



Prediction of soil properties at farm-scale using factor analysis and model-based soil-sampling schemes

Mauricio Castro Franco (1), Jose Luis Costa (2), and Virginia Aparicio (2)

(1) CONICET, INTA, Agronomy, Balcarce, Argentina (agronomao@gmail.com), (2) INTA, Agronomy, Balcarce, Argentina (costa.jose@inta.gob.ar), (3) INTA, Agronomy, Balcarce, Argentina (aparicio.virginia@inta.gob.ar)

Digital soil mapping techniques can be used for improve soil information at field-scale. The aim of this study were develop a RF model to soil organic matter (SOM) and clay content in top soil at farm-scale combining predictors reduction and model-based soil-sampling techniques. We combine predictors reduce by factor analysis and model-based soil-sampling schemes by Conditioned Latin hypercube sampling (cLHS) and Fuzzy c-means sampling (FCMS). In general, 11 of 18 predictors were selected. Factor analysis provided an efficient quantitative method to determine the number of predictors. The combination of cLHS and predictors reduction with factor analysis was effective to predict SOM and clay content. Factors related with vegetation cover and yield map were the most important predictors to predict SOM and clay content, whereas factors related with topography were the less important. A dataset minimum of 50 soil samples were necessary to demonstrate the efficacy of the combination Factor Analysis–cLHS–RF model. The accuracy of the RF models to predict SOM and clay content can be maximized by increasing the number of samples. In this study, we demonstrated that the combination Factor Analysis–cLHS could reduce the time and financial resources need to improve the predictive capacity of RF models to predict soil properties.