Remote sensing and GIS techniques applied to identify the ecological preference of Southamerican Locust (Orthoptera: Acridoidea: Schistocerca cancellata) and the influence of land use / cover changes in the NW of Argentina.

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Historically, the South American locust, Schistocerca cancellata, has been considered as the most serious agricultural pest in Argentina. From 1954 on, invasion of agricultural lands has been prevented by application of chemical insecticides against nymphal bands in outbreak areas of La Rioja and Catamarca provinces in NW Argentina. Factors involved in the origin of plagues of Schistocerca cancellata have been analyzed, however, much of the detailed information required for accurate forecasting and planning of efficient preventive control, trying to reduce the use of chemicals, is not available. The main objectives of this study are 1) to identify the locust habitats in the study area by remote sensing and GIS techniques (the mapping of locust biotopes is essential for identification of the potential outbreak areas and for organizing efficient locust survey), 2) to compare the characteristics, extension, and possible disruptions of current and historical biotopes, and 3) to determine possible factors, other than man-driven control, that could have had an effect in the decreases (both in magnitude and frequency) of the outbreaks. First, we analyzed different current sensors to improve the identification of plants communities (different forests, grasslands, crops, etc.) and to generate a detailed land use map. We applied different classification methods (SAM, Isodata, Minimum Distance, Maximum Likelihood, Decision Tree (including a DEM)), vegetation index (NDVI, SAVI, OPVI) and visual interpretation on Landsat ETM+, Aster, SAC-C, ALI and Hyperion data, and the results were compared.A second step was the analysis of historical data to evaluate the land use/cover changes in the study area, as an important factor on locust population dynamic. In this point we used: ancient cartography (1953-56), aerial photographs (1973), Landsat MSS (1984), satellite cartography (1995) and Landsat ETM+ (2002). We unify formats (paper, film, digital) and projections, and integrate the data in a GIS, different units of land use/cover were mapped (native communities, agricultural lands (intensive and extensive use) and others) and compared their variations along time (1953-2002). We integrated the analysis of rainfall data, too. These results show a decrease of native communities in a 30%, and an important increase of agricultural irrigated lands.We conclude that the use of RS and GIS allowed us to integrate the multiple data (in time and sources) to improve the analysis of this important agricultural plague, and at the same time to monitor the changes of native plant communities and the relationship with cropped areas.