Soil Pedogenesis and Landscape Relationships in the Santa Catalina Mountains

Abstract

Landscape position, precipitation quantity, vegetation, and parent material are major factors of soil genesis in Arizona's Santa Catalina Mountains. Differences in soil mineralogy and soil morphology between convergent and divergent landscape positions over an elevation gradient on Mt. Lemmon were examined. Soils in this area are derived from granite parent material which is fairly weather resistant. The depth to bedrock, particle size, organic matter content, color, and clay mineralogy for each landscape position were determined. The Quartz/Feldspar ratios of the low and high elevation divergent sites were compared. Data showed that divergent low elevation soils have the highest overall Quartz/Feldspar ratio and are therefore the most resistant to weathering. The depth to bedrock was greatest at the high elevation sites and at the divergent landscape positions due to surface water flows over the convergent positions not penetrating the soil deeply enough to substantially facilitate weathering. The value and chroma of the first soil horizon for the convergent and divergent landscape positions are highest at the low elevation, indicating that there is less organic material in the lower elevation soils. At low elevations the soil pH was higher at the convergent sites, while at the high elevation sites the pH is higher at the divergent sites. An increase in the pH from the low to the high elevation sites is due to an increase in precipitation and organic material. An increase in the electrical conductivity from the low to the high elevation sites is due to an increase in precipitation.