Nitrogen Deposition, Critical Loads and Biodiversity

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ABSTRACTS

Part I - Plenary and Working Group Presentations

Part II - Poster Presentations

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Effect of increased nitrogen availability in Mediterranean-type ecosystems: a case study in a Natura 2000 site in Portugal.

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The Mediterranean Basin forms a unique ecosystem and is one of the most anthropogenically shaped region worldwide. However they are one of the top five ‘hottest’ biodiversity and endemism hotspots for vascular plants, and one of the more responsive type of ecosystems to human pressure considering several possible scenarios (water shortage, temperature increase, change of the seasonal pattern). Unfortunately N has not been considered as a threat to these ecosystems and consequently there are not many studies on the effect of increased N availability on their functioning and sustainability.

We are undertaking an integrated field study of the effects of increased N availability in a Mediterranean-type ecosystem in southern Portugal belonging to Natura 2000 (PTCON0010 Arrábida/Espichel), Arrábida has a typical Mediterranean climate, hot and dry summers and mild and wet winters (annual mean temperature of 17.5 ºC, annual precipitation ~ 600 mm). N availability has been modified by the addition of 40 and 80 kg N/ha/year in the form of NH₄NO₃ and 40 kg N-NH₄⁺/ha/year as ammonium chloride (the control plots corresponds to no fertilization). N was added, beginning in January 2007, in three equal applications throughout the year corresponding to distinct seasons, which correlate with distinct biological activities (spring, summer and middle autumn/winter). Each N treatment has three replicates (400 m² plots).

One year of N additions were sufficient to induce changes in plant and soil communities (bacterial and AMF communities), and C/N ratios of the litter.

Increased N availability appeared to be targeting specific plant species: ericaceous, evergreen sclerophylls, Summer semi-deciduous (especially Cistus ladanifer) and legume shrubs with spines (especially Genista triacanthos) increased their plant cover when subjected only to ambient N deposition. On the contrary, when compared to controls, not only did the fertilized plots showed a decreased (negative relative gain) of plant cover for the referred functional groups, but they also increased plant cover of Herbaceous machia plants, Ruderals and Grasses. The C/N ratio of the litter of the dominant species decreased 5 times in the 80 kg N/ha/year in relation to the control. Which may be an initial sign of nitrogen exceedance in the ecosystem.