MAPPING AREAS FOR SPECIFIC MANAGEMENT IN SUGARCANE PRODUCTION AREAS USING PEDOMETRICS

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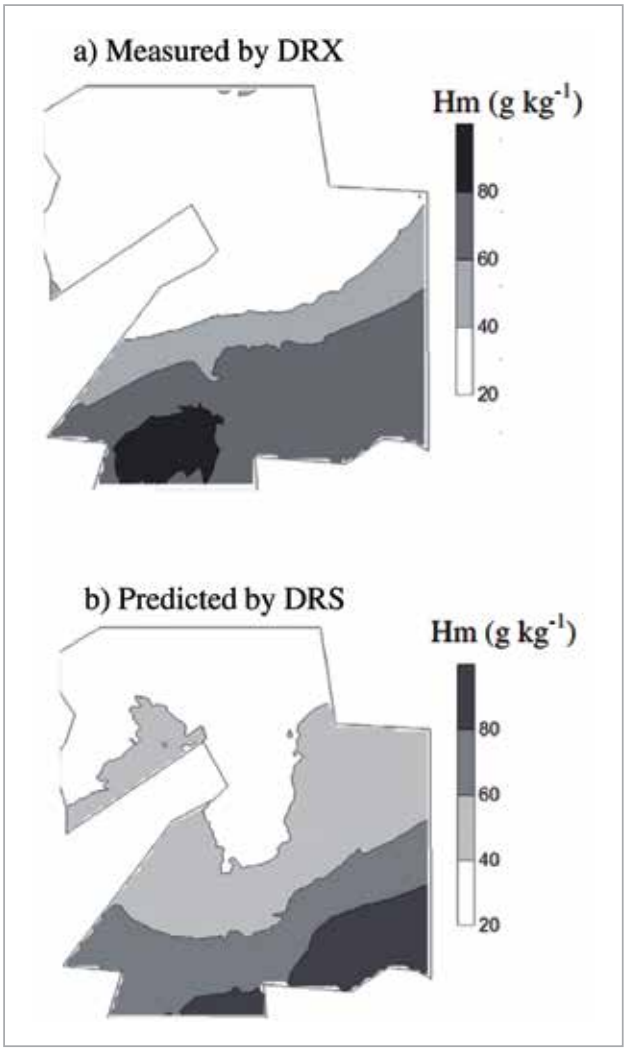

Figure 1. Spatial distribution maps of the hematite (Hm) measured by X-ray diffraction (DRX) (a) and Hm predicted by diffuse reflectance spectroscopy (DRS) (b) in an area of 770 hectares cultivated with sugarcane (n= 110) (Camargo et al., 2015)

The demand for detailed information on soils to assist agricultural and politic decision making is increasing. Despite it is well known that detailed soil attributes information could be used to support sustainable production, current study reports the requirement for new and detailed indexes on the global impacts of land use and management. In general, the greater is the number of data points, the greater the accuracy, pushing into the way of spatial variability studies with a lot a soil samples, unless an alternative soil analysis method helps into the modelling . The magnetic susceptibility (MS) and diffuse reflectance spectroscopy (DRS) are rapid, convenient, less expensive, non-destructive, and sometimes more accurate methods than the conventional soil laboratory analysis. In addition, this technique allows the simultaneous characterization of many soil attributes with agronomic and environmental relevance, besides being adaptable for field use. The MS and DRS are covariate of mineralogical attributes sensitive the soil formation factors and processes. Spatial variability studies of mineralogical attributes at different scales (1 – 100.000 ha) and different landscape models have proved spatial dependence of these minerals and spatial correlation with physical, chemical, environmental attributes (erosion and greenhouse gas emissions) and plant response. The results indicate that MS and DRE (pedometrics techniques) can be used as alternative techniques to identify areas in the "boundaries", between two or more environments of contrasting soil minerals (hematite, goethite, maghemite, ferrihydrite, kaolinite and gibbsite) (*Figure 1*). This allows, by using pedometric mapping, to predict values of some soil attributes at unobserved locations and to access the uncertainty of estimations using statistical inference and sensors.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

The use of pedometrics techniques based on MS and DRS have enabled the conversion of basic knowledge in mineralogy to better understanding tropical soils, especially in a new strategy applied to improve yield in sugarcane areas. These results have helped the innovation of the agricultural sector improving the planning and recommendation of vinasse application in sugarcane areas (*Figure 2*). In addition, we have results that have pointed to the identification of areas with potential CO_2 emission , erosion or even having higher potential for production total reducing sugars.

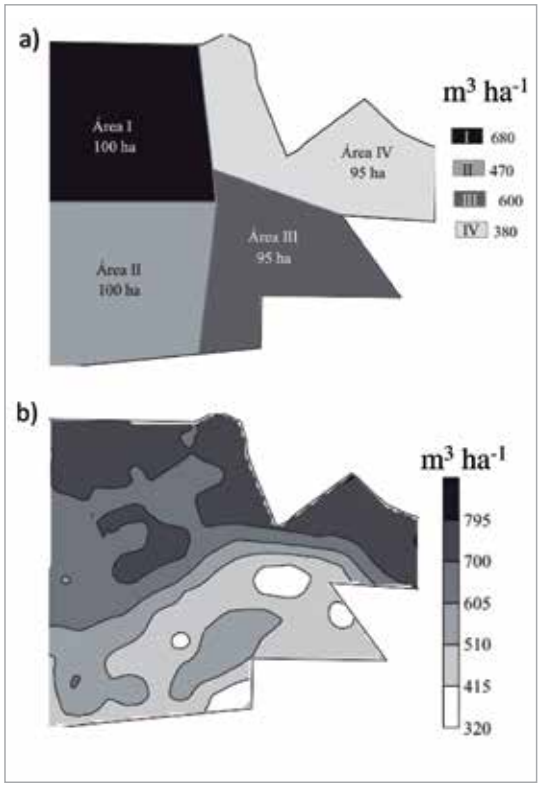

Figure 2. Vinasse[1] application recommendation map, according to the Company's sampling of Environmental Sanitation Technology (CETESB) (a) and the soil bearing capacity to the application of vinasse, estimated according to the magnetic susceptibility of the soil (b) in an area of 380 hectares cultivated with sugarcane (n= 241) (1 - residue of ethanol production) (Peluco et al., 2013)

The future prospects are the production of those thematic maps to other regions of Brazil, based on BigDatas, integrating useful information to different areas, allowing the creation of new hypotheses and generate results based on the update allowed information on soils (eScience).

MAIN PUBLICATIONS

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