Cross-year comparison of gene diversity indices in Mytilus galloprovincialis samples from Corrubedo beach

(Impact on biological systems)

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RESULTS AND DISCUSSION

Gene diversity levels were assessed in a mussel population of Mytilus galloprovincialis sampled at an intertidal zone of Corrubedo beach, just after the Prestige spill (January 2003). Changes in genetic diversity, particularly based on differences in genetic composition and genetic structure, can provide useful information on the impact of oil spills on a natural population (James, 1971). The genetic erosion of a living resource is an irreversible threat due to the homogenization of genomes, and it is caused by both, natural events (such as exotic invasions and environmental shifts) and artificial phenomena (such as intense culturing, overexploitation, rarefaction of ecological chains, and anthropogenically-driven catastrophes) (Diz and Presa, 2003). The systematic monitoring of the genetic diversity of mussel populations allows for the detection of significant genetic changes, which are useful to maintain and improve the optimal genetic status of the species (Presa and Pérez, 2003). This affordability of appreciating gene diversity changes requires at least two priors: a) the availability of genetic data from mussel populations collected both before and after the spill in the same site, and b) the availability of informative genetic tools to undertake the analyses with.

In this study we aimed to assess the putative impact of the Prestige spill-oil on the genetic diversity of a natural mussel population of Mytilus galloprovincialis from Corrubedo beach, one most affected sites. Genetic data have been recorded in years 2000 (long before spill), 2003 (just after the spill) and 2005 (long after the spill). DNA from fifty individuals from each of the three samples (Figure 1) was extracted using a modified phenol-chloroform protocol (Pressa and Diz 2005, submitted). The genetic variation of microsatellite markers Mgp1 and Mgp2 (Pressa et al., 2002) was PCR-amplified and the amplicons were electrophoresed in an ALFexpress II (BIO-RAD) automated sequencer. The parameters used to detect genetic shifts of allelic frequencies were allele richness (Rs) observed heterozygosity (Ho) expected heterozygosity (He) and Wright's fixation indices (Fst and Fis). The computer programme Fstat 2.9.3.1 (Goudet 1995) was used to calculate those parameters.

The null hypothesis of genetic homogeneity across years was tested through the programme Fstat 2.9.3.1 (Goudet 1995) was used to calculate those parameters. The genetic parameters measured on Corrubedo population across years are shown in table 1. Non-significant differences were detected between years (Fst = 0.082, P = 0.892), indicating that this population might not be in Hardy-Weinberg equilibrium. However all year samples showed a heterozygote deficit (Fis values, P < 0.01), indicating that this population might not be in Hardy-Weinberg equilibrium. However, all year samples showed a heterozygote deficit (Fis values, P < 0.01), indicating that this population might not be in Hardy-Weinberg equilibrium. However, all year samples showed a heterozygote deficit (Fis values, P < 0.01), indicating that this population might not be in Hardy-Weinberg equilibrium. 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In this sense, the absence of a significant shift of allelic richness (Rs) observed heterozygosity (Ho) expected heterozygosity (He) and Wright's fixation indices (Fst and Fis) could be indicative of a lack of changes in allele frequencies and allele richness across years. The null hypothesis of genetic homogeneity across years was tested through the programme Fstat 2.9.3.1 (Goudet 1995) was used to calculate those parameters.

Figure 1: Sample site of Mytilus galloprovincialis population.

Figure 3: Comparison of allelic richness (Rs) and expected heterozygosity (He) of mussel populations from Corrubedo beach.

Table 1: Genetic diversity indices of mussel populations from Corrubedo beach.

<table>
<thead>
<tr>
<th>Sample-year</th>
<th>Rs</th>
<th>Ho</th>
<th>He</th>
<th>Fst</th>
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<tr>
<td>2000</td>
<td>12.85</td>
<td>0.938</td>
<td>0.978</td>
<td>0.003</td>
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<tr>
<td>2003</td>
<td>13.13</td>
<td>0.947</td>
<td>0.968</td>
<td>0.049</td>
</tr>
<tr>
<td>2005</td>
<td>11.98</td>
<td>0.933</td>
<td>0.924</td>
<td>0.365</td>
</tr>
<tr>
<td>P-value</td>
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<td>0.082</td>
<td>0.193</td>
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</tbody>
</table>

REFERENCES


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