

**RE-DELINEATION, RE-CLASSIFICATION AND MAPPING THE SOIL SERIES  
OF BARANGAY BALANTE, SCIENCE CITY OF MUÑOZ, NUEVA ECIJA**

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## **BIOGRAPHICAL SKETCH**

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## ABSTRACT

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The agricultural areas of Barangay Balante was re-delineated using ArcGIS 10.3.1. and Garmin (Montana 650) GPS. These devise were used to generate and locate the sampling points for soil samples collection. Soils were collected using soil probe with the depth of 0-20cm and 30-50cm. The collected soil samples were analyzed in laboratory for the texture, soil series and soil type determination. Using the Simplified Keys to Soil Series Nueva Ecija of PhilRice the current soil series and soil type of Barangay Balante were re-classified and re-validated. It was found that there are four soil series and six soil types in Barangay Balante compared to the previous soil series and soil types reported by BSWM in 2010. BSWM reported only Maligaya clay loam for Barangay Balante.

Barangay Balante was found to be marginally suitable for rice, phaseolus bean and corn due to its limitation in rooting condition.

Keywords: Balante; Soil Series; Soil Type; Crop Suitability; Detailed map

## LITERATURE CITED

- Aubert G. (1985), Soil Survey: Different Types and Categories, Cornell University, Ithaca. pp. 7.
- Carré, F., A.B. Mcbratney, T. Mayr, & L. Montanarella. (2007). Digital soil assessments: Beyond DSM. *Geoderma* 142:69-79.
- C. Bacatio, L. Costelo, N. Crucena, T. Retamar, and S. Fabula. *Soilscape*. (2010). Spectral Response Analysis of Selected Philippine Agricultural Soils in Varying Nutrient Conditions. pp. 8.
- City Planning And Development Office. (2017). City Profile 2018. Science City of Munoz. pp. 3-5.
- Collado et al. (2008). Philippine Rice Research Institute. Simplified Keys to Soil Series Nueva Ecija. Science City of Munoz.
- Deckers J., Spaargaren O., Dondeyne S., (2002). Soil Survey as a Basis for land evaluation. *Eolss Publishers*. pp. 3.
- Domingo A., Fiegalan F., Garcia F., Juico P., Mactal A., & Mason M.L., (2004). Laboratory Manual; Principles of Soil Science (SO 101). College of Agriculture, Central Luzon State University. Science City of Munoz.
- Ellis G. Knox. (1965). Soil Genesis, Morphology, and Classification. *Soil Individuals and Soil Classification*. pp. 83.
- Ferguson R. B Et Al. (2007). Guidelines for Soil Sampling. *NebGuide*.
- Food And Agriculture Organization Of The United Nations. (1967). Soil Survey Interpretation and Its Use. Rome. pp. 83
- Lesaffre, B .(1990):General report. In: Land Drainage, 4th International Drainage Workshop. International Commission on Irrigation and Drainage (ICID). Cairo. pp. 53
- Mark H. Silverman & Val J. Krawiecki.(1994).Soil Survey of Hamilton County, New York. pp. 6.
- McBratney, A.B., M.L. Mendonça-Santos, & B. Minasny. (2003). On digital soil mapping. *Geoderma* 117:3-52.
- Dent F. J., Gallup D. L., Muljadi D., Soepraptohardjo M., Sudjadi M., et. al (1983).Reconnaissance Land Resource Surveys 1:250,000 scale Atlas Format Procedures by CSR/FAO. pp. 43-54.

- Simonson, R.W. (1959). Outline of a generalized theory of soil genesis. *Soil Science Society of America Procedures* 23:152-156.
- Shields J. A., St. Araud R. J., Paul E. A., & Clayton J. S. (1965). Measurement of Soil Color. Saskatchewan Institute of Pedology, University of Saskatchewan, Saskatoon, Saskatchewan. pp. 86.
- Smith, G.D. (1963). Objectives and basic assumptions of the new soil classification system. *Soil Science* 96:6-16.
- Soil Survey Division Staff. (1993). Soil survey manual. U.S. Department of Agriculture Handbook 18. Natural Resources Conservation Service. pp. 37
- Soil Survey Staff. (1999). Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys, 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.
- Soil Survey Staff. (2009). Soil survey field and laboratory methods manual. Soil Survey Investigations Report No. 51, version 1.0. R. Burt (ed.). USDA Natural Resources Conservation Service. pp. 120
- Soil Survey Division Staff.(2017). Soil survey manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, D.C. pp. 145.
- United States Department Of Agriculture. (1993). Soil Survey Manual. pp. 57.