ROMANCING THE COPEPOD – THE QUEST FOR NATIVE SPECIES SUITABLE FOR INTENSIVE PRODUCTION

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ABSTRACT

This work gives information on species from Ria Formosa lagoon, south of Portugal, which seems to be good candidates for intensive rearing in aquaculture. From the trial species *Tisbe tenera*, *Tisbe graciloides* and *Acartia grani* present chemical and biological properties that are good for intensive mass culture. Besides being easy to rear in captivity they have good nutritional value and size spectra that will fit the mouth gapes of small marine fish larvae.

INTRODUCTION

Copepods are the natural food item for marine fish larvae. They have high nutritional value, mainly polyunsaturated fatty acids (PUFAs), and natural antioxidants that elicit a natural feeding response from the larvae. They can be obtained from the wild or by cultivation. The aim of this study was to find which indigenous copepod species from Ria Formosa lagoon, south of Portugal, would be good candidates for intensive mass culture and at the same time be of good nutritional value and acceptability by small marine fish larvae.
Among the criteria for selecting a species for intensive rearing are:

1. Good adaptability to laboratory conditions and tolerance to frequent handling;
2. Short generation times and high reproductive output;
3. High nutritional value, i.e., high levels of PUFAs (DHA, EPA, and ARA);
4. Good acceptability by fish larvae – different size of small particles (life stages) and swimming behavior.

MATERIAL AND METHODS

Adult species were captured in the Ria Formosa (Fig. 1) with 200 µm WP2 plankton nets and brought to the lab for sorting under a stereomicroscope. Local temperature and salinity was determined in order to maintain species in similar conditions.

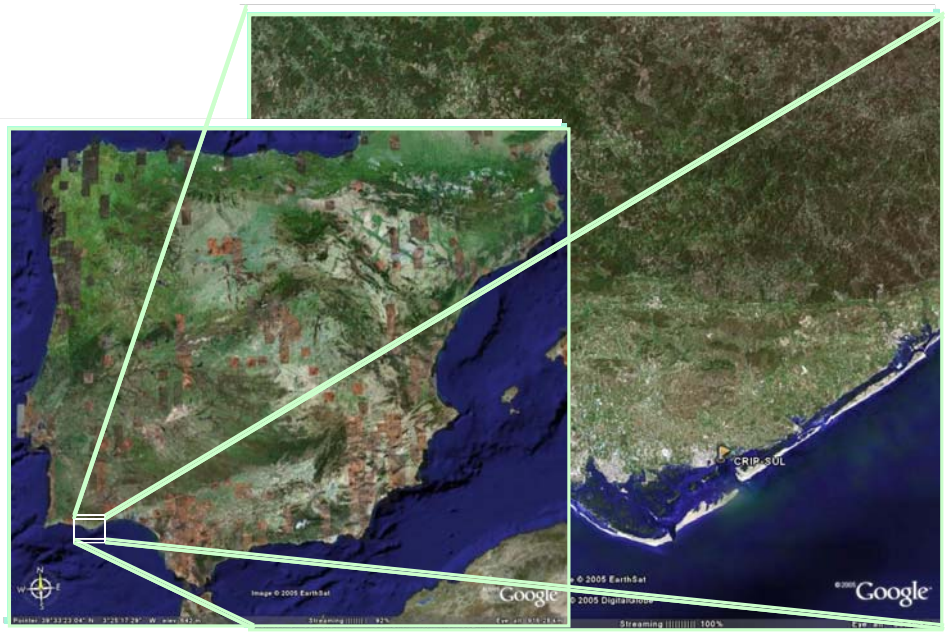

Fig. 1 – Location of Ria Formosa.

Depending on the groups they were handled differently. In the case of harpacticoids ovigerous females were isolated in small Petri dishes. After hatching of the eggs females were removed and kept isolated in different containers. Second generation ovigerous females were used to start the culture in 250 ml Petri dishes which were progressively up-scaled into larger volumes. Cultures were fed to excess with mixtures of equal parts of the microalgae *Isochrysis galbana* and *Rhodomonas* sp. In the case of calanoids only dominant species were sorted. For each species a minimum of 400 adults and stage 4/5 copepodids were reared in 20 L cylindrical-conical containers. Cultures were fed to excess with *Rhodomonas* sp.. Culture densities were monitored daily and when nauplii appeared they were removed and used to seed a fresh culture in large volume (220 L) conical containers. The bottom was siphoned daily to collect eggs that were stored in dark anoxic conditions at 4ºC for seeding future cultures.

RESULTS AND DISCUSSION

The trial species were *Euterpina acutifrons*, *Tisbe* spp., *Centropages chierchiae*, *Temora stylifera*, *Acartia clausi*, *Acartia grani* and *Acartia margalefi* and the successful species turned up to be *Tisbe* spp. (*Tisbe tenera* + *Tisbe graciloides*) and *Acartia grani*.
The successful species exhibit the following characteristics that seem to conform the required criteria for intensive rearing:

1. *Tisbe* spp. and *A. grani* were resilient species that support large temperature variations and outdoor rearing (mainly *Tisbe* spp.);
2. They have short generation times since, depending on the temperature, *Tisbe* spp. may reach sexual maturity in 6 days and *A. grani* in 9 days. Females of *Tisbe graciloides* produce 1 egg-sacs every 3.5 days (Vilela, 1969) with a mean number of 42 eggs and each *A. grani* female lay 2 to 7 eggs per day during the spawning period that can last from 8 to 30 days;
3. *Acartia grani* and *Tisbe* spp. have high levels of DHA and EPA (Fig. 2) and they seem to be able to synthesize DHA independently of the food. The same is true for ARA in which concerns to A. grani;

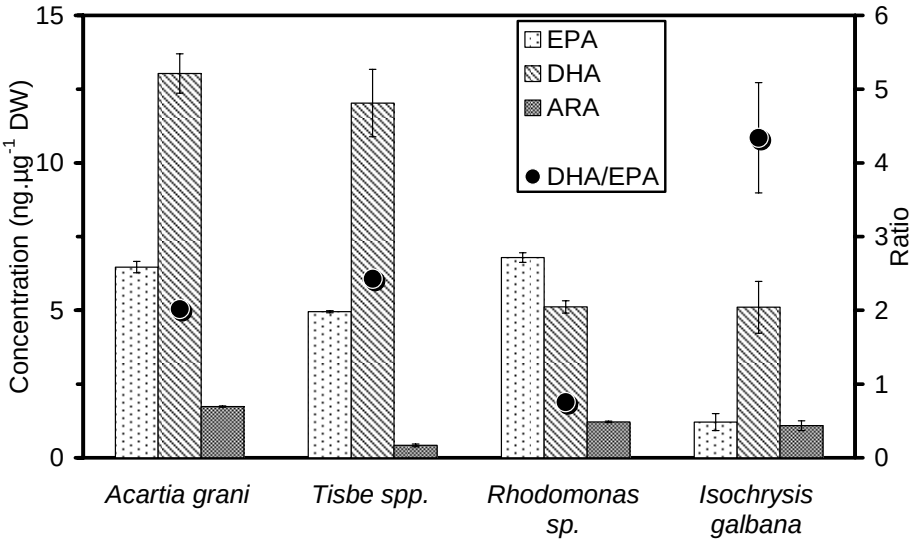

Fig. 2 – Fatty acid composition of *Acartia grani*, *Tisbe* spp. fed *Rhodomonas* sp. and *Isochrysis galbana*.

4. *Acartia grani* and *Tisbe graciloides* offer a broad range of prey sizes for larvae (Fig. 3) from the ones requiring smaller sizes than rotifers at first feeding to larger prey at later stages.

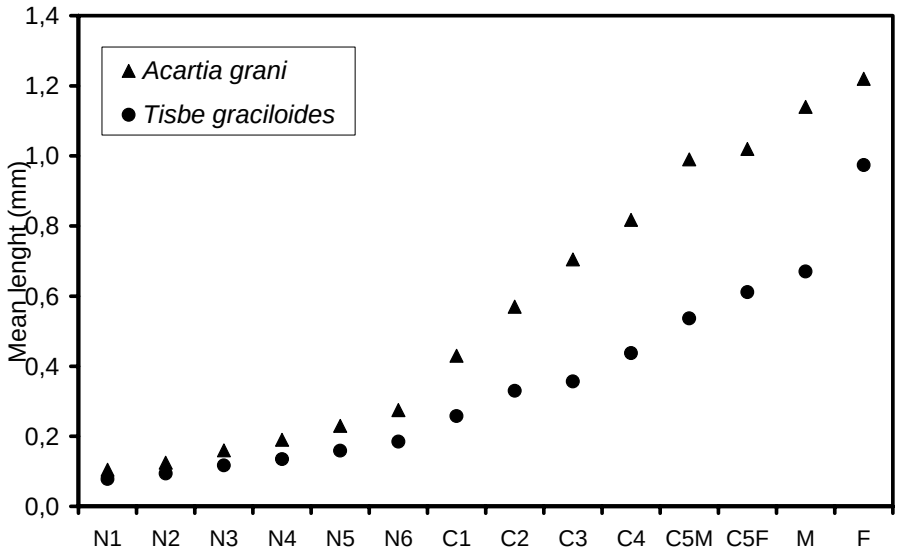

Fig. 3– Size spectra (length) of *Acartia grani* and *Tisbe graciloides*

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