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GRASSHOPPER DENSITY POPULATION CLASSIFICATION WITH NEURAL NETWORKS

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Satellite images of the grassland area in Durango M'exico were obtained of altitude, slope, average annual temperature, annual precipitation, type of vegetation, type of soil, normal vegetation index, percentage of herbaceous and percentage of bares soil, in order to relate them with grasshopper density population (GDP) surveyed in 35 sampling sites from June to November in 2003 in the study area. A stepwise regression analysis was performed with the most abundant grasshopper species *Phoetaliotes nebrascensis* (Thomas), *Melanoplus lakinus* (Scudder) and *Boopedon nubilum* (Say) with data extracted from the satellite images. Results showed R > 0.798, F(4, 27) > 9.86 and P > 0.000016. The significant variables were normal vegetation index, type of vegetation, altitude and precipitation. GDP raster maps were interpolated using the stepwise regression equations. Then, classification neural networks models were used in order to classify GDP maps. Analysis of percentage of classification error showed that the adequate number of hidden neurons was between six and twelve. Results of error classification were 21% for *P. nebrascensis*, 5% for *M. lakinus* and 20% for *B. nubilum*. Neural networks are practical tools to classify grasshopper population and it will help to take control measurements in overpopulated areas.

Keywords: Grasshopper population; neural network; normal vegetation index.