IMPORTANCE OF WATER QUALITY AND MINERAL SALT BALANCE IN TWO FISH FARMING SYSTEMS IN THE NORTH NILE DELTA

By

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B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Assiut Univ., 2004

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ABSTRACT

The study was conducted in two fish farming systems in earthen ponds located at (Bahr El-Arab drains- El-Rayed area- Kafer El-Shiakh government- Egypt); namely, the feed fish farming and fertilizer fish farming systems. Each system was replicated in four ponds (8400m^2 each). The experimental period lasted from July 2014 to June 2015, including 3 month overwintering. Nile tilapia (*Orechromis niloticus*); mullet (*Mugil cephalus*) and catfish (*Clarias garipinus*) were cultured in each pond at initial weight of 2, 30 and 5 g, respectively. Samples were collected once every month to determine water quality, phytoplankton and zooplankton abundance and fish growth performance. Sediment samples were collected at the beginning and the end of experimental period to determine sediment quality. Showed no significant differences in monthly values of water temperature between the feed fish farm and fertilizer fish farm ponds. The monthly pH values were significantly higher in the fertilizer fish farm (7.9-8.9units) compared to those of the feed fish farm (7.6-8.2 units) due to the increased photosynthetic activities in the fertilized ponds. Results clear that salinity, EC and total hardness were not affected by pond management. Pond management (feed and organic fertilizer) did not affect soil pH in both the surface and subsurface layers. While, water quality in fish farms is greatly influenced by feed management and fertilizer inputs which in turn affect sediment quality in ponds. The total production of fish within each fish farm averaged 5050 and 2957 kg/feddan for feed and fertilizer fish farms, respectively. The production costs per kilogram of fish were 8.06 and 4.53 LE in the feed and fertilizer farms, respectively. While, the total income per feddan was higher in the feed fish farm, the net income was significantly higher ($P<0.05$) in the fertilizer fish farm due to its lower operating costs per unit of production. The cost of fish production in the fertilizer system was significantly less than that of artificial feed system. It is concluded that the fertilizer fish ponds needed additional doses of artificial feed during the last two months to increase individual growth rates of Nile tilapia and catfish.

Key words: Aquaculture, Nile tilapia, water quality, sediment quality, physical-chemical properties, fertilizer, supplemental feeding.

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LIST OF ABBREVIATIONS

BOD	Biological oxygen demand
Chl “a”	Chlorophyll “a”
DO	Dissolved oxygen
EC	Electric conductivity
Kg	Kilogram
L	Litter
Mg	Milligram
NH_3	Un-ionized ammonia
NH_4	Ionized ammonia
NO_2-N	Nitrite
NO_3-N	Nitrate
OM	Organic matter
OP	Orthophosphate
Org.	Organism
pH	Hydrogen logarithm
SD	Secchi disc
T.Alk	Total alkalinity
T.H	Total harness
TAN	Total ammonia nitrogen

INTRODUCTION

Aquaculture constitutes an important business in worldwide agriculture activities particularly in developing countries where subsistence farming prevails (Tucker, 2015). Rapid growth of aquaculture outputs in recent years had negative effects on surrounding environment which instigated world concern (Tucker, 2015).

Freshwater fish farming activities in Egypt are dependent on the use agriculture drainage water which conflict with irrigation needs for other agriculture crops that simultaneously use recycled drainage water (EL-gayar, 2003).

Fish farming in Egypt is considered as a cash crop with higher revenues and net income compared to other agricultural activities. So, aquaculture activities in Egypt had a higher economic competitive edge than crop production sector in the Nile Delta, allowing their rapid growth during the last two decades.

Good water supply is considered as essential requirement for successful fish farming activities. Evaluations of water in terms of its seasonal quality, micronutrients dynamics during farming operations and effluent composition are needed in order to design future management plans (Ali *et al*., 2009), suitable for the Nile Delta farming operations. Also, water quality in fish farm ponds should conform to physiological requirements for optimal growth of the cultured species; since good quality water is a prerequisite for successful fish farming (Boyd and McNevin, 2015).

Sediment and water quality of fish ponds has a higher influence on enhancing pond productivity, supplying partial feeding for cultured