Model of alternative predominance of phytoplankton-periphyton-macrophytes in lentic waters of Mediterranean coastal wetlands

R. Trobajo, X. D. Quintana and R. Moreno-Amich

Abstract: A study was conducted to explain the predominance of different types of aquatic primary producers (algal assemblages and macrophytes) in relation to nutrient levels, in twenty-two shallow lentic waterbodies in the Empordà wetlands. The waterbodies show great variation of environmental parameters within small scales of time and space. The two first axes of the PCA analysis (52.74% of total variance) are related to water turnover rate and eutrophy, respectively. Cluster analysis of physical and chemical data produced five groups of sites, each typifying a particular hydrological dynamics: confined coastal waters, semi-confined waters with marine and continental influence, freshwater coastal lagoons with high nutrient inputs, fluctuating freshwater systems and freshwater springs. A model for alternative dominance of phytoplankton-periphyton-macrophytes is described on the basis of two main gradients defined by the first two PCA axes. The model describes a horseshoe curve where, at each extreme, with maximal water turnover and or maximal confinement, macrophytes dominate. In states of intermediate turnover the degree of eutrophy increases and phytoplankton dominates.

Key words: Aquatic primary producers, nutrient levels, Empordà wetlands.

Introduction

Macrophytes and algae represent the first level in the structure of an aquatic community, by means of which energy and matter are incorporated into the biological community. Despite the global abundance of wetland habitats, ecological research has mainly focused on rivers, lakes, and oceans. Consequently, information on the algal assemblages of wetlands remains fragmentary (GOLDSBOROUGH & ROBINSON 1996) and represents a major void in our

Authors’ address: Institute of Aquatic Ecology and Dept. of Environmental Sciences, University of Girona, Campus de Montilivi, 17071 Girona, Spain.