

Spectral characteristics of soil and vegetation in saline wetlands, NE Spain

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Sparse vegetation

Introduction

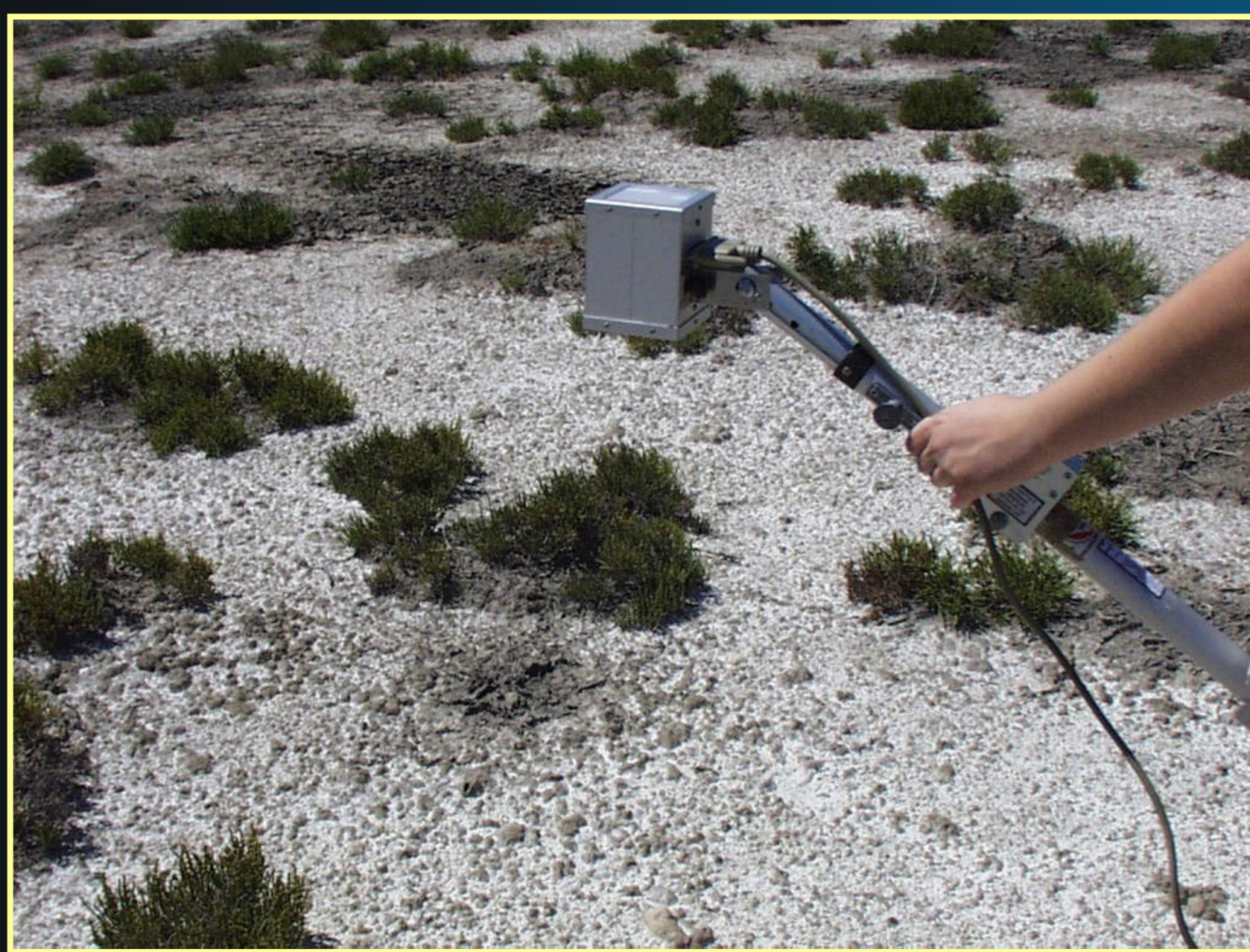
A goal of European Habitats Directive is to protect the biodiversity through the **conservation of habitats**. The vegetation of Monegros' saline wetlands includes endemisms and habitats protected by European laws.

Mapping and estimating **vegetation cover in these arid environments** is conditioned by the sparse vegetation and the influence of soil background reflectance.

The remote monitoring of the vegetation requires knowing the relationship between their spectral characteristics and the vegetation cover and soil conditions.



Variable soil condition



Methods

- A total of **11 saline wetlands** were surveyed in 2007 and 2008 using two spectrometers based on discrete and continuous readings, respectively.

- We sampled **242 sites** deemed representative of plants with different percent cover and soils with different moisture and efflorescence conditions.

- Brightness (BI), Redness (RI) and Colour (CI) **indexes** were applied to differentiate soils and plants. The **green cover fraction** obtained from classification of ground photographs was related to NDVI.

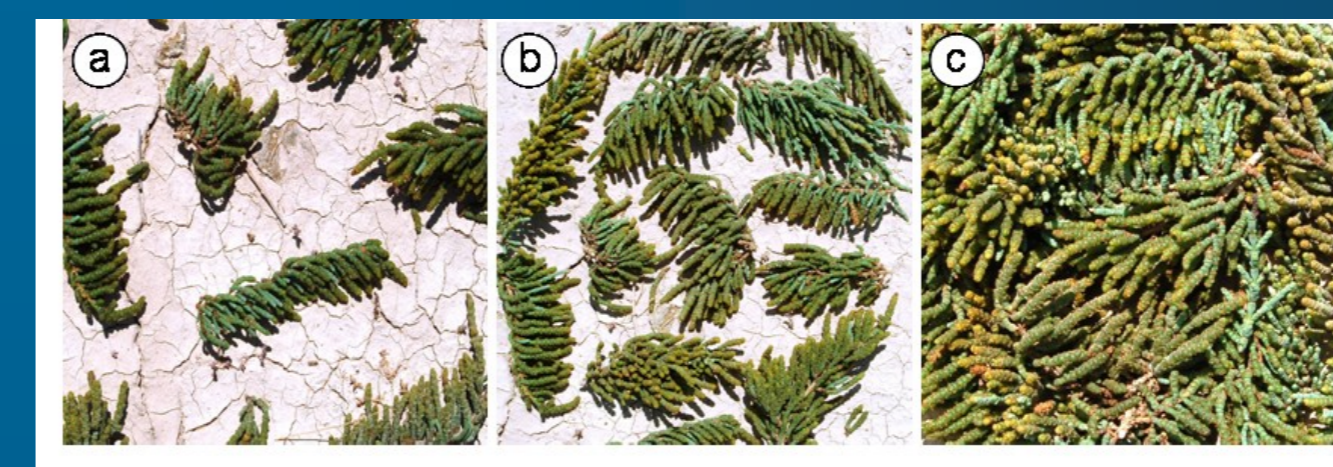
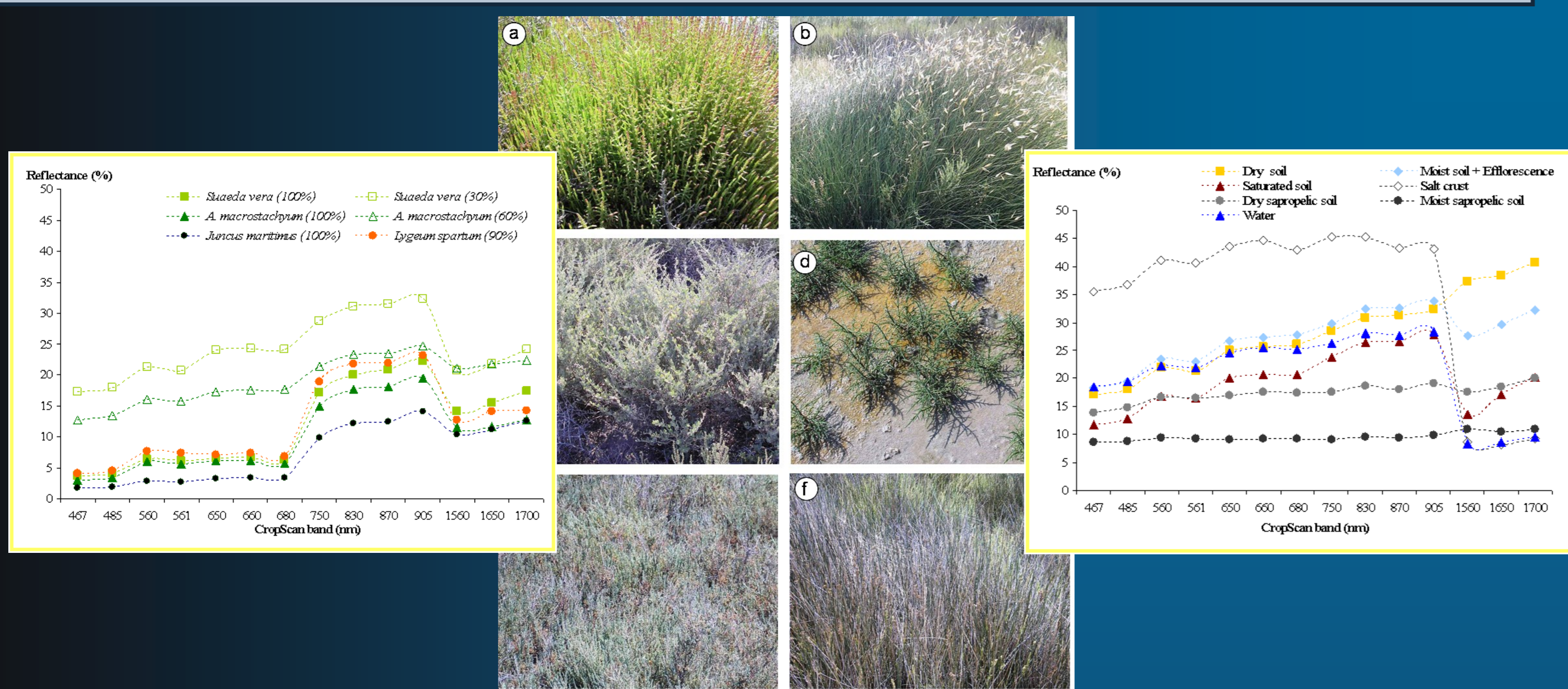


CropScan (VIS-NIR-SWIR)

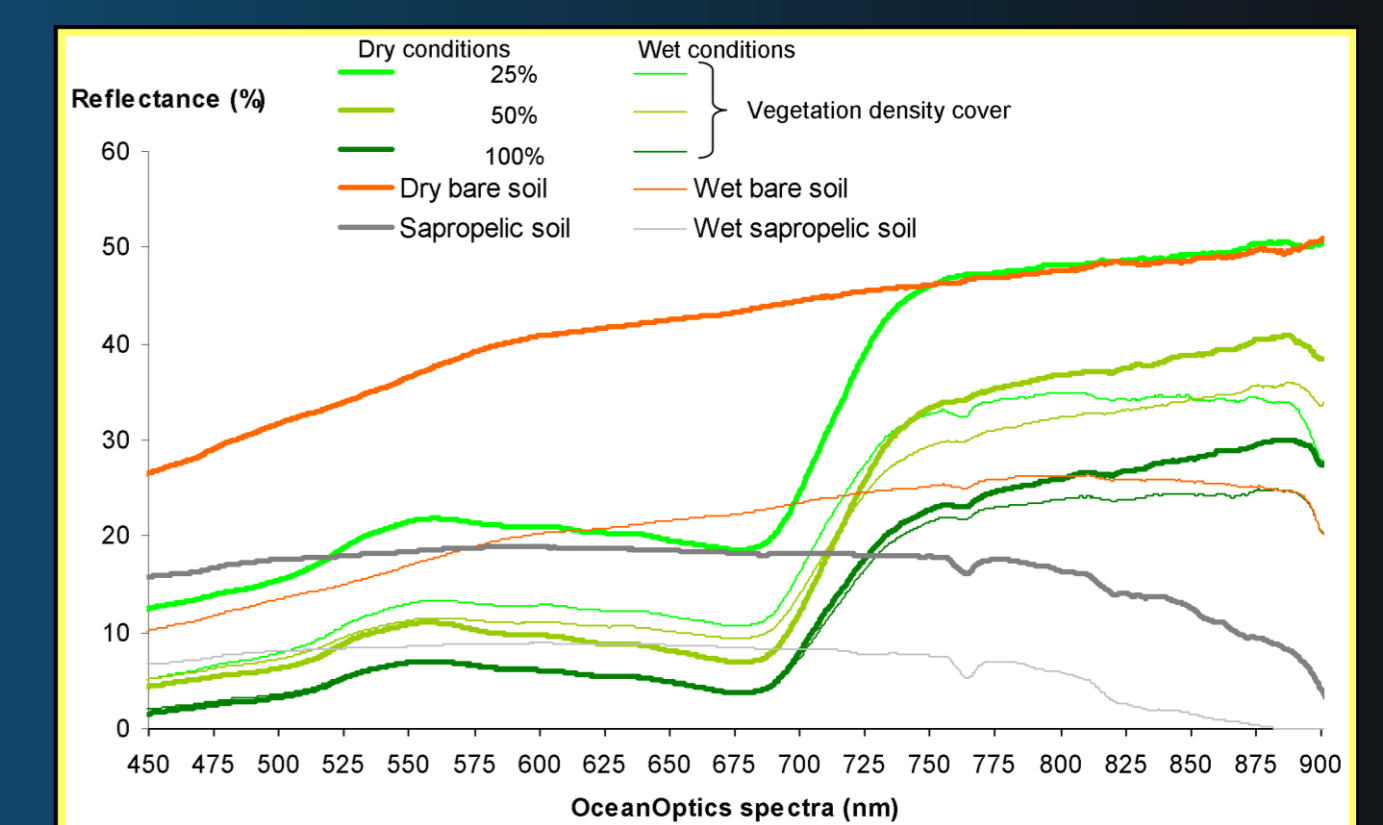
Was used to characterize different plants (perennials, annuals) and soil conditions (dry, moist, salt crust, efflorescence).

OceanOptics (VIS-NIR)

and field data (zenital photograph, soil moisture and Munsell color) were used to classify the green fraction cover and the soil features.



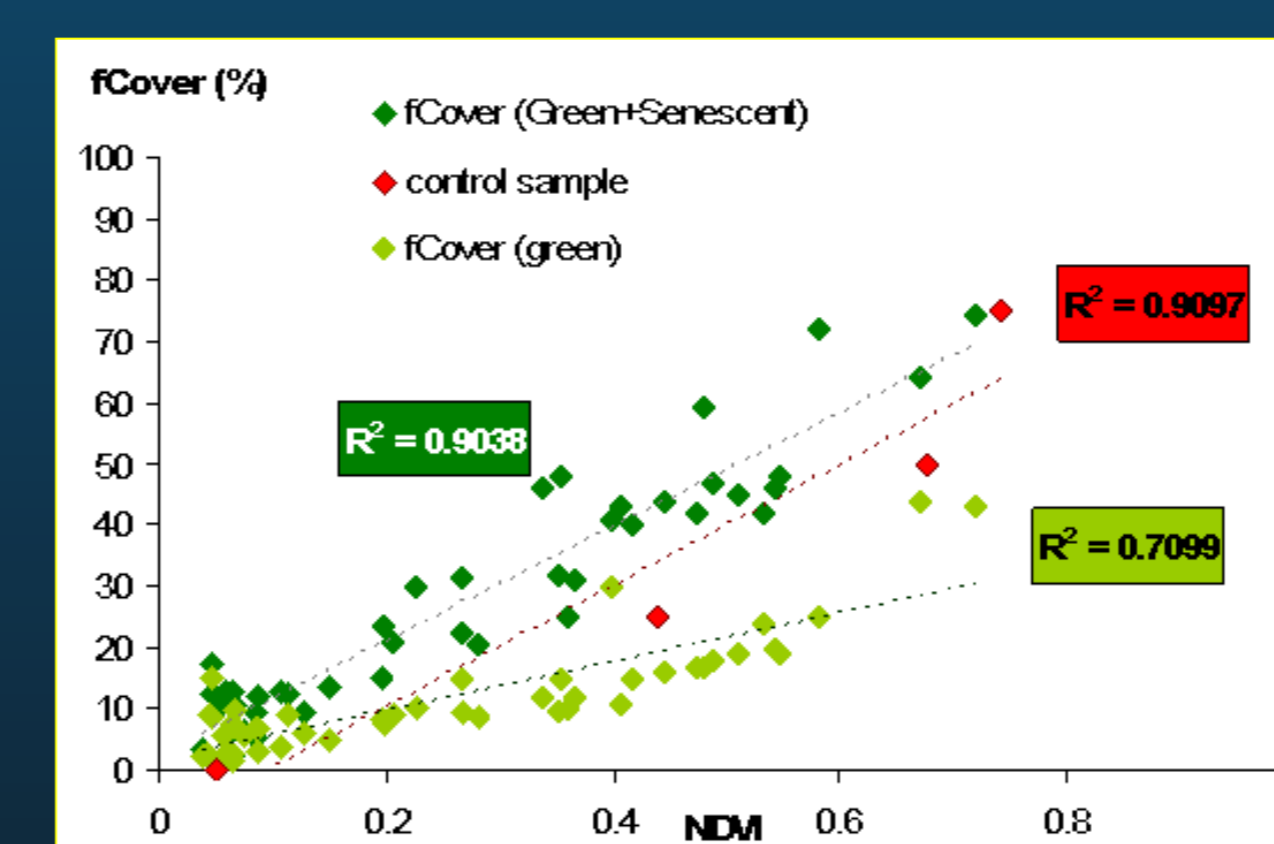
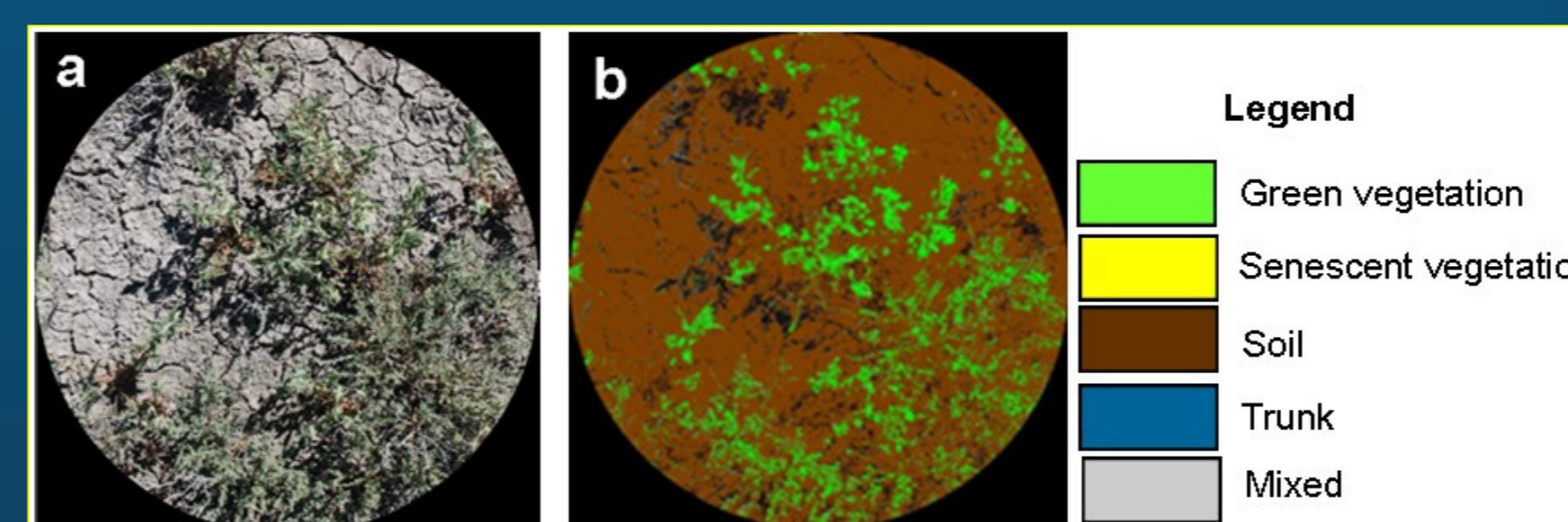
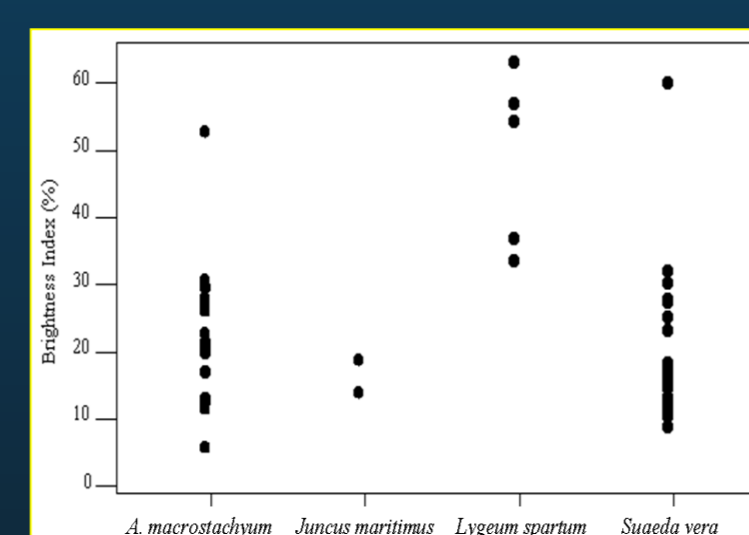
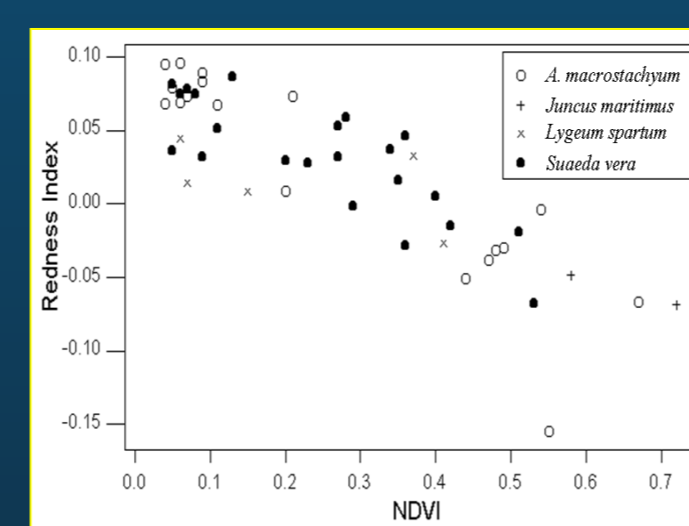
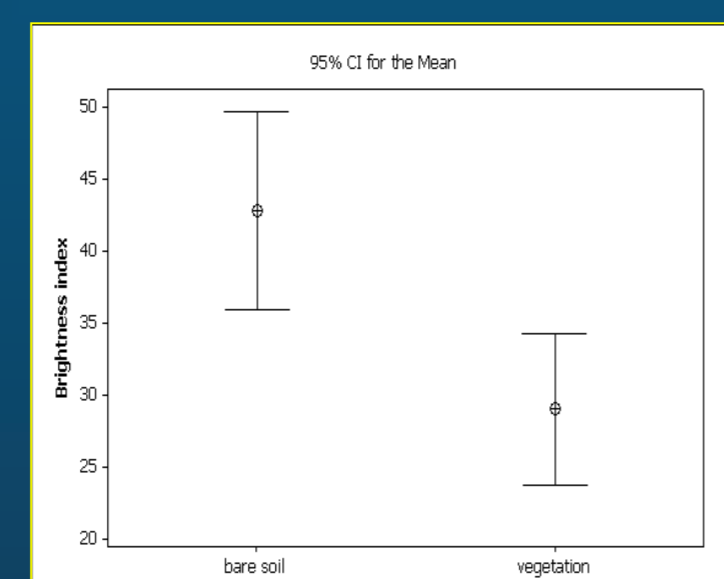
Control samples of *A. macrostachyum* with different percent cover: (a) 25%, (b) 50%, and (c) 100%.



Results

- RI, BI, and CI indexes were suitable **to separate soil and vegetation** thought they were not useful to differentiate plant species.

- Vegetation reflectance increases where soil surface is dry and **efflorescence** occurs, and decreases with soil **moisture** and shadow of branches.



- The **NDVI and Brightness Index** were the most suitable to discriminate vegetation. Soil separation is not obvious due to efflorescence and moisture effects.

- The mixture of dry, senescent and green (**green and yellow-green**) parts in the plant contribute to their spectral response (NDVI).

Conclusions

- The field spectral measures show the low reflectance of the plants studied. Moreover, field spectra of vegetation is conditioned by the plant species composition, phenological state and density cover.

- Soil surface data and field spectra are essential to identify the components contributing to the reflectivity measured with remote sensors and to validate vegetation and soil surface maps in hypersaline environments.