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# *FECUNDITY OF SEA BREAMS, PAGELLUS SPP. FROM EGYPTIAN MEDITERRANEAN, OFF ALEXANDRIA.*

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## *ABSTRACT*

*The fecundity of both Pagellus erythrinus and Pagellus acarne captured from Egyptian Mediterranean, off Alexandria were studied. It was significantly correlated with fish length, fish weight, gonad weight and age. The relationship between fecundity and fish length was exponential, while it was a linear regression with weight, gonad weight and age. The fecundity estimates for P. erythrinus ranged from 11,140 to 27,158 eggs in the size range 13-20 cm, while for P. acarne, it varied between 9,260 and 18,889 eggs for the size range 14-19 cm.*

## *INTRODUCTION*

Sea breams, ***Pagellus*** spp. constitute a major part of the landed trawl catch in the Egyptian Mediterranean waters ( Rizkalla, 1992 and Faltas, 1993).

Fecundity represents an important item in the study of reproduction of fishes. It is an adaptive character since its change seems to be a part of density population regulating mechanism ( Bagenal, 1960 and Bagenal, 1963). Time series of observations of fecundity give an indication of the state of the habitat and of the stock (Horwood, 1990).

Despite the economic importance of ***Pagellus*** spp, no information is known about their fecundity except those given by Whitehead ***et al.***(1986).

The present investigation was therefore undertaken to study the fecundity of ***P. erythrinus*** and ***P. acarne*** in the Egyptian Mediterranean as a contribution to their general biological aspects aiming to be useful for their fishery management.

## *MATERIALS AND METHODS*

Fishes of ***Pagellus*** species were collected from the catch of trawlers operated in the Egyptian Mediterranean waters, off Alexandria. Fish samples taken were restricted to the spawning time over the period of 27 April to 6 June, 1993 for ***P. erythrinus*** and 7 November to 20 December, 1993 for ***P. acarne*** as reported by Rizkalla (1992). The total length, gutted body weight and ovary weight of each female specimen were taken. Ripe ovaries were preserved in 5 % formalin solution. Fish were aged by using scales and fecundity was estimated by the method of Batts (1972).

## *RESULTS*

### I- Total fish length- fecundity relationship:

The relationship between fish length (L) and the absolute fecundity (F) is that of the type $F = a\ L^b$, where a and b are constants. The estimated fecundity of ***P. erythrinus*** and ***P. acarne*** are plotted against total lengths as shown in Figure 1. As obvious, the fecundity increases with the increase in total fish length. The regression equations calculated were as follows:

For ***P. erythrinus*** $\text{Log } F = 1.4560 + 2.2786 \text{ Log } L$ ( $r = 0.9737$).
For ***P. acarne*** $\text{Log } F = 1.7500 + 1.9913 \text{ Log } L$ ( $r = 0.9117$).

### II- Fish weight - fecundity relationship:

Analysis of data representing fecundity ( F) and the corresponding gutted weight (W) revealed a linear relationship of the form: $F = a + b\ W$ where a, is a constant and b, is a regression coefficient ( Fig. 2).

The equations expressing this relation are as follows:

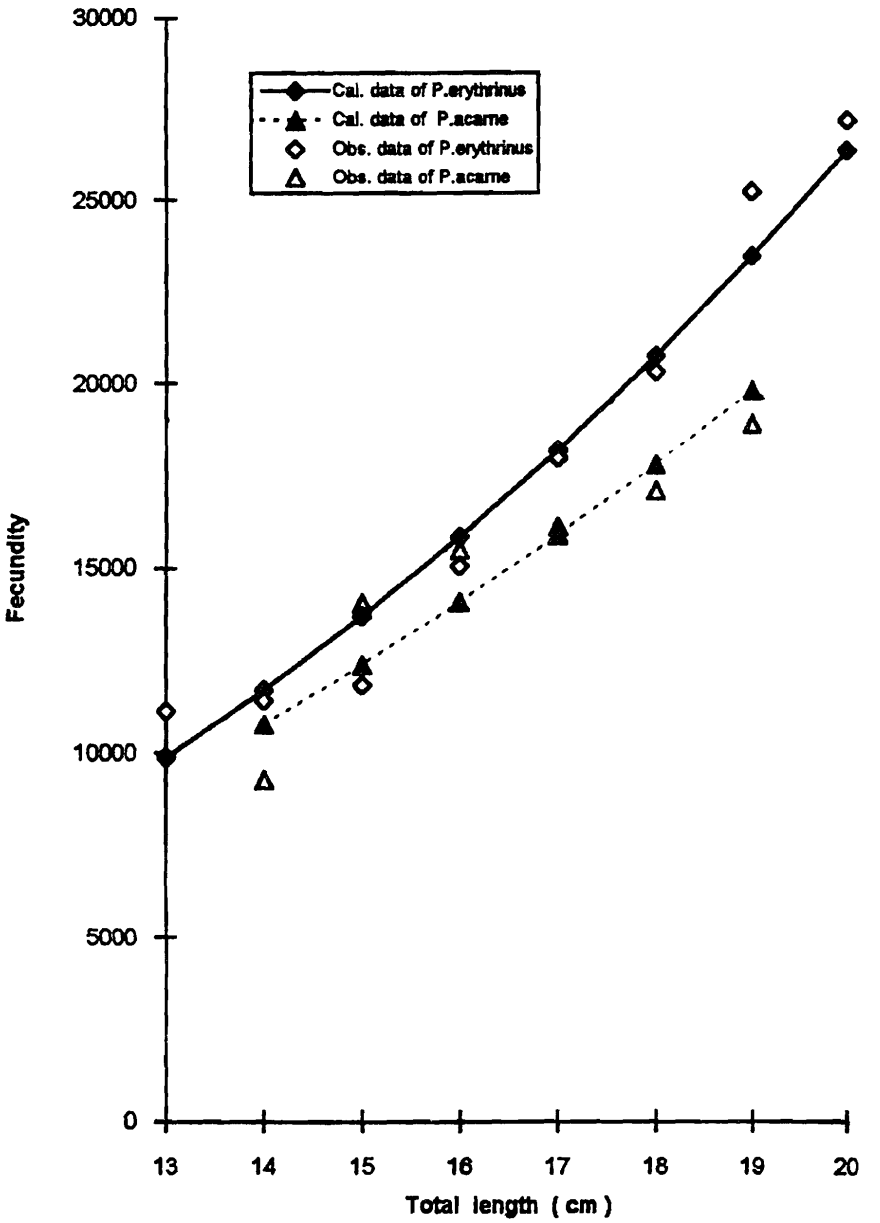


Fig. 1 : Relationship between fecundity and total length for *P. erythrinus* and *P.acarne.*

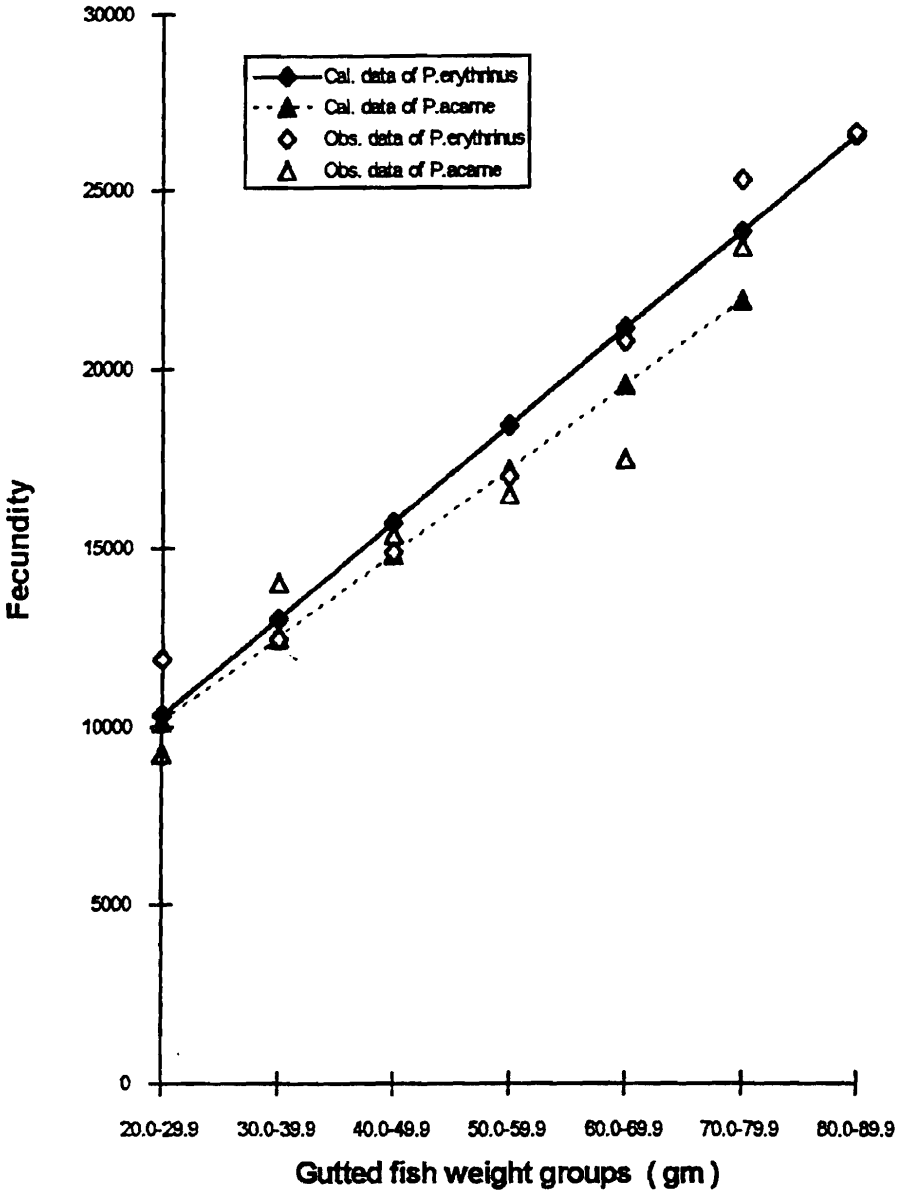


Fig. 2 : Relationship between fecundity and gutted fish weight for ***P.erythrinus*** and ***P.acarne***.

For ***P. erythrinus***: F = 3592.8214 + 296.0786 W ( r = 0.9814).
For ***P. acarne*** : F = 4301.6905 + 233.8029 W ( r = 0.9492).

It is clear that the number of eggs produced rises with the increase of fish weight.

**III - Ovary weight - fecundity relationship :**

Fecundity (F) increases as the ovary weight (G) increases. ( Table 1). This relation is expressed by a linear equation :

For ***P. erythrinus***: F = 4829.7619 + 5995.4286 G ( r = 0.9681).
For ***P. acarne*** : F = 3464.8000 + 4686.4000 G ( r = 0.9939).

**IV - Age - fecundity relationship :**

The relations between fecundity (F) and age (A) for ***P. erythrinus*** and ***P. acarne*** are shown in Table (2). The formulae expressing the linear relations are:

For ***P. erythrinus*** : F = 5885.5 + 5277.1 A (r = 0.9928).
For ***P. acarne*** : F = 4902.5 + 4521.8 A ( r = 0.9929).

These relations show that the fecundity increases as fish grows older.

## *DISCUSSION*

As a rule, the fecundity of fishes increases with the growth of fish until senility stage. However, most exploited fish species do not reach the senility age. Furthermore the fecundity of fishes having the same length may vary within wide limits.

In the present study, fecundity increases with fish length, weight, gonad weight and age. The fecundity of ***P. erythrinus*** ranged between 11,140 and 27,158 for fish measuring 13 to 20 cm in total length, while, for ***P. acarne***, fecundity estimates were less than that of ***P. erythrinus*** and varied between 9,260 and 18,889 for fish having total lengths between 14 to 19 cm.

Table (1): Relation between fecundity and gonad weight for ***P. erythrinus*** and ***P. acarne***.

| Gonad weight (g) | | ***P. erythrinus*** | | | ***P. acarne*** | | |
|---|---|---|---|---|---|---|---|
| | | Fecundity | | | Fecundity | | |
| Range | Mid pt. | No | Obs. | Calc. | No | Obs. | Calc. |
| 1.0- | 1.25 | 10 | 10836 | 12324 | 2 | 9260 | 9323 |
| 1.5- | 1.75 | 6 | 14985 | 15322 | 1 | 12160 | 11666 |
| 2.0- | 2.25 | 3 | 20498 | 18319 | 7 | 13550 | 14009 |
| 2.5- | 2.75 | 7 | 22538 | 21317 | 5 | 16040 | 16352 |
| 3.0- | 3.25 | 7 | 24125 | 24315 | 8 | 19036 | 18696 |
| 3.5- | 3.75 | 5 | 25928 | 25514 | | | |

Table (2): Relation between fecundity and age for ***P. erythrinus*** and ***P. acarne.***

| **Age-Groups** | ***P. erythrinus*** | | | ***P. acarne*** | | |
|---|---|---|---|---|---|---|
| | Fecundity | | | Fecundity | | |
| | No | Obs. | Calc. | No | Obs. | Calc. |
| I | 4 | 11905 | 11163 | 2 | 9260 | 9424 |
| II | 16 | 15621 | 16440 | 12 | 14646 | 13946 |
| III | 17 | 21127 | 21717 | 8 | 17561 | 18468 |
| IV | 1 | 27660 | 26994 | 1 | 23361 | 22990 |

Analysis of covariance for regressions of fecundity with respect to length, weight, gonad weight and age showed significant differences between ***P. erythrinus*** and ***P. acarne***. The high fecundity of ***P. erythrinus*** may explain at least probably the numerical superiority of ***P. erythrinus*** over its related species ***P. acarne***. Whitehead ***et al.*** (1986) reported fecundity of ***P. erythrinus*** were 31,000 - 151,000 (16 - 31 cm ) and those of ***P. acarne*** were 85,000 - 536,000 (21 -31 cm )in the Mediterranean which seem to be greatly higher than the corresponding ones of the present study. Thereby, it can be stated that our ***Pagellus*** population has a low reproductive potential as compared with other populations. This may be due to differences of genetics and ecological factors such as food supply, population density and changes in temperatures (Scott, 1962; Bardakci and Tanyoloc, 1990; Unlo and Balci, 1993 ).

As Whitehead ***et al.*** (1986) reported that fecundity of ***P. erythrinus*** is less than that of ***P. acarne***, the reverse is true in the present study. This is in accordance with the finding of Rizkalla (1992) who stated that ***P. erythrinus*** is more common than ***P. acarne*** in the Egyptian Mediterranean .

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