Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

AGE030-P13 会場:コンベンションホール 時間: 5月26日17:15-18:30

黒ボク土の水分保持特性に関する研究

Characterization of Water Retention Property of Kuroboku Soil

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High-porosity and well-structured volcanic ash soil, also known as Kuroboku, found in Kanto region is known to have a unique soil hydraulic properties. However, in general, measuring soil hydraulic properties, such as soil water retention curve, is time-consuming and requires well-trained skills. To overcome this, pedotransfer functions have been developed and practiced to predict soil hydraulic properties from more-easily-obtained soil physical properties, such as soil texture. Most pedotransfer functions were however calibrated using data collected in the U.S., Europe, and Australia. There is, thus, a need for development of pedotransfer functions suitable for Japanese soils. To develop a useful pedotransfer function, we need not only to create a database with a number of soil data, but also to find soil parameters that correlate well with target hydraulic properties. The aim of this study was therefore to investigate the correlations between easily-obtained soil physical properties and soil hydraulic properties using volcanic ash Kuroboku soil.

In this study we collected 30 samples along a transect with a constant 30-cm spacing at one of the experimental fields in Field Science of Tokyo University of Agriculture & Technology. Particle size distribution, bulk density, soil particle density, aggregate size distribution, organic matter content, hydraulic conductivity, as well as soil water retention curve were obtained for all 30 soil samples. Available functional models were fit to particle size distribution data and water retention data for parameterization of those properties. Correlations between soil properties, including those parameters, were then investigated. Common pedotransfer functions (e.g., ROSETTA) were also performed to examine whether or not soil hydraulic properties of Kuroboku soil can be predicted. This study demonstrates that the unique structure of Kuroboku soil, such as aggregates, cannot be ignored for reliable estimate of soil hydraulic properties through pedotransfer functions.

キーワード:水分保持,ペドトランスファー関数,相関,黒ボク

Keywords: Water retention, Pedotransfer function, Correlation, Kuroboku