

## Sample size and the detection of a hump-shaped relationship between biomass and species richness in Mediterranean wetlands

"What is the observed relationship between biomass and species richness across both spatial and temporal scales in communities of submerged annual macrophytes? Does the number of plots sampled affect detection of hump-shaped pattern?"

**Location:** Doñana National Park, southwestern Spain.

**Methods:** A total of 102 plots were sampled during four hydrological cycles. In each hydrological cycle, the plots were distributed randomly along an environmental flooding gradient in three contrasted microhabitats located in the transition zone just below the upper marsh. In each plot (0.5 m × 0.5 m), plant density and above- and below-ground biomass of submerged vegetation were measured. The hump-shaped model was tested by using a generalized linear model (GLM). A bootstrap procedure was used to test the effect of the number of plots on the ability to detect hump-shaped patterns.

**Result:** The area exhibited low species density with a range of 1 - 9 species and low values of biomass with a range of 0.2–87.6 g-DW / 0.25 m<sup>2</sup>. When data from all years and all microhabitats were combined, the relationships between biomass and species richness showed a hump-shaped pattern. The number of plots was large enough to allow detection of the hump-shaped pattern across microhabitats but it was too small to confirm the hump-shaped pattern within each individual microhabitat.

**Conclusion:** This study provides evidence of hump-shaped patterns across microhabitats when GLM analysis is used. In communities of submerged annual macrophytes in Mediterranean wetlands, the highest species density occurs in intermediate values of biomass. The bootstrap procedure indicates that the number of plots affects the detection of hump-shaped patterns."

**Auteurs du document :** ESPINAR J. L.

**Obtenir le document :** Departamento de Geoeología, Instituto de Recursos Naturales y Agrobiología de Sevilla

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