Mapping *Mimosa pigra* on the Mary River floodplain using TopSAR, Landsat ETM+ and MASTER data

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Summary

Mimosa, *Mimosa pigra*, L., threatens the ecological, cultural and economic values of tropical wetlands. For effective management and control of mimosa, new methods for mapping its distribution and condition are required. This study is unique, as it presents the first specific application of radar, hyperspectral and fused optical/radar remote-sensing data to the mapping of mimosa.

The objectives of this study were: (1) to determine if mimosa could be mapped at various densities using TopSAR; (2) to determine the spectral overlap between mimosa and other wetland cover types; (3) to determine whether the fusion of TopSAR and optical data (Landsat ETM+) increases the classification accuracy of mimosa; and (3) to map mimosa using MASTER hyperspectral data.

A supervised classification approach using minimum distance to means and maximum likelihood was applied to the TopSAR and fused data sets. Training areas were selected from the major land cover types on the floodplain. Accuracy assessment of the classifications was carried out using 275 field-sampling points and error matrices. An ISODATA unsupervised classification was performed on a small subset of the MASTER data. Spectral classes were labelled using a vegetation map and field data.

Mimosa could not be discriminated on the TopSAR imagery at low density, nor could training areas be created for intermediate densities of mimosa. The fused methods did not increase the classification accuracy of mimosa. The *Melaleuca* woodland/grassland/sedgeland, and mimosa/*Melaleuca* woodland classes had significant classification errors for both the TopSAR and fused classifications. These errors are attributed to the spectral and structural similarities between the communities. Compared with other floodplains, the Mary River is a mosaic of cover types and vegetation communities, which makes land-cover classification difficult.

The MASTER results were promising. Mimosa in low/intermediate and intermediate/high density from field sites showed similarities with labelled classes. Some confusion occurred between dense mimosa, *Melaleuca* woodland and mangroves, mainly due to mixed pixels.

Keywords: mapping techniques, weed management, remote sensing.

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