SEASONAL AND YEAR TO YEAR CHANGES OF THE EDIBLE SEA URCHIN PARACENTROTUS LIVIDUS POPULATIONS IN THE BAY OF PORT-CROS (VAR, FRANCE)

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RESUME. L'utilisation de transects permanents a permis d'ébaucher un modèle descriptif de la dynamique des populations de *Paracentrotus lividus* (Lmk.) dans la baie de Port-Cros (Var).

INTRODUCTION. The influence of grazing by the sea urchin *Paracentrotus lividus* (Lmk.) on the Mediterranean benthic algal and seagrass communities is well documented by TRAER (1980), NEDELEC et al. (1981), NEDELEC (1982), VERLAQUE and NEDELEC (in press). This influence is in relation with high population densities together with rapid and large scale population changes (BOUDOURESQUE , NEDELEC et al.,1980); AZZOLINA et al., 1982).

MATERIAL AND METHODS. Two permanent transects, respectively 250 and 50 meters long, were established in the bay of Port-Cros (BOUDOURESQUE, GIRAUD et al., 1980; AZZOLINA et al., 1982) to monitor sea urchin population changes. The former (transect AM) is layed across healthy and dead *Posidonia oceanica* (Linnaeus) Delile beds, the latter (transect ZW) crosses mainly rocky substrates. Monthly or seasonal censuses,using a metal frame (1 m^2) shifted meter to meter along the transect lines, were carried out together with an *in situ* test diameter measure. In addition, an enclosure was set up on the *Posidonia* bed.

RESULTS AND DISCUSSION. At springtime, shallow water populations increase more or less heavily according to the year:+217 % in 1981,+77 % in 1982. Newly occurring individuals are mostly 35-45 mm in diameter on rocky substrates, and 10-25(35) mm on the outer reef area of the *P.oceanica* meadow (degraded meadow and dead "matte"). The origin of these incoming individuals is still unknown. As far as the outer reef area is concerned, the density increase cannot be due to *in situ* growth of preexistent juveniles ,nor to migration of animals from neighbouring deeper *Posidonia* beds. Moreover no other sources of migratory individuals have been detected in the vicinity. Therefore, we may hypothesize that *P.lividus* individuals from more distant nurseries (dense photophilous *Cystoseira* stands?) could be transported by hydrodynamism induced saltation or semi-floatation during winter and spring storms (as suggested by B.THOMASSIN, pers. communication).
Every summer, at least since 1979, the *Paracentrotus* population density strongly declines:
Transect AM : -64 % in 1980 (sea urchins with an horizontal diameter less than 20 mm were not taken into account)
-70 % in 1981 (all individuals)

-68 % in 1982 (all individuals)

Transect ZW : -65 % in 1982 (all individuals)

This decline is in relation with a disease which affects Mediterranean echinids (HÖBAUS et al., 1981; AZZOLINA, in press). Predation (mainly by the fishes *Diplodus* Raf. sp. plur. and *Sparus aurata* L., and the asteroïd *Marthasterias glacialis* (Linnaeus)) seems to have a comparatively irrelevant impact. The study of an enclosed population suggests that migration is not involved (AZZOLINA, in press).
In the *Posidonia* meadow, the summer mass mortality and the spring recruitment, the latter usually less important than the former, result in an overall long-term decline of the *P.lividus* population (fig.). It is of interest to emphasize the striking regularity of summer mortality compared with great recruitment fluctuations from year to year.

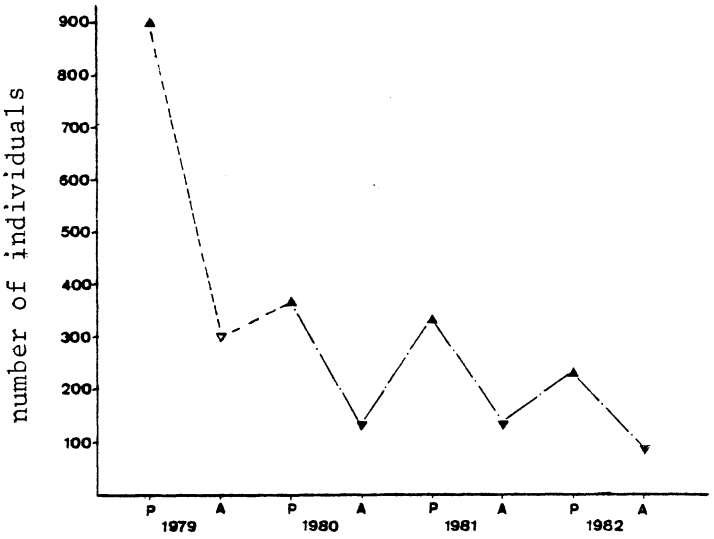

fig. : *P.lividus* population decline in the *Posidonia* bed. The data concern only adult individuals (test diameter ⩾ 20 mm).

▽ extrapolated data

P spring

A fall

On the contrary, on rocky substrates, long-term stability is observed despite seasonal fluctuations at least since 1979.

CONCLUSION. Such short and long-term fluctuations of sea urchin populations, and their impact on algal stands have already been reported for *Stongylocentrotus franciscanus* by PEARSE and HINES (1979).

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