

۹ *Artemia urmiana*

parthenogenetic *Artemia*

*

(I I : I I :)

Shikimate)

Artemia)

(parthenogenetic *Artemia*)

(pathway

(*urmiana*

(I)

(*Dunaliella salina*)

Mycosporine- Porphyrin-334 Palythine Mycosporine-2Glycine Shinorine Asterina-330

HPLC

Palythanol

Glycine:valine

A. urmiana Shinorine

A. urmiana

...
(Mycosporine-like amino acids)

(MAAs)

Singh *et al.*,)

MAAs (2008)

Sinha *et al.*, 2007;)

(Singh *et al.*, 2008

-) Shikimate MAAs

Singh *et al.*,) (

(2008

Sinha) MAAs

(*et al.*, 2007

Jeffrey *et al.*,)

(1999

MAAs

Newman *et al.*, 2000; Carefoot *et al.*, 2000;)

(Helbling *et al.*, 2002;

(Shick *et al.*, 2005)

MAAs

(Shick and Dunlap, 2002)

MAAs

- (Newman *et al.*, 2000) (*Euphausia superba*)

Tartarotti *et al.*, 2001;)

Grant *et al.*,) (Pérez *et al.*, 2006

(1984

Artemia)

MAAs

(parthenogenetic *Artemia*) (*urmiana*)

-

B () A

- () C ()

(Halliday *et al.*, 2008)

-

)

(UVR)

McCulloch, 2003; Platt and)

(Honninger, 2003

DNA

(Kieber *et al.*, 2003; Buma *et al.*, 2003)

Jokinen *et al.*,)

(2000; Lesser and Barry, 2003

Hessen,)

UV

(2003

-

Shick and Dunlap,)

(2002

MAAs

-

¹ Ultraviolet Radiation

(g l⁻¹) Walne
) B₁₂ B₁
(Lavens and Sorgeloos, 1996) (

MAAs

Dunaliella

salina

A. urmiana

() parthenogenetic *Artemia*

°C

: lux : pH= °C :)
(g l⁻¹

(Sorgeloos et al., 1986)

(I

g l⁻¹

g l⁻¹

g l⁻¹

Lavens and Sorgeloos,)

± / °C

(1996

$$A = X \times 10^4 \times d$$

:X .

:A

:d -

D. salina

Dunaliella salina

g l⁻¹

D. salina

(Coutteau et al., 1992)

g l⁻¹

(Fisher et al., 1994)

Dunaliella salina

Carreto *et al.*,)

MAAs

(2001 MAAs

) Martine Fouchereau-Peron

SPSS (ver. 15.0)

Mason *et al.*, 1998

($P = 0.05$)

(Two way-ANOVA)

Excel (ver. 2007)

Germany,)

ml (DELAWARE, 15 ml, No 96006

Dunaliella

°C

t *salina*

ml

ml

Dunaliella salina

C18 Sep Pak

Dunaliella

MAAs

salina

Dunaliella salina

°C

MAAs

% / % μ l

MAAs

SPECTRASYSTEM) HPLC

()

(SN 4000, AS 3000,P 1000XR,SCM 1000

Dunaliella salina

C8(4.6 mm \times 500 mm)

)

MAAs

% / %

(*A. urmiana* Shinorine

/

Dunaliella salina

() ($P < /$)

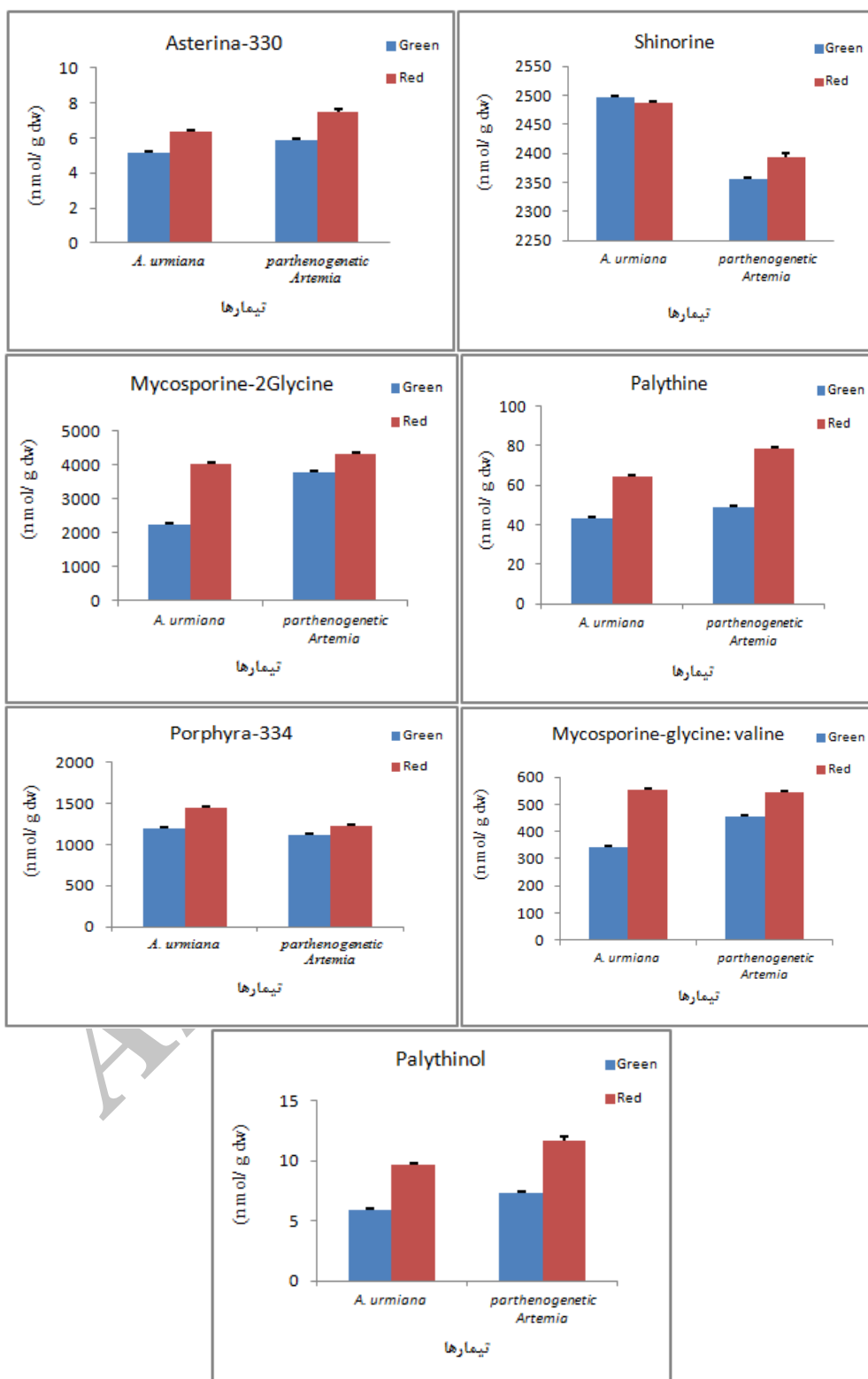
MAAs

() *A. urmiana*

² Pierre and Marie Curie University or UPMC-Paris University of Paris 6

		Porphyra-334	Shinorine
		(<i>A. urmiana</i>)	
(/ :)	Asterina-330	Palythine	
(/ :)			
MAAs			Mycosporine-glycine:valin
()	Carefoot .		<i>Dunaliella salina</i>
MAAs			<i>A. urmiana</i> MAAs
	(<i>Aplysia dactylomela</i>)		
<i>Acanthophora spicifera</i> , <i>Centroceras clavulatum</i>			
<i>Ulva lactuca</i>	<i>Laurencia sp.</i>		
-	MAAs	Asterina-330	MAAs
			Mycosporine-2glycine
	MAAs		
	<i>Acanthophora</i>		
<i>Ulva lactuca</i>			MAAs
			MAAs
	MAAs	Shick Carrol	
()	Newman		()
	MAAs		(<i>Strongylocentrotus droebachiensis</i>)
<i>Phaeocystis</i>	(<i>Euphausia superba</i>)	<i>Mastocarpus</i>	
	<i>antarctica</i>	<i>Laminaria</i>	(MAAs) <i>stellatus</i>
MAAs			(MAAs) <i>saccharina</i>
()	Helbling .	MAAs	
<i>Idothea</i>	<i>Amphitoe valida</i>	()	Mason
	<i>baltica</i>	<i>Mastocarpus stellatus</i>	
	MAAs	<i>Oryzias latipes</i>	(MAAs)
	MAAs		MAAs
(MAAs)	<i>Polysiphonia sp.</i>	MAAs	
<i>Codium sp.</i>			(Asterina-330 Palythine)
(MAAs)	<i>Enteromorpha sp.</i>		

/ /



() MAs *Dunaliella salina* () parthenogenetic *Artemia* *A. urmiana* ()

() MAAs t						
. (P = 0.05)						
<i>Dunaliella salina</i>						
AS	SH	Myc-2G	PI	PR	Myc-G:V	PL
/ ± / ^a	/ ± / ^a	/ ± / ^a	/ ± / ^a	/ ± / ^a	/ ± / ^a	/ ± / ^a
/ ± / ^b	/ ± / ^b	/ ± / ^b	/ ± / ^b	/ ± / ^b	/ ± / ^b	/ ± / ^b

AS: Asterina-330; SH: Shinorine; Myc-2G: Mycosporine-2glycine; PI: Palythine; PR: Porphyra-334; Myc-G:V: Mycosporine-glycine:valine; PL: Palythinol

MAAs				
. (P = 0.05)				
MAA identity	Source	df	F	p
Asterina-330	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Shinorine	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Mycosporine-2glycine	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Palythine	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Porphyra-334	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Mycosporine-glycine:valine	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/
Palythinol	Species		/	/
	Diet		/	/
	Species*Dite		/	/
	Residual		/	/

...

(*Mastocarpus stellatus*) 330
Mason *et al.*,) *Dunaliella*) MAAs
Shinorine .(1998 (*salina*)
Asterina-330 Palythine - MAAs ()
Dunaliella salina
Shinorine Porphyra-334 *Dunaliella salina*
MAAs MAAs
MAAs *Dunaliella salina*
MAAs *Dunaliella salina*
.(Shick and Dunlap, 2002)
Shinorine MAAs) MAAs
MAAs Porphyra-334 () (*Dunaliella salina*)
A. urmiana - MAAs
A. urmiana MAAs
(*Dunaliella salina*)
(*Artemia*)
Mycosporine- Asterina-330
) 2glycine
.(Agh *et al.*, 2008) (MAAs
MAAs MAAs
UV
.(Mason *et al.*, 1998)
(*Strongylocentrotus droebachiensis*)
MAAs *Chondrus crispus* Shinorine
MAAs
MAAs Usujirene Asterina-330 Palythine
) .(Adams *et al.*, 2001)
(Asterina- Palythine MAAs *Oryzias latipes*

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Effect of Diet on Mycosporines Accumulation in *Artemia urmiana* and Parthenogenetic *Artemia*

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Abstract

Mycosporines are UV-absorbing metabolites which are produced via aromatic amino acids synthesis pathway (shikimate pathway). In the present study the effect of diet was examined on accumulation of these compounds in *Artemia urmiana* and parthenogenetic *Artemia*. The cysts of both strains were hatched under standard conditions. The larvae (instar-I nauplii) were directly transferred to the diluted Urmia Lake water (150 g l⁻¹), the salinity was then increased gradually up to 250 g l⁻¹. During the culture period, both *Artemia* strains were fed on two algal feeding regimes including green and red *Dunaliella salina*. Concentration of seven Mycosporines including Asterina-330, Shinorine, Mycosporine-2Glycine, Palythine, Porphyra-334, Mycosporine-Glycine:valine and Palythinol were measured in adult *Artemia* using HPLC at the end of experiment. Results showed significant increase in the concentration of mycosporines in both *Artemia* populations fed on red algae compared to those received green algae, except for Shinorine in *A. urmiana*. Parthenogenetic *Artemia* showed higher capability for accumulation of Mycosporines compared to *A. urmiana* in most cases.

Keyword: Mycosporine, *Dunaliella salina*, *Artemia urmiana*, Parthenogenetic *Artemia*.