

Catherine FERNANDEZ* and Angela CALTAGIRONE**

* CEVAREN, UFR des Sciences et Techniques, Université de Corse, CORTE (France)

** LBMEB, Faculté des Sciences de Luminy, MARSEILLE (France)

Monitoring of the gonad index of *Paracentrotus lividus* has been carried out at numerous locations : Alger (SEMROUD and KADA, 1987), Marseille (REGIS, 1978), Villefranche Bay (FENAUX, 1968), Corsica (NEDELEC, 1983), Ireland (BYRNE, 1990). The present study was undertaken in the Urbinu lagoon, south of Bastia (Corsica) where there is a large population of *Paracentrotus lividus*, whose density varies according to the biotopes (*Cymodocea nodosa* beds, shingle, sand and muddy bottoms) (FERNANDEZ, 1990; FERNANDEZ and CALTAGIRONE, 1990). This lagoon has been chosen as a site for the echinoculture of *P. lividus*. The initial part of this programme consists of gaining a better understanding of the indigenous populations (population dynamics, stock evaluation, diet, physiological indices) so as to define sites of recruitment, good growth potential, as well as the spawning period. The preliminary results, presented here, concern the definition of the spawning period which is estimated by following the evolution of the gonad index and the percentage of mature females (FENAUX, 1968).

The Urbinu lagoon offers very different trophic conditions according to the biotope. In the *Cymodocea nodosa* algal beds, the trophic factor is not limiting as the urchins readily consume this phanerogame (FERNANDEZ, 1990). It is noted that *C. nodosa* is considered as a preferential food species by *P. lividus* (TRAER, 1980). Individuals living on the shingle bottoms, where often the vegetation resources are quite small, have a very varied diet : either a diet of animal material (crustaceans, gasteropods) and fragments of vegetation or a material obtained from grazing (observation of stomach contents : FERNANDEZ, 1990).

Samples for gonad analysis of urchins living in the beds of *Cymodocea nodosa* were taken monthly from April to August 1990 and from April 1991 to January 1992. Urchins living on the shingle bottoms were sampled from April to August 1990 and quarterly from May to November 1991. Ten individuals were sampled at each sampling session; their test diameter (not including the spines) varied from 35 to 50 mm. Gonads were removed and oven dried for 48 hours at 70°C before being weighted (± 0.1 mg). The gonad index (GI) utilized is that of SEMROUD and KADA (1987) derived from the index of repletion proposed by NEDELEC (1983). It is the ratio between the gonadal dry weight and the cube of the horizontal teste diameter, expressed in mg cm^{-3} .

This index permits the detection of the spawning period and the establishment of a relationship between the development of the gonads and the different biotopes.

The results obtained (Table 1) show that the urchins living in the algal beds have a gonad index which is always elevated in comparison to data in the literature (KADA, 1987; SADOUD, 1988). The curve of evolution of this index shows some statistically significant oscillations, particularly between May and June (Kruskall and Wallis Test and Mann Whitney Test) during the two years studied. Moreover, the data concerning the percentage of mature females present during 1991 also shows a sharp decrease during the same period (Table 1). The urchins living on the shingle bottoms, have a lower overall average gonad index but equally show a decrease between May and June 1990.

These data show that spawning of the urchins takes place during May/June at both stations in the lagoon and this is in agreement with other reported spawning times from the Mediterranean (FENAUX, 1968; REGIS, 1978). The gonad indices of individuals living in the beds of *C. nodosa* (whatever the month) are always significantly higher than those of individuals living in the shingle bottoms. This suggests that the urchins living in the *C. nodosa* beds are in a favourable environment permitting high gonad production. In contrast, the trophic resources of the shingle biotope constitute a limiting factor. It has been shown that a diet based on the consumption of a preferred vegetable species such as *C. nodosa* promotes high gonad production (FERNANDEZ, 1990). This is confirmed by the fact that gonad indices in this biotope are generally higher than those reported in the literature. This is important when considering the dietary regime to be used in urchin rearing. *Cymodocea nodosa* appears to be a choice food which facilitates high gonad growth during the entire year.

Table 1: Average gonad index (GI) of *P. lividus* in the Urbinu lagoon in mg/cm^3 , and the percentage of mature females (% mature) in the beds of *C. nodosa*.

	AVR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.
GI <i>C. nodosa</i> (1990)	9.76	12.21	9.88	10.64	7.35					
GI Shingle (1990)	3.62	5.70	1.94	0.97	1.62					
GI <i>C. nodosa</i> (1991)	8.37	10.06	5.63	7.63	9.33	7.60	5.98	9.05	8.45	9.30
% Mature females (1991)		100	40	25	25	67	50	100	80	75
GI Shingle (1991)		2.01			2.23			5.47		

REFERENCES

- BYRNE M., 1990. - Annual reproductive cycles of the commercial sea urchin *Paracentrotus lividus* from an exposed intertidal and a sheltered subtidal habitat on the west coast of Ireland. *Mar. Biol.*, 104, 275-289.
- FENAUX L., 1968. - Maturation des gonades et cycle saisonnier des larves chez *Arbacia lixula* (L.), *Paracentrotus lividus* et *Psammechinus microtuberculatus* (Echinides) à Villefranche-sur-Mer. *Vie Milieu*, Fr., 19 : 1-52.
- FERNANDEZ C., 1990. - Recherches préliminaires à la mise en place d'un pilote d'Aquaculture de l'oursin *Paracentrotus lividus* dans un étang Corse. *Mém. DEA Océanologie*, Univ. Aix-Marseille II, Fr. : 1-60.
- FERNANDEZ C. et CALTAGIRONE A., 1990. - Données préliminaires sur la population de *Paracentrotus lividus* de l'étang d'Urbinu (Corse). *Commiss. int. Explor. sci. Mer Médit.*, Monaco, 32 (1) : 37.
- KADA H., 1986. - Contribution à l'étude de l'oursin *Paracentrotus lividus* (Lmk.) de la région de Ain Chorb (ex Surcouf). *Mém. D.E.S. USTHB*, Alger : 1-48.
- NEDELEC H., 1983. - Sur un nouvel indice de répletion pour les oursins réguliers. *Rapp. P.V. Réun. Commiss. internation. Explor. sci. Médit.*, Monaco, 28 (3) : 149-151.
- REGIS M.B., 1978. - Croissance de deux échinoides du Golfe de Marseille (*Paracentrotus lividus* (Lmk.) et *Arbacia lixula* (L.)). Aspects écologiques de la microstructure du squelette et de l'évolution des indices physiologiques. *Thèse Doct. Etat*, Fac. Sci. Techn. St. Jérôme, Marseille, Fr. : 1-221.
- SADOUD L., 1988. - Contribution à l'étude de la biologie de *Paracentrotus lividus* des régions d'Ain Chorb et du port d'Alger. *Mém. D.E.S. USTHB*, Alger, Alg. : 1-70.
- SEMROUD R. et KADA H., 1987. - Contribution à l'étude de *Paracentrotus lividus* (Lmk) dans la région d'Alger (Algérie) : Indices de répletion et indice gonadique. *Colloque international sur Paracentrotus lividus et les oursins comestibles*, Boudouresque C.F. édit., Gis Posidonie publ., Marseille, Fr. : 117-124.
- TRAER K., 1980. - The consumption of *Posidonia oceanica* Delile by echinoids at the isle of Ischia. In *Echinoderms : Present and past*. Jangoux, M. Edit., Balkema publ., Rotterdam : 241-244.