

Occurrence and fluctuations of larval stages of Penaeus kerathurus in Amvrakikos gulf (Forsskal, 1775)

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Summary The occurrence and fluctuation of the larval stages (nauplius, protozoa, mysis) of the shrimp Penaeus kerathurus at Amvrakikos gulf (Greece) has been studied for a period of about two years. The larvae occur only during the warm period and form a peak in July. The spawning begins in April and its maximum is noted in June.

Résumé. - Nous avons étudié la répartition et l'abondance des stades larvaires de l'Écrevisse Penaeus kerathurus dans le golfe de Amvrakikos. Amvrakikos se trouve dans la partie nord-ouest de la Grèce et constitue une extension de la mer Ionienne. Sa salinité est basse à cause des débouchures de fleuves. L'échantillonnage planctonique (WP₂) s'est effectué durant deux années approximativement. La présence des larves de Penaeus est limitée à la période chaude et présente un maximum en juillet. L'abondance des larves de Penaeus révèle une augmentation linéaire avec la température.

The influence of various environmental factors on the biology and artificial rearing of the shrimp Penaeus kerathurus is studied at the Zoological Laboratory of the University of Athens. This programme is supported financially by the Fisheries Division of the Greek Ministry of Agriculture. The initial stage of this research includes the field approach: the study of the occurrence of Penaeus at a biotope "the Amvrakikos gulf" which seems favourable for the production of this species.

Amvrakikos lies on the N.W. coast of Greece and is an extension of the Ionian Sea. It is a shallow semi-enclosed area connected with the Ionian Sea by the Preveza channel. Amvrakikos is characterized by low salinities especially along its north coast where important rivers discharge.

The occurrence and fluctuations of Penaeus larvae is studied from plankton samples. The sampling was performed with a WP₂ net (220 μ) equipped by TSK flowmeter by oblique hauls from an extensive net of 2 stations along the coastal area of the gulf. Figure 1 shows the sampling area and the collection stations. Amvrakikos was visited eight times between May 1982 and March 1984. Simultaneous measurements of the principal oceanographic parameters were also performed. Three ontogenetic stages of P. kerathurus were identified from our samples and were counted separately: nauplii, protozoa and mysis. A synoptic presentation of the results is shown in Table 1.

All parameter values are shown as means of all measurements of each sampling period. The quantitative presence of the larval stages is expressed as numbers m⁻³. From Table 1 it becomes clear that the larval stages of Penaeus in Amvrakikos occur only during the warm period. The spawning period begins in April and its maximum intensity is noted during June (1.528 nauplii/m³).

The total number of larval stages increases from April to July when the quantitative maximum is formed (6.184 ind/m³).

SAMPLING DATE	TEMPERATURE °C	SALINITY S ‰	O ₂ ml/l	NAUPLIUS/m ³	PROTOZOEAE/m ³	MYSIS/m ³	TOTAL Nb. LARVAE/m ³
MAY	21,124 ^{+1,76}	27,5 ^{+3,57}	2,2 ^{+0,59}	0	0,184	0,80	0,984
SEPTEMB.	24,72 ^{+3,28}	29,80 ^{+1,90}	3,79 ^{+2,56}	0,0285	0,712	0,408	1,1485
JANUARY	11,43 ^{+2,51}	20,2 ^{+8,26}	9,02 ^{+4,05}	0	0	0	0
APRIL	16,80 ^{+0,55}	28,33 ^{+2,24}	-	0,008	0,032	0,008	0,048
JUNE	22,59 ^{+2,05}	29,29 ^{+2,61}	6,75 ^{+3,55}	1,528	1,76	0,28	3,568
JULY	25,73 ^{+2,69}	28,67 ^{+2,64}	4,9 ^{+2,0}	0,856	3,648	1,68	6,184
MARCH	12,5 ^{+1,51}	25,8 ^{+2,50}	8,15 ^{+3,11}	0	0	0	0

Table 1.

An important decrease of the number of mysis compared with those of protozoa was noted in all samples proving the high mortality of *Penaeus* larval stages. The numbers of nauplii were usually low because our nets only partially retained them due to their small size.



Figure I.

The total number of *Penaeus* larvae/m³ (ψ) showed a linear increase with the temperature. (x). The regression equation $y = -0,486 + 0,034x$ has a coefficient of correlation 0,663 which is significant at 95% level ($r_{theor} = 0,636$). The same was observed comparing the numbers of mysis and protozoa with temperature but the correlation between nauplii and temperature is nonlinear (probably due to partial retention). No linear relationship was noted between the different larval stages and salinity.