

...

(PL)

n-3HUFA

(EPA: : n)

(DHA: : n)

EPA DHA

(P< / ,r = /)PL (P< / ,r = /)PL (0)

0

) PL

(

.(P< / r= / P< / , r = /)

// : // :

n-3HUFA

()

n-3HUFA

())

(
()
()

(.)

() (PLs)

...

()

()

()

n-

EPA DHA 3HUFA

()

DHA

n-3HUFA

EPA

(PL)

)

(

Docosahexaenoic Acid; DHA

Eicosapentaenoic Acid; EPA

()

n-3HUFA

()

()

()

ICES30 ICES0 ICES)

(ICES50

()

()

()

()

()

()

0

CMI=D5+D10+...+Dx +D30 or D60

PL

PL

:

=CMI

X

= Dx

= X

= D30 or D60

International Council for the Exploration)

(of the sea

n-3HUFA

n-3HUFA

n-3HUFA

[⚡] - Cumulative Mortality Index

^Δ -Super Selco (INVE; Aquaculture;Gent;Belgium)

...

SPSS

ICES0 /

/ / ICES30 /

/ / ICES50

()

n- (P< /)

EPA DHA 3HUFA

(n= M(SD))

DHA/EPA	n-3 HUFA	DHA	EPA	
/	d / (/)	c / (/)	c / (/)	
/	d / (/)	c / (/)	c / (/)	ICES0
/	c (/)	b / (/)	b / (/)	ICES30
/	a / (/)	b / (/)	a / (/)	ICES50
/	b / (/)	a / (/)	b / (/)	

(P< /)

EPA DHA n-3HUFA

, / PL

() PL

سایر تیمارها

نتیجه

(P< /)

(P< /)

/

¹- One-Way Analysis of Variance (ANOVA)

(PL)				(PL)				CMI
0		0		0		0		
	/	/	/		/	/	/	
/	/	/	/		/	/	/	ICES0
/	/	/	/	/	/	/	/	ICES30
/	/	/	/	/	/	/	/	ICES50
	/	/	/		/	/	/	

PL PL PL PL
 (P < /) (0)
 PL PL
 (P < /)
 () 0 ()

(SD)		PL		
0				
(/) b	(/) d	/ (/) d	(/) d	
(/) b	(/) c	/ (/) dc	(/) Cd	ICES0
(/) a	(/) a	(/) b	(/) ab	ICES30
(/) b	(/) b	(/) c	/ (/) cb	ICES50
(/) a	(/) a	(/) a	(/) a	

(P < /)

(SD)		PL		
0				
(/) b	(/) c	(/) c	(/) c	
(/) b	/ (/) c	(/) b	(/) C	ICES0
/ (/) a	(/) a	(/) ab	(/) ab	ICES30
/ (/) b	(/) b	(/) b	/ (/) b	ICES50
(/) a	/ (/) a	(/) a	(/) a	

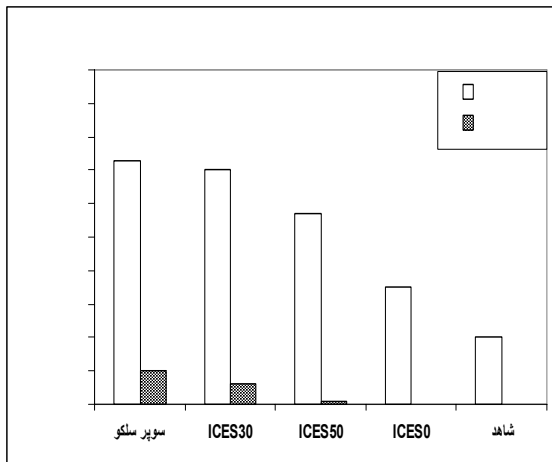
(P < /)

()

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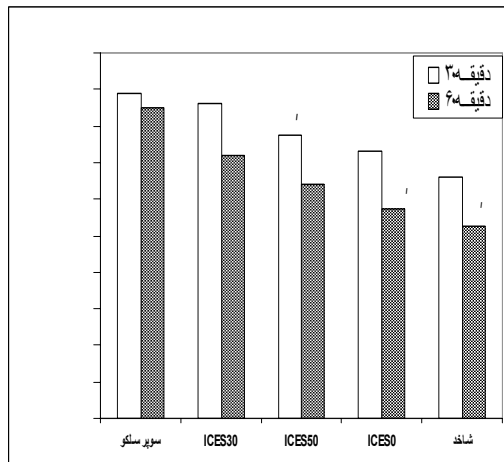
	c	
	c	ICES0
/	a	ICES30
	b	ICES50
	a	

(P < /)



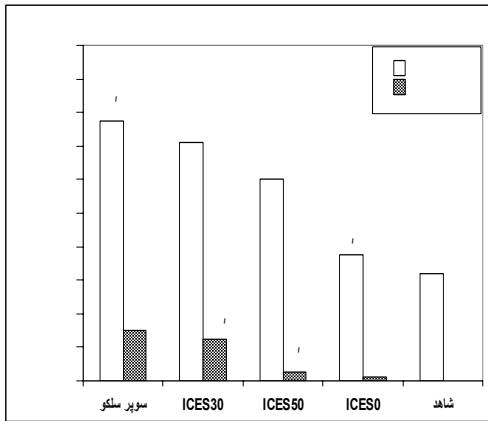
(Oppt)

PL



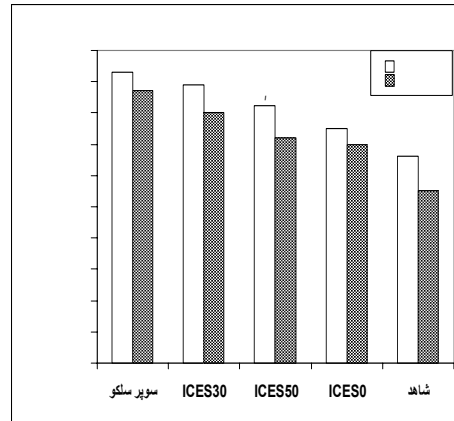
(ppt)

PL



(Oppt)

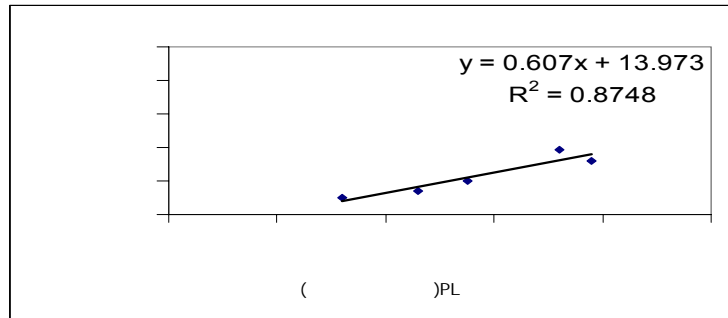
PL



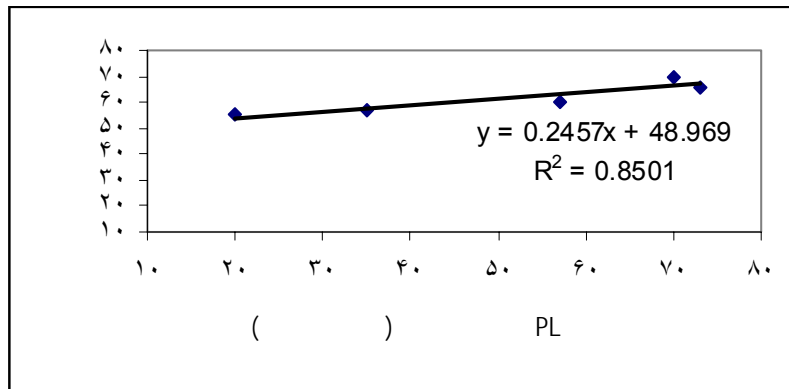
(PPT)

PL

()



PL



0 PL

n-3HUFA

PL PL

n-3HUFA

n-3HUFA PL

(/ EPA DHA n-3HUFA) ICES30

n-3HUFA

(/ EPA DHA) (P< /)

EPA DHA /

n-3HUFA

EPA DHA

(P< /)

n-3HUFA

n-3HUFA

/

n-3HUFA

(P< /)

PL ()

(P.mondon)

n-3HUFA

/

n-3HUFA

(« » 0)

(P< /)

PL ()

(Litopenaeus vannamei)

/

n-3HUFA

PL ()

(P< /)

حالی کہ (P< /)

PL

(P< /)

()

n-3HUFA

زنجیره

اسیدهای

تاثیر

(.)

DHA

EPA

n-

3HUFA

n-3HUFA

EPA DHA

($P < /$, $r = /$) PL

0)

($P < /$ $r = /$) PL

n-3HUFA

(

)

PL

(0

()

افزایش

محیطی

بیانگر

اهمیت

این تحقیق

DHA

جیره غذایی

EPA

محیطی

سفید هندی

همبستگی‌ها

دیگر

(/

PL PL

:

)

/) EPA DHA

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2-Bauman, R.H., Jamandre, D.R.,1990.A Practical Method for Determining Quality of *Penaeus monodon*(Fabricus)Fry for Stocking in Grow-out Ponds,Technical and Economic Aspects of Shrimpfarming, Proceeding of the Aquatec90, Conference, Kualalumpure, Malasyia,INFOFISH, 124-137

3-Bauman, R.H; Scura, E.D., 1990.Determining the Quality of *Penaeus monodon* Postlarvae, AbstractsWorld Aquaculture 90, National Research Council Canada, Ottawa, Ontario, Canada, 101/T30.2

4-Cavali, R.O., Hernandez-Herrera, R., Racotta, I.S., Lavens, R., and Sorgeloos, P., 2001.The use of an Ammonia Stress Test as a Tool to Evaluate Larval Quality, Larvi2001.Fish & Shellfish Larviculture Symposium, Aquaculture Society, Special Publication, No.30, Oostende, Belgium.Pp.125-128

5-Coutteau, P., and Sorgeloos, P., 1997.Manipulation of Dietary Lipids, Fatty Acids and Vitamins in Zooplankton Cultures.Freshwater Biology, 38,501-512.

6-Dhert, Ph., Lavens, P., and Sorgeloos, P., 1992.Asimple Test for Quality Evaluation of Cultured Fry of Marine Fish, Med, Landbouw, Univ.Gent,57/4b.2135-2142.

-
- 7-Dhert, Ph., Lavens, P., and Sorgeloos, P., 1994. Stress Evaluation: a Tool for Quality Control of Hatchery-Produced Shrimp and Fish Fry, *Aquaculture*, Europe, 2, 6-10.
- 8-Gomez, R.O., Rodrigues, J.M., and Morales, J., 1991. Stress-Test: a Practical Tool to Control Postlarval Shrimp quality, Larvi91, Fish & Shellfish Larviculture Symposium, 27-30 August, Gent, Belgium. Special Publication, European Aquaculture Society, 15, pp.358-360.
- 9-Kontara, E.K.M., Coutteau, P., and Sorgeloos, P., 1997. Effect of Dietary Phospholipid on Requirements for and Incorporation of n-3 Highly Unsaturated Fatty Acids in Postlarval *Penaeus Japonicus* Bate. *Aquaculture* 158, 305-320.
- 10-Kumlu, M., Jonnes, D.A., 1995. Salinity Tolerance of Hatchery-Reared Postlarvae of *Penaeus Indicus* H. milne Edwards Originating From India, *Aquaculture* 130, 287-296.
- 11-Leger, P., Naessens-Foucaert, E., and Sorgeloos, P., 1987. International Study on Artemia: XXXV. Techniques to Manipulate the Fatty Acid Profile in Artemia Nauplii and the Effect on Its Nutritional Effectiveness' for the Marine Crustacean Mysisopsis Bohia (M.), *Artemia Research and its Application*, Vol., 3. Ecology, Culturing, Use in Aquaculture, Universa Press, Wetteren, Belgium. pp.411-424.
- 12-Leger, Ph., and Sorgeloos, P., 1992. Optimized Feeding Regimes in Shrimp Hatcheries, *Culture of Marine Shrimp: Principles and Practices*, Elsevier Science Publishers, New York, pp.225-244.
- 13-Lignot, J.H., Cochard, J.G., Soyez, C., Lemarine, P., and Charmantier, G., 1999. Hemolymph Osmolality According to Nutritional Status, Molting Stage and Body Weigth of *Penaeus Stylirostris*, *Aquaculture* 170, 79-92.
- 14-Parado-Estepa, F.D., Feraris, R.P., Ladja, J.M., and Dejensus, E.G., 1987. Responses of Intermolt *Penaeus indicus* to Large Fluctuations in Environmental Salinity. *Aquaculture* 64, 175-184.
- 15-Ress, J.F., Cure, K., Piyatiratitivorakul, S., Sorgeloos, P., and Menasveta, P., 1994a. Highly Unsaturated Fatty Acid Requirements of *Penaeus Monodon* Postlarvae, An Experimental Approach Based on Artemia Enrichment, *Aquaculture* 122, 193-
- 16-Ress, J.F., Cure, K., Piyatiratitivorakul, S., Menasveta, P., and Sorgeloos, P., 1994b. Osmotic Stress Resistance as a Quality Diagnostic for Penaeid Postlarvae, The Third Asian Forum, Asian Fisheries Society, Manila, Philippines. pp.1025-1028.
- 17-Samocho, T.M., Guajardo, H., Lawrence, A.L., Castle, F.L., Speed, M., Mckee, D.A., and Page, K.I., 1998. A Simple Stress Test for *Penaeus vannamei* Postlarvae, *Aquaculture* 165, 233-242.
- 18-Tackaert, W., Abeline, P., Dhert, Ph., and Sorgeloos, P., 1989. Stress Resistance in Postlarval Penaeid Shrimp Reared Under Different Feeding Procedure, *J. World Aquaculture, Soc*, 20:74A.
- 19-Wouters, R., Hauwaert, A.V., Naessens, E., Ramos, X., Pedrazzoli, A., and Lavens, P., 1997. The Effect of Dietary n-3HUFA and 22:6n-3/20:5n-3 Ratio on White Shrimp Larvae and Postlarvae, *J. Aquaculture International*, 5, 113-126.
- 20- Yashiro, R., 1987. The Effect of Artemia Fed With Different Diets on the Growth and Survival of *Penaeus Monodon* Fabricius Postlarvae, *Artemia Research and its Application*, Vol.3. Ecology, Culturing, Use in Aquaculture, Universa press, Wetteren, Belgium. pp.447-457.

The Effects of n-3HUFA on the Osmotic Stress Resistance of Postlarval *Fenneropenaeus indicus*

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M.Shakouri³

N.Agh⁴

Abstract

This study was conducted to determine the resistance of *Fenneropenaeus indicus* to osmotic stress. PL-1 of *Fenneropenaeus indicus* were reared for 15 days on *Artemia urmiana* nauplii enriched with various levels of n-3HUFA. On days 10 and 15, their resistance to osmotic stress, transfer from 33 ppt to 0 and 6 ppt, for 30 and 60 minutes were analyzed. In PL-10 and PL-15, Postlarvae fed with *Artemia* containing 33/8 mg/g DW n-3 HUFA and DHA/EPA ratio of 2/5, had a significantly higher resistance in 80% and 100% reduced salinity ($P < 0.001$). Also, there is positive and significant correlation observed between DHA/EPA ratio in *Artemia* and osmotic stress resistance (0ppt) in PL-10 ($r = 0.99$, $P < 0.05$) and PL-15 ($r = 0.96$, $P < 0.01$). On the other hand, a significant correlation was found between the osmotic stress resistance of PL-10 in 6 and 0 ppt for 30 minutes as well as the survival recorded in five days later in each tank ($r = 0.87$, $P < 0.05$; $r = 0.85$, $P < 0.05$). It is concluded that resistance to osmotic stress is a rapid, inexpensive and valuable quality indicator for postlarval penaeidae shrimp.

Keywords: Osmotic stress, Postlarvae, Enrichment, *Artemia urmiana*, Stress resistance, HUFA

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