquaculture Sites

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ABSTRACT

This study aimed to evaluate the effect of some environmental conditions on water quality and concentrations of some heavy metals in some fish farms waters and Lake Manzala that lasted for four seasons. The sites of the diversity of water resources were the Lake Manzala, Al Aboty region (South Port said), brackish water; private fish farm used water from Bahr El Bakar drain directly (sewage wastewater), Shader Azzam region (Port Said Governorate); governmental fish Farm, Abbassa - Abou Hammad (agricultural drainage and ground water) and private fish farm in Abbassa - Abou Hammad (agricultural drainage water). Water, phytoplankton and zooplankton samples were collected once every season. The results obtained revealed that: ammonia, nitrate, nitrite, and phosphorus were higher in Shader Azzam fish farm, followed by Lake Manzala then the two fish farms in Abbassa. The harmful phytoplankton significantly higher in Lake Manzala than other sites but chlorophyll "a" was high in the private farm in Abbassa than other sites and this is due to the applied management system only. Also pollutant concentration of iron, zinc, copper, lead and cadmium were in the same direction. The study recommends the prevention of the use of sewage water in aquaculture.

Key words: Environmental condition; water quality; lakes; heavy metals; fish farms.

Introduction

Environmental conditions play an important role in determining the properties of physical, chemical, biological of water and affecting the accumulation of pollutants from heavy elements and then move to the fish and soil.

The environmental conditions in water bodies are constantly changed by various natural and human induced factors. The features of the physico-geographical environment of the catchment area, as well as the morphometric parameters of the water body and its hydrological regime, accelerate or block the supply of organic matter to the lakes, which affects its trophic level, water pH and hardness, its electrolytic conductivity and coloring, light and oxygen availability, and consequently algae and plant species diversity (Chobot and Banaś, 2008).Physical factors such as climate (i.e. temperature, wind, precipitation, and solarradiation) are also important determinants of water quality in lakes and all critically affect the lake's hydrologic and chemical characteristics, and indirectly affect the composition of the biological community (Najafpour et al., 2008). Also, water quality may be affected by the source of the water, rate of flow, nutrients and algae. Other factors like sewage and agricultural runoffs, various hazardous chemicals and natural contaminants (animal feces) reach the natural sources of water and also pollute the ground water by seeping (Hamill and Verburg, 2010).

Heavy metals are the most hazardous pollutants due to the speed of their dissemination in biosphere and their accumulative concentration. They permeate the environment by various means, penetrate the circle of metabolism, become toxic and disturb physiological functions of organism (Öztürk et al., 2009). While regulating constituents of food products, the World Health Organization (WHO) as well as the Food and Agriculture Organization (FAO) suggest monitoring the concentrations of heavy metals.

Studies on heavy metals in rivers, lakes, fish and sediments have been a major environmental focus especially during the last decade. Sediments are important sinks for various pollutants like pesticides and heavy metals and also play a significant role in the remobilization of contaminants in aquatic systems under favorable conditions and in interactions between water and sediment (Özmenet al., 2004; Fernandes et al., 2008; Öztürk et al., 2008; Pote et al., 2008 and Praveena et al., 2008).

Heavy metals such as copper, iron, chromium and nickel are essential metals since their play an important role in biological systems, whereas cadmium and lead are non-essential metals, as they are toxic, even in trace amounts (Fernandes et al., 2008). For the normal metabolism of the fish, the essential metals must be taken up from water, food or sediment (Canlı and Atlı, 2003). These essential metals can also produce toxic effects when the metal intake is excessively elevated (Tüzen, 2003).The aim of this study was to evaluate the

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