
(Oreochromis sp.)

(Lactuca sativa var longifolia)

(Mean+SD) / ± /

(pellet)

Archive of SID

E-mail: rezarafiee@yahoo.com

(L)

(PVC)

(Spotte, 1970; Liao &

Mayo, 1974)

(Bacterial nitrifying biofilters)

(Denitrifying bacterial biofilter)

(N₂)

(N₂O)

(Austin & Austin, 1989)

(UPM)

()

()

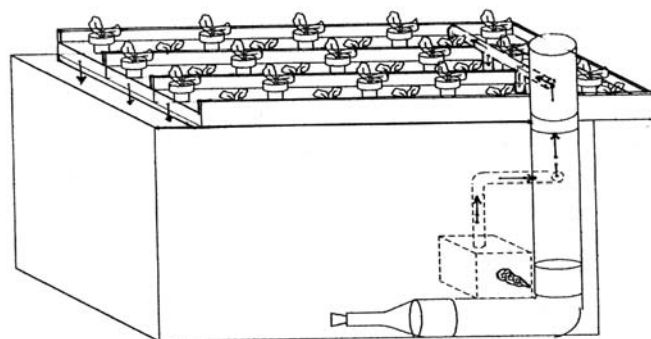
(Naegel, 1977; Lewis *et al.*, 1978;

Sutton and Lewis; 1982; Rakocy, 1994)

)

() (

()



	Ec*	pH	Mn (mg/l)**	Zn (mg/l)	Cu (mg/l)	Ca (mg/l)	Mg (mg/l)	N (mg/l)	K (mg/l)	P (mg/l)
	,	/	/	/	/	/	//	/	/	/

Ec*
= mg/l**

(*Lactuca*)

sativa

(Cargill. Company)

()

(*Oreochromis sp.*)

/ ± /

(Mean+SD)

(DO)

(YSI Model 57)

(Ec)

(HANA, HI 8033)

(Orion pH

model 410A)

±
/ ± /

(NO₂-N)

(TAN)

/ ± /

(Indophenols)

± /

(Parsons, 1984)

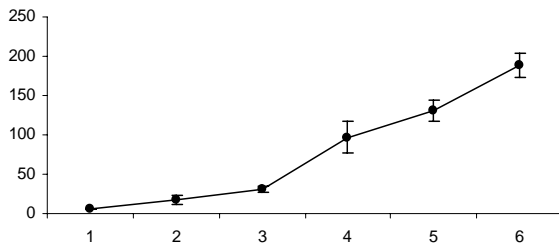
(NED)

(AHPA, 1980)

/ ± /

(NO₃-N)

(Kitamura *et al.*, 1982)

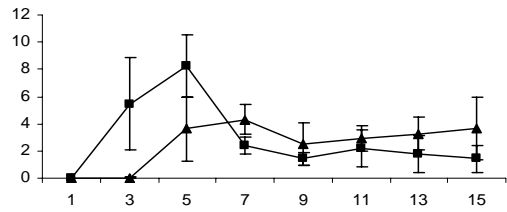


±

±

±

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(Render & Stickney, 1979)

(Render & Stickney, 1979)

pH

pH

. (Seawright, 1993)

(nitrifying bacteria)

.(Naegel, 1977; Rakocy, 1995)

()

pH

.(Austin & Austin, 1987)

(N₂)

pH

.(Rakocy, 1995)

(*Oreochromis niloticus*)

(Mackay & Toever, 1981;

pH

pH

.Wren, 1984, MacMurtry *et al.*, 1997)

(Naegel, 1977; Rakocy,

pH

.1995)

/

pH

/

/ - / (Gloger *et al.*, 1995)

(MacMurtry *et al.*, 1997)

/

/ /

pH

(Burgoon & Baum,

1984)

/ /

/

/ / (Rakocy *et al.*, 1997) .(Watten and Busch, 1984; Rakocy, 2000)
 / (MacMurtry *et al.*, 1997) . /
 (Watten and Busch, 1984)
 Lewis *et al.*, 1978; / /
 L . (Burgoon & Baum,1984)

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Design of a Simple Closed Aquaponic System and Production of Red Tilapia (*Oreochromis* sp.) and lettuce (*Lactuca sativa* var *longifolia*)

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H. Farahmand³

Abstract

A simple recirculating tilapia and lettuce culture system containing aerobic and anaerobic bacterial compartments was designed. The efficiency of the system for fish and lettuce production as well as improvement of water quality parameters were investigated. Seventy five juveniles of red tilapia with a mean individual weight of 5.62 ± 1.75 g (Mean \pm SD) were introduced in each rearing fish tank. Fish tank was a rectangular fiberglass one with the capacity of holding 840 liters of water. At the initiation of the experiment was the tank filled with 640 liters of fresh water. The system benefitted from a good efficiency in the reduction of N-compounds (total ammonia -N, nitrite and nitrate) at the defined standard levels after five weeks. The concentration of total ammonia-N increased and reached a level of 8 mg/l after 5 weeks. Concentration of total ammonia-N was 0.73 mg/l at the end of experimental period. Concentration of nitrite increased and got to less than 1.52 mg/l after 9 weeks. Concentration of nitrate averaged 0.73 ± 0.61 mg/l at the end of the experimental period. The fish attained a mean individual weight of 188 ± 19 g at the end of 15-week experimental period. Mean fish was 9.14 ± 1.55 kg per unit of production system or about 13 kg/m³ of water at the end of experiment. Three harvests biomass of lettuce yielded wet weights of 1437 ± 339 , 2112 ± 297 and 1173 ± 202 g respectively during the experimental period. Results indicated that with use of available facilities, construction of a simple recirculating aquaponic system for combined production of fish and vegetable with a minimum use of water and space would be practically possible.

Keywords: Recirculating a quaponics system, Aerobic bacterial biofilter, Anaerobic bacterial biofilter, Lettuce, Red tilapia, Water quality, N-compounds.

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