

**TOPOSEQUENCE OF SOILS IN NAKHON RATCHASIMA
PROVINCE, NORTHEASTERN THAILAND**

BUREE BOONSOMPOPPUNTH

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ABSTRACT

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Four soil profiles in each toposequence of Amphoe Muang and Amphoe Dan Khun Thot, Nakhon Ratchasima province, were studied to determine their physical, chemical and mineralogical characteristics and to gain understanding of the nature of their genesis in relation to the topography. The mineral contents of the silt fraction were determined by x-ray diffraction technique. The clay was characterized by x-ray diffraction and differential thermal analysis (DTA). The mineralogy of the light and heavy minerals in fine sand and very fine sand fractions was determined by grain count using petrographic microscope. The micromorphology study was performed on thin sections from selected horizons in each profile.

In Amphoe Muang Toposequence Profile SR-4 which occurred in the low terrace contained more clay than the other three profiles that occurred on the higher terrace or elevation. Likewise, in Amphoe Dan Khun Thot Toposequence, Profile SR-8 which occurred in the same physiographic position as Profile SR-4 contained more

available water than the rest of the profiles. These profiles also had more exchangeable bases, higher pH, higher cation exchange capacity, and higher electrical conductivity.

The clay mineralogical suite in Amphoe Muang toposequence contained more kaolinite in the high and middle terraces and in the upper part of the low terrace, while in Amphoe Dan Khun Thot toposequence this clay mineral was moderate to small in amounts in the same physiographic position. In both toposequences montmorillonite was concentrated in the low terrace. Mineral assemblages in the profiles indicated the weathering of soils from alluvial sediments. Because the parent rocks were sandstones and siltstones, the soils are quartz-rich, with very few if any weatherable minerals and ubiquitous heavy minerals. The few lower stability minerals which were found in the soils occurred on the low terrace.

Soil development has resulted in a loosely bound, clay-poor, S-matrix with low degree of orientation in the upper horizons and illuvial B-horizons with more oriented plasma in the lower part of the profile. Iron and manganese oxide nodules in the lower part of some profiles were directly related to iron mobility and accumulation associated with fluctuations of the water table.

Seven of the profiles in both toposequences which showed the evidence of argillic horizon were classified as Ultisol and Alfisol. The Ultisols were Profiles SR-5 and SR-6 which were classified as Typic Paleustults and Profile SR-2 as Oxic Paleustult. For the Alfisols, SR-1 was classified as Oxic Paleustalf, SR-3 as Ultic Haplustalf, SR-7 as Typic Haplustalf and SR-4 as Aeric Tropaqueft. On the other hand, Profile SR-8 which has no argillic horizon fits well in the Inceptisols order and was classified as Aeric Tropaqueft.

Characteristics of these soils indicate serious problems in their management under cultivation. The nutrient level is very deficient for most crops. With the present crops and level of management, response to fertilization and irrigation is still very poor because of other limiting soil factors. Multiple improvements in other essential factors of production are also needed. Improvements are taking place but sustained efforts on all aspects of the problem are required for effective and lasting progress. Understanding of the soil resources and their management requirements are essential to these developments.

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INTRODUCTION

In Dokuchaev's original equation, the factors of soil formation included only climate, organisms, substrata and age. Later, a factor of relief was subsequently added. These five factors with substrata termed "parent material" were given the major emphasis in the concepts of soil-forming factors by Jenny (1941). Jenny's equations described the relationship between a soil property and state factors which are groups of factors as follows: environmental climate, organisms, topography (including hydrologic features), parent material, time, and additional unspecified factors.

Jenny has recognized the interdependence of the state factors of soil formation but has looked for situations in which, because all factors but one are ineffective in the landscape, the influence of the one variable factor is revealed. Sequences of soils can be sought which are dominated by single factor.

Toposequence is "a sequence of soils whose properties are functionally related to topography as a soil formation factor." The characteristics of soils in the toposequence reveal certain well defined relationships with respect to topographical gradations. In the toposequence, soil color changes in color have been observed from deep red in uplands