

# ROMANCING THE COPEPOD – THE QUEST OF PROSPECTIVE SPECIES SUITABLE FOR INTENSIVE PRODUCTION



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**ABSTRACT:** This work give information on species from Ria Formosa lagoon, south of Portugal, that 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 a 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. 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 (Fig. 2) and brought to the lab for sorting under a stereomicroscope. Local temperature and salinity was determined in order to maintain species in similar conditions.

**Harpacticoids:** Oviparous females were isolated in small Petri dishes. After hatching of the eggs female were removed and kept isolated in different containers. Second generation oviparous 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.

**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 4°C for seeding future cultures.

**RESULTS AND DISCUSSION:** Trial species: *Euterpina acutifrons*, *Tisbe* spp., *Centropages chierchiae*, *Temora stylifera*, *Acartia clausi*, *Acartia grani*, *Acartia margalefi*. Successful species: *Tisbe* spp. (*Tisbe tenera* (Fig. 3a) + *Tisbe graciloides* (Fig. 3b)) and *Acartia grani* (Fig. 3c and 3d). These species exhibit the following characteristics that seem to conform the required criteria for intensive rearing:

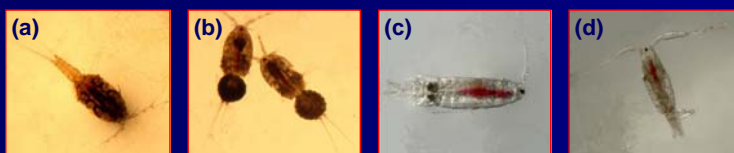


Fig. 3 –Females (a) *Tisbe tenera*; (b) *Tisbe graciloides*; (c) *Acartia grani*. Male *Acartia grani* (d)

1. *Tisbe* spp. and *A. grani* are resilient species that support large temperature variations and outdoor rearing (mainly *Tisbe* spp.);
2. 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;
3. *Acartia grani* and *Tisbe* spp. have high levels of DHA and EPA (Fig. 4) 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*;
4. *Acartia grani* and *Tisbe graciloides* offer a broad range of prey sizes for larvae (Fig. 5) from the ones requiring smaller sizes than rotifers at first feeding to larger prey at later stages.

**ACKNOWLEDGMENTS:** Thanks to Dr. Linda Holste from the Institute for Hydrobiology and Fisheries Research, University of Hamburg, Germany for introducing M.E. Cunha to calanoid rearing and for providing the initial stock of *Rhodomonas* sp. This study was supported by the contracts “Redaqua”

**REFERENCES:** Vilela, M.H. 1969. The life of *Tisbe* sp. (Copepoda, Harpacticoida) under laboratory conditions. *Notas e Estudos do Inst. Biol. Marít.*, 36, 1-16, 5 ests.



Fig. 1 - Location of Ria Formosa



Fig. 2 – WP2 plankton net

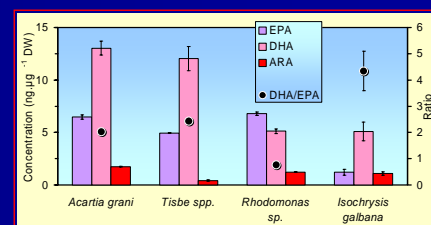


Fig. 4 – Fatty acid composition of *Acartia grani*, *Tisbe* spp. fed *Rhodomonas* sp. and *Isochrysis galbana*.

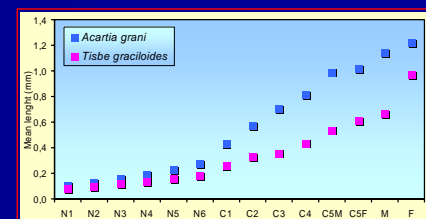


Fig. 5– Size spectra (length) of *Acartia grani* and *Tisbe graciloides*