INTERNAL REPORT 128

SOILS OF THE REFERENCE STANDS-- OREGON IBP

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ABSTRACT

Field reconnaissance, soil sampling, and laboratory analyses were conducted to characterize the soils of the 50 by 50 meter forest community reference stand plots in and near the H. J. Andrews Experimental Forest. Soil descriptions, chemical and physical properties, soil classification, and nutrient capital information for mineral soils are summarized. Soils of the reference stands are mostly Inceptisols; the remainder are Alfisols.

INTRODUCTION

This study was conducted from June, 1972 through June, 1973 to characterize the soils of the reference stand plots under study by the Coniferous Forest Biome in and near the H. J. Andrews Experimental Forest (Berntsen and Rothacher 1959). Nineteen reference stands, each a 50 by 50 meter plot, representing a particular forest community (Dyrness et al. 1973) were studied. Reported here are descriptive information on landscapes and soil morphology, laboratory data on some physical and chemical properties, tentative soil classification, and statements as to total nutrient capital for the soils of the reference stands.

MATERIALS AND METHODS

Field Investigations

Field work was conducted from June through September, 1972. Each reference stand was studied to describe and interpret soil-landscape patterns. Soil survey techniques, including air photo interpretation and preliminary shallow pits, were utilized. No walking or digging was done in the reference stands, but based on preliminary reconnaissance, pedons were selected at or near the periphery of the stands, in positions thought best to characterize and represent the soils underlying the stands. At least one pedon was selected for morphologic study and sampling at each reference stand. At some stands, where necessary to characterize the range of soil properties and in an effort to gain preliminary information on soil variability, two or four pedons were selected. A total of 32 pedons were chosen in this manner, to characterize the soils of the 19 reference stands.

At each site a morphological profile description was made from excavations, using the techniques of the Soil Survey Manual (Soil Survey Staff 1951, 1962). Content of coarse fragments, by volume, was estimated for each horizon by scrutiny of the pit face. Each profile was sampled by horizons for laboratory analysis of the fine earth (<2 mm.) fraction.

One hundred eighty bulk samples were collected. Bulk samples were air dried in open bags and screened to remove all coarse fragments (>2 mm.) prior to lab analysis. Where not restricted by overwhelmingly large numbers of coarse fragments, core samples were taken for bulk density determination. From one to three replicate core samples, depending on conditions, were taken from each of 57 master (A, B, or C) horizons sampled. For horizons where core samples could not be taken due to interference from coarse fragments, bulk density was approximated for use in nutrient capital computations. All pedons studied were segregated into three groups based on presumed parent material (pyroclastic breccia and tuff, andesitic/basaltic flow rocks, or andesitic/basaltic flow rocks with a large admixture of ash). Within each group, the mean of measured bulk densities was determined for each of the three master (A, B, and C) horizons. Mean values thus determined were assigned to the appropriate horizons for which bulk density had not been measured.

Laboratory Investigations

Chemical methods

Chemical analyses were performed at the USFS Forestry Sciences Laboratory, Corvallis. A Corning Model 10 pH meter was used to determine pH with electrodes immersed in a 1:1 soil-water suspension, and also in a 1:1 soil to N KCl suspension. Extractable phosphorous was determined using the Dilute Acid-Flouride Method (Bray and Kurtz 1945). Soil organic matter was determined by Walkley-Black titration (Walkley and Black 1934). Total nitrogen was determined by the regular Macro-Kjeldahl Method (Bremner 1965), using Nessler reagent for colorimetric analysis of the distillate. Exchangeable calcium, magnesium, and potassium were extracted by ammonium acetate at pH 7 (Peech et al. 1947) and determined on a Jarell-Ash atomic absorption spectrophotometer. Cation exchange capacity was determined by the ammonium acetate method, pH 7 (Schollenberger and Simon 1945). Exchangeable hydrogen, run only on selected samples for soil classification purposes, was determined using the triethanolamine method (Roberts et al. 1971). Chemical data are given in Table 1.

Physical methods

Physical property analyses were done in the OSU Soil Physics Laboratory by the senior author. Particle size distributions were determined for major genetic horizons by the pipette method (Kilmer and Alexander 1949, Chu and Davidson 1953). Dispersion of 10-gram samples was accomplished with 10 milliliters of 5 percent Calgon solution. Bulk densities of master horizons were determined by drying core samples overnight at 105°C (Blake 1965). Particle size and bulk density data appear in Table 2. Gravimetric moisture contents of air dry samples, for nutrient capital computations, were determined based on weight loss (Gardner 1965) when dried at 105°C overnight.

Soil Classification

Soil classification at each site was determined according to criteria in the Soil Taxonomy (Soil Survey Staff 1970). Where data on the soils were inadequate to make firm decisions at given levels of the classification system, inferences were made based on field observation and the literature (Paeth 1970, Paeth et al. 1971, Rothacher et al. 1967, Thomas 1970). Soil moisture regimes were assumed to be udic in all cases except the shallow soils on portions of Reference Stand 1, where assignment of a xeric regime was considered justified. Soil temperature regimes varied from mesic to frigid to cryic, with the majority of pedons falling into the frigid regime.[1] Soil classification is TENTATIVE in all cases, pending correlation by the National Cooperative Soil Survey.

RESULTS AND DISCUSSION

Soils of the Reference Stands

This section gives information on location, elevation, forest community, and soil classification, and a general description of the landscape and major soil properties, for each reference stand. Landform terminology conforms, in most cases, to that described by Ruhe (1960). The concept of alluvium-colluvium as a parent material on mountain slopes is as described by Balster and Parsons (1968) and Parsons and Balster (1966). Identifications of bedrock and parent material lithologies are tentative. Forest communities named here are described by Dyrness et al. (1973). Detailed profile descriptions for representative pedons at each reference stand are given in Table 3.

Reference Stand 1

Location: NW¼, SW¼, Sec. 6, T16S, R5E

Elevation: 480-500 m.

Forest community: *Pseudotsuga menziesii*/*Holodiscus discolor*

Soil classification: Loamy-skeletal, mixed, mesic families of Typic Dystrochrepts and Dystric Lithic Xerochrepts

Soil landscape: This reference stand occupies a portion of the interfluve which forms the northwest boundary of Watershed 9. Pediment backslope grades upward to the doubly-convex shoulder of a ridge spur. Slope

[1] Soil temperature data for all reference stands were provided by Professor D. B. Zobel, Department of Botany, O.S.U.

gradients vary from 30 percent on portions of the spur to more than 65 percent on those parts of the stand extending over the shoulder. Slope aspects range from 150 to 250 degrees, with most of the stand facing southwest.

Soils on the pediment backslopes are deep, well-drained, very gravelly loams and sandy loams developed in colluvium from reddish breccia and basalt. A dark brown to dark reddish brown A horizon overlies a brown to reddish brown B horizon. Highly fractured breccia bedrock underlies these soils at depths of 1.5 to 2.5 meters. Soil on the interfluve itself differs in being shallow and somewhat excessively drained. Bedrock underlies this soil at a depth of 50 centimeters or less, and rock outcrops are common. Four pedons were selected around the periphery of this stand for description and sampling. Profile descriptions for two of these pedons appear in Table 3.

Reference Stand 2

Location: NW¼, SW¼, Sec. 32, T15S, R5E

Elevation: 480-500 m.

Forest community: Tsuga heterophylla/Rhododendron macrophyllum/Berberis nervosa

Soil classification: Fine-loamy, mixed, frigid family of Typic Dystrochrepts

Soil landscape: This reference stand is on a pediment surface between backslope and footslope. The north side of the stand is on part of a fan terrace which emanates from a draw on the hillslope. The slope is generally concave, with a gradient of about 35 percent. Slope aspect is 285 degrees.

The soil is a deep, well-drained, brown to dark brown loam over silt loam developed in colluvium and alluvium from reddish tuffs and breccias. Pebbles in the A horizon are rounded, and the pumice content of the soil matrix increases strikingly with depth. Depths to a saprolitic C horizon range from 90 to 100 centimeters. One pedon was selected nearby to characterize the soils of this stand. Morphologic detail is presented in Table 3.

Reference Stand 3

Location: NE¼, SW¼, Sec. 13, T15S, R5E

Elevation: 940-950 m.

Forest community: Tsuga heterophylla-Abies amabilis/Linnaea borealis

Soil classification: Loamy-skeletal, mixed, frigid family of Typic Dystrochrepts

Soil landscape: Reference Stand 3 is located on an extensive, slightly concave pediment footslope in a U-shaped valley. Slope gradients vary from 15 to 25 percent. Slope aspect is 300 degrees.

The soil is a deep, well-drained, dark brown gravelly loam over a cobbly silt loam C horizon. Parent material was alluvium-colluvium and/or glacial till, derived from andesite. Depth to the C horizon is approximately 1 meter. Pumice is abundant throughout the A3, B, and C horizons. One pedon was studied at this site. Descriptive information appears in Table 3.

Reference Stand 4

Location: NW¼, SE¼, Sec. 7, T15S, R6E

Elevation: 1300-1350 m.

Forest community: *Abies amabilis/Tiarella unifoliata*

Soil classification: Loamy-skeletal, mixed, frigid family of Typic Haplumbrepts

Soil landscape: Reference Stand 4 is on a smooth pediment backslope which forms part of the headwall at the origin of McCrae Creek. Slope gradient is 50 percent, aspect 280 degrees.

The soil underlying this stand is a deep, well-drained, dark brown to brown gravelly silt loam over cobbly silt loam. It has developed in alluvium-colluvium and/or glacial till, derived from andesite. Thickness of the solum is approximately 110 to 120 centimeters. Pebbles in the A horizon are rounded, and the solum and substratum contain moderate amounts of pumice. One pedon was selected for study. A detailed description is given in Table 3.

Reference Stand 5

Location: SE¼, NW¼, Sec. 34, T15S, R5E

Elevation: 880-900 m.

Forest community: *Tsuga heterophylla-Abies amabilis/Rhododendron macrophyllum/Berberis nervosa*

Soil classification: Fine-loamy and loamy-skeletal, mixed, frigid families of Typic Dystrochrepts, and coarse-loamy, mixed, frigid family of Typic Haplumbrepts

Soil landscape: This reference stand is located on a broad, undulating bench with a complex pattern of gently to moderately sloping ridge spurs, saddles, and pediment surfaces. Slope gradients vary from 0 to 30 percent. Aspects vary from 270 to 045 degrees, with a northwest aspect being the most common. Human influence may have complicated the landform further, as it appears that an old road bed cuts across the stand in a northeast-southwest direction.

The pattern of soils is equally complex, as evidenced by the variation in textural families and the existence of both ochric and umbric epipedons in close proximity around the reference stand. Changes in coarse fragment content with depth, particularly in the Haplumbrept where coarse fragments are absent below 1 meter, provide further evidence of the complex geomorphic history of this bench area. Parent material appears to have been andesitic alluvium-colluvium which overlies a layer of previously weathered, and possibly water-deposited, silty material.

Soils are deep, well-drained, dark brown gravelly loams over silt loams and gravelly silt loams, except for the higher area on the south portion of the stand, where the texture is a loam throughout the solum. The A horizons, with the exception of the high area, contain numerous rounded pebbles. Pumice and charcoal fragments vary with depth in no particular sequence. Zones of yellowish red soil in the profiles indicate at least one episode of root burning here, and the soil in the saddle which may have been an old road bed possesses masses, 4 to 8 centimeters in diameter, of extremely firm soil surrounded by friable material. Four pedons were chosen for study at this site, and morphologic data for three of them appear in Table 3.

Reference Stand 6

Location: SE¼, NW¼, Sec. 31, T15S, R5E

Elevation: 590-635 m.

Forest community: *Tsuga heterophylla/Castanopsis chrysophylla*

Soil classification: Loamy-skeletal, mixed, mesic family of Typic Dystrochrepts, and fine, mixed, mesic family of Typic Paleudalfs

Soil landscape: Reference Stand 6 is located on a shoulder and pediment backslope, just below the ridge spur which forms the northern boundary of Watershed 10. The landform is generally convex, with slopes varying from 55 percent on upper portions near the interfluve to 80 percent on the lower positions. Slope aspects range from 170 to 190 degrees.

Soils are predominantly deep, well-drained, dark yellowish brown to dark brown gravelly loams developed in alluvium-colluvium from reddish

breccia and tuff, and andesite. The A horizon has numerous small rounded pebbles. Depth to underlying saprolite is generally about 90 centimeters. Most of the stand consists of this Dystrochrept, but the extreme southwest portion of the stand overlies a deep, highly weathered, dark yellowish brown loam over a strong brown and yellowish red silty clay argillic horizon. This Paleudalf exhibits several lithologic discontinuities and is of considerable pedologic interest. Moreover, localized occurrences of similar deep, red soils have been observed on other slopes in the area. However, the significance of the occurrence of these areas is, as yet, unknown. Consequently, the more extensive Dystrochrept was selected to better represent the soils of Reference Stand 6, and it alone is treated in Table 3.

Reference Stand 7

Location: SE¼, SE¼, Sec. 31, T15S, R5E

Elevation: 450-470 m.

Forest community: *Tsuga heterophylla/Polystichum munitum-Oxalis oregana*

Soil classification: Fine-loamy, mixed, frigid family of Dystric Eutrochrepts

Soil landscape: This reference stand resides on a generally concave pediment backslope with a complex pattern of local relief. A convex hummock is superimposed on the northeast portion of the stand. Slope gradients vary from 50 to 60 percent, while slope aspects range from 350 to 360 degrees.

The soil is deep and well-drained, with a dark brown gravelly loam overlying a brown to dark brown clay loam. The A horizon, with numerous small rounded pebbles, thickens toward locally concave areas. Parent material appears to have been alluvium-colluvium derived from reddish breccia and tuff, and andesite. Depth to saprolite varies from 80 to 130 centimeters. A particularly high base status in the lower B horizon requires that this soil be classified as a Eutrochrept rather than the expected Dystrochrept. One pedon was studied, and morphologic data is presented in Table 3.

Reference Stand 8

Location: NE¼, SW¼, Sec. 6, T16S, R5E

Elevation: 500-520 m.

Forest community: *Pseudotsuga menziesii-Tsuga heterophylla/Corylus cornuta*

Soil classification: Loamy-skeletal, mixed, mesic families of Lithic Dystrochrepts and Lithic Haplumbrepts

Soil landscape: Reference Stand 8 is located on a pediment backslope and ridge shoulder near the headwall of Watershed 9. The slope is generally convex, but a concave draw trends across the stand from east to southwest. Slopes vary from 60 to 75 percent, and aspects from 220 to 290 degrees.

Soils are well-drained, dark brown and dark reddish brown, very gravelly loams and very gravelly sandy loams. The soils have developed in colluvium from reddish breccia and basalt, with depths to reddish breccia bedrock ranging from 15 to 50 centimeters. The steep slopes, shallow profiles, and high gravel contents of these soils make traversing the area very difficult. Two pedons were studied at this site, and morphologic data for the deeper of the two appear in Table 3.

Reference Stand 9

Location: SW¼, NW¼, Sec. 31, T15S, R5E

Elevation: 435-465 m.

Forest community: *Tsuga heterophylla/Acer circinatum/Polystichum munitum*

Soil classification: Loamy-skeletal, mixed, frigid family of Typic Dystrochrepts

Soil landscape: This reference stand is located on a slightly convex pediment surface on a northwest-facing slope near the mouth of Watershed 10. Slope gradients vary from 70 to 80 percent.

The soil is well-drained, dark brown, very gravelly loam over brown to dark brown gravelly loam. In the deeper positions upslope, the soil is underlain by gravelly clay loam saprolite at a depth of 1 meter. However, rock outcrops occur on this slope and the soil becomes shallower on the lower portions of the stand, near the creek. Small rounded pebbles are numerous in the A horizon, and occur in moderate amounts down through the solum and into the underlying saprolite. One pedon was studied in detail at this stand. Morphology is presented in Table 3.

Reference Stand 10

Location: SE¼, NW¼, Sec. 28, T15S, R5E

Elevation: 600-620 m.

Forest community: *Tsuga heterophylla/Rhododendron macrophyllum/Gaultheria shallon*

Soil classification: Fine-silty, mixed family of Eutric Glossoboralfs

Soil landscape: Reference Stand 10 is located on a pediment surface associated with a gently to moderately sloping ridge spur. The contour is convex on the upper side and concave on the lower portions, with slopes ranging from 10 to 25 percent. The surface is radially convex, with aspects varying from 160 to 240 degrees, tending mainly toward the south and southeast.

The soil is well-drained and very deep. A dark brown, gravelly silt loam surface soil with numerous rounded pebbles overlies a brown to dark brown and dark reddish brown clay loam argillic horizon. Parent material was alluvium-colluvium from reddish breccia and basalt. Depth to the saprolitic substratum is 1.5 meters. One pedon was studied, and morphology is given in Table 3.

Reference Stand 11

Location: NW¼, NE¼, Sec. 14, T15S, R5E

Elevation: 970-1010 m.

Forest community: *Pseudotsuga menziesii/Acer circinatum/Berberis nervosa*

Soil classification: Medial, frigid family of Entic Dystrandepts, and medial-skeletal, frigid family of Andic Dystrochrepts

Soil landscape: This reference stand is located in a complex concave/convex portion of pediment backslope in Watershed 7. Slope gradients on the upper, concave area of the stand and on the lower shoulders are 40 to 50 percent, but diminish to 20 to 30 percent on convex portions in the southeast corner. Slope aspects vary from 160 to 195 degrees.

Soils are deep and well-drained, with a very dark brown, gravelly sandy loam A horizon with rounded pebbles overlying a dark brown gravelly sandy loam B horizon. The soils have developed in alluvium-colluvium from andesite, flow-breccia, and a significant component of volcanic ash. Soils on steeper positions possess higher contents of coarse fragments and less influence from ash, and thus fit into the skeletal family of Andic Dystrochrepts rather than Dystrandepts. Depths to the C horizon range from 90 to 110 centimeters. Two pedons were studied at this site, and morphologic data from one of these appear in Table 3.

Reference Stand 12

Location: NW¼, SW¼, Sec. 29, T15S, R6E

Elevation: 980-1000 m.

Forest community: Abies amabilis/Vaccinium alaskaense/ Cornus canadensis

Soil classification: Loamy-skeletal, mixed, frigid family of Typic Dystrochrepts

Soil landscape: This reference stand is on an undulating, slightly concave pediment footslope. Slope gradients vary from 15 to 30 percent, and slope aspects range from 260 to 290 degrees. The southwest corner of the plot drops to an intermittent stream flowing west. The northern edge of the stand is influenced by a draw which apparently has served as a road bed, and another draw, trending southeast to northwest, cuts across the central portion of the stand.

The soil at this stand has developed in deep alluvium-colluvium, and possible glacial till, derived from andesite. A dark reddish brown sandy loam A horizon with varying amounts of coarse fragments is underlain to a depth of 80 centimeters by dark brown to dark reddish brown loam and sandy loam with a mixture of stones, cobbles, pebbles, and boulders. The C horizon is a very stoney silt loam and sandy loam with a similar mixture of coarse fragments. The soil is well-drained and contains varying amounts of pumice. The C horizon has masses of extremely firm fine earth in a friable matrix. Two pedons were studied nearby. Information on one profile is given in Table 3.

Reference Stand 13

Location: NE¼, NW¼, Sec. 20, T14S, R6E

Elevation: 1310-1340 m.

Forest community: Abies procera/Clintonia uniflora

Soil classification: Medial, frigid family of Typic Dystrandepts

Soil landscape: Reference Stand 13 is located on a concave pediment backslope with slope gradients between 30 and 45 percent. Slope aspects vary from 210 to 220 degrees.

The soil at this site is deep and well-drained, with very dark brown silt loam over dark brown silt loam and gravelly silt loam. Depth to the very gravelly silt loam C horizon is 120 centimeters. Parent material was colluvium derived from pink and gray porphyritic flow rocks, with a significant admixture of volcanic ash and pumice. One pedon was selected for study. A morphologic description is given in Table 3.

Reference Stand 14

Location: Center of NE¼, Sec. 28, T14S, R6E

Elevation: 1400-1450 m.

Forest community: Abies amabilis-Tsuga mertensiana/ Xerophyllum tenax

Soil classification: Medial family of Entic Cryandepts, and medial-skeletal families of Entic Cryandepts and Andic Cryochrepts

Soil landscape: Reference Stand 14 is located on an unstable, predominantly concave backslope beneath the crest of a ridge spur. Slumping appears to be an active factor on this surface; and the north, east, and middle portions of the stand may constitute a slump headwall. The south corner of the plot is a convex shoulder from a minor ridge spur extension. Slope gradients range from 35 to 55 percent, and slope aspects from 305 to 345 degrees.

Soils are shallow, well-drained, dark brown sandy loams primarily developed in alluvium-colluvium derived from flow rocks, with a significant admixture of volcanic ash and pumice. Depth to fresh, gray and pink porphyritic flow bedrock ranges from 50 to 70 centimeters, with the boundary between soil and bedrock often broken and irregular. Distribution and size range of coarse fragments is irregular throughout the solum, and stones and boulders are common on the surface. Lateral variability in content of ash and coarse fragments accounts for the range in classification among these soils. Morphologic information for two of the four pedons studied is given in Table 3.

Reference Stand 15

Location: SE¼, SW¼, Sec. 32, T15S, R5E

Elevation: 680-720 m.

Forest community: Tsuga heterophylla/Polystichum munitum

Soil Classification: Fragmental, mixed, frigid family of Typic Dystrochrepts

Soil landscape: Reference Stand 15 is located on a slightly concave pediment backslope on the northeast side of Watershed 2. A prominent draw occurs along the eastern edge of the stand. Slope gradients are 40 to 50 percent in the draw and 60 to 80 percent elsewhere. Slope aspect is 355 degrees.

The soil is deep and well-drained, with a dark brown to black gravelly loam over dark brown gravelly silt loam, developed in alluvium-colluvium derived from andesite. Depths to the very gravelly silt loam C horizon range from 70 to 80 centimeters, and pumice is very evident throughout the profile. The A horizon contains many small rounded pebbles, but larger angular pebbles, stones, and cobbles dominate the lower solum and substratum, and there is insufficient fine earth to fill all interstices between coarse fragments. The soil in the draw on the east side

of the stand has a thicker A horizon and exhibits less influence of coarse fragments, but is of little consequence since the draw does not extend through the buffer zone of the reference stand. One pedon was chosen for study at this plot. A profile description is given in Table 3.

Reference Stand 16

Location: SE¼, SW¼, Sec. 32, T15S, R5E

Elevation: 630-700 m.

Forest community: Tsuga heterophylla/Castanopsis chrysophylla

Soil classification: Fine-silty, mixed, mesic family of Typic Hapludalfs

Soil landscape: This plot is on a slightly convex shoulder/backslope below the ridge crest on the northeast side of Watershed 2. Slopes vary from 60 percent on the upper side to 70 percent on the lower side, and aspects range from 190 to 220 degrees.

The soil is a brown to dark brown gravelly silt loam over a dark yellowish brown silty clay loam argillic horizon. The depth to dark yellowish brown, loam saprolite is 120 centimeters. The soil has developed in colluvium derived from both reddish and greenish breccia, and andesite. One pedon was studied at this reference stand, and a profile description is given in Table 3.

Reference Stand 17

Location: SE¼, NW¼, Sec. 32, T15S, R5E

Elevation: 480-510 m.

Forest community: Tsuga heterophylla/Rhododendron macrophyllum/Berberis nervosa

Soil classification: Fine-silty, mixed, frigid family of Typic Dystrochrepts

Soil landscape: This reference stand is located on a concave pediment footslope. Slope gradients vary from 40 percent on the upper side to 20 percent on the lower side. Slope aspects range from 325 to 355 degrees.

The soil is a deep, well-drained dark brown loam, with many small rounded pebbles, over brown to dark brown gravelly silty clay loam, and has developed in alluvium-colluvium from reddish breccia and tuff, and andesite. Depth to the saprolitic C horizon is approximately 100 centimeters. One pedon was selected nearby for examination. A profile description is given in Table 3.

Reference Stand 18

Location: SE¼, NW¼, Sec. 24, T15S, R5E

Elevation: 1070-1110 m.

Forest community: Pseudotsuga menziesii/Acer circinatum/Whipplea modesta

Soil classification: Medial, frigid family of Andic Dystrochrepts

Soil landscape: Reference Stand 18 is on a concave pediment backslope on the upper side and footslope on the lower side, with slopes between 25 and 50 percent, and aspects between 160 and 200 degrees.

The soil is a moderately deep, well-drained, very dark brown gravelly silt loam over very dark brown and dark brown gravelly silt loam. The profiles have developed in alluvium-colluvium derived from andesite and a significant component of volcanic ash. The A, B, and C horizons contain rounded pebbles, and depths to gray and brown, highly weathered, saprolitic andesite bedrock is approximately 70 centimeters. One pedon was studied near this plot, and descriptive data are given in Table 3.

Reference Stand 19

Location: NE¼, SE¼, Sec. 19, T16S, R4E

Elevation: 380-440 m.

Forest community: Tsuga heterophylla/Polystichum munitum-Oxalis oregana

Soil classification: Fine-loamy, mixed, frigid family of Ultic Hapludalfs

Soil landscape: This plot is on a pediment backslope and footslope, just above an alluvial toeslope associated with Cone Creek. The contour is slightly convex on the upper side and slightly concave on the lower side. Slopes vary from 45 to 60 percent, and aspects from 100 to 120 degrees. A concave draw, trending from west to east, bisects the reference stand.

The soil is a deep, well-drained, dark brown gravelly loam with rounded pebbles over a dark reddish brown and reddish brown clay loam argillic horizon. Parent material was alluvium-colluvium from reddish breccia and andesite, and depths to the reddish brown gravelly clay loam saprolitic C horizon are 120 to 130 centimeters. One pedon was selected for study, and morphology is summarized in Table 3.

Field vs. Laboratory Anomalies

Soil pH measured colorimetrically in the field, using bromthymol blue and chlorphenol red, in the majority of cases was substantially higher than that measured by either method (1:1 water or 1:1 KCl) in the lab. This is probably due to the dryness of soils in the field and the resultant incomplete wetting and poor contact between soil and indicator.

Field textures and laboratory particle size distribution analyses did not always agree. As expected, the tendency was for field textures to be finer than those determined in the lab. For example, the A1 horizon of Reference Stand 1, Pit No. 4 was considered a loam in the field, but is a sandy loam based on lab analysis. The IIB2 horizon of Reference Stand 4, Pit No. 1 was a silty clay loam in the field, but a silt loam in the lab. This relationship corresponds to observations by Paeth (1970) for some soils in and near the Andrews Forest. He suggested that the disruptive force of rubbing soil while field-texturing caused a decrease of sand and silt-size pseudomorphs composed of clay particles, and hence, a corresponding increase in the apparent clay fraction. While sand and silt mineralogy have not been examined in this study, it is believed that the breakdown of pseudomorphs suggested by Paeth offers a viable explanation for the anomaly between field and lab textures for these soils. Another contributing factor may have been incomplete dispersion of aggregates of silt and clay particles in the lab prior to pipette analysis.

Nutrient Capital

Calculations were made to estimate the amounts of extractable phosphorous, Walkley-Black organic matter, total nitrogen, and exchangeable calcium, magnesium, and potassium in the rooting zone of each reference stand. The rooting zone was considered to be the section from the top of the mineral soil to a depth of one meter or to hard bedrock, whichever is shallower.

For each pedon sampled, Equation (1) was used to compute the amount of each "nutrient" present in kilograms per hectare per horizon, on an oven dry basis.

$$Y = AxBx(100-C)x(100+D)xExF \qquad (1)$$

Y = amount of a particular nutrient (P, OM, N, etc.) per horizon (kg./ha.)

A = horizon bulk density ($g./cm.^3$)

B = horizon thickness (cm.)

C = horizon coarse fragment content (%)

D = gravimetric water content of air dry sample (%)

E = analytical value (ppm for P; % for OM and N; meq./100g. for Ca, Mg, and K)

F = constant (0.00001 kg.-cm.^{2}/ug.-ha. for P; 0.1 kg.-cm.^{2}/g.-ha. for OM and N; 0.00200 kg.-cm.^{2}/meq.-ha. for Ca; 0.00122 kg.-cm.^{2}/meq.-ha. for Mg; 0.00391 kg.-cm.^{2}/meq.-ha. for K)

Quantities thus obtained for horizons were totaled to give nutrient capital in kg./ha. to the appropriate depth for each pedon. Results for all pedons at all reference stands are summarized in Table 4. In addition, for any reference stand where more than one pedon was described and sampled, values of the mean ($\bar{X}$), standard deviation (s), and coefficient of variation (CV) (Petersen 1972) for each nutrient at that stand are included in the table.

It is supposed that the least reliable factor in Equation (1) is percent of coarse fragments, since this factor was not measured but only estimated, and that this factor has a relative uncertainty of 1 in 10. Blaedel and Meloche (1963) suggest that the uncertainty of a computational result should lie between one-fifth and twice that of the least precise component. Accordingly, expressions of nutrient capital in Table 4, including means and standard deviations, are rounded off to fall within a range of relative uncertainty between 1 in 5 and 1 in 50.

It should be noted that the omission of root density, along with other unknown contributing factors, as a component in the computations probably adds some further variability to the data.

List of References

BALSTER, C. A., and R. B. PARSONS. 1968. Sediment transportation on steep terrain, Oregon Coast Range. Northwest Science 43:62-70.

BERNTSEN, C. M., and J. ROTHACHER. 1959. A guide to the H. J. Andrews Experimental Forest. U.S. Forest Service Pacific Northwest Forest and Range Experiment Station. 21 p.

BLAEDEL, W. J., and V. W. MELOCHE. 1963. Elementary quantitative analysis, second edition. Harper & Row, Inc., New York. 964 p.

BLAKE, G. R. 1965. Bulk density. IN: C. A. Black (ed.), Methods of soil analysis, part I, p. 374-394. Agronomy Monograph 9. American Society of Agronomy, Madison, Wisconsin. 1572 p.

BRAY, R. H., and L. T. KURTZ. 1945. Determination of total, organic, and available forms of phosphorous in soils. Soil Science 59:39-45.

BREMNER, J. M. 1965. Total nitrogen. IN: C. A. Black (ed.), Methods of soil analysis, part II, p. 1149-1178. Agronomy Monograph 9. American Society of Agronomy, Madison, Wisconsin. 1572 p.

CHU, T. Y., and D. T. DAVIDSON. 1953. Simplified air jet dispersion apparatus for mechanical analysis of soils. Proceedings of the Highway Research Board 32:541-547.

DYRNESS, C. T., J. F. FRANKLIN, and W. H. MOIR. 1973. Preliminary classification of forest communities in the central portion of the Western Cascades in Oregon. (Manuscript in preparation for publication as Biome Bulletin.)

GARDNER, W. H. 1965. Water content. IN: C. A. Black (ed.), Methods of soil analysis, part I, p. 82-127. Agronomy Monograph 9. American Society of Agronomy, Madison, Wisconsin. 1572 p.

HOOVER, M. D., and H. A. LUNT. 1952. A key for the classification of forest humus types. Soil Science Society of America Proceedings 16:368-370.

KILMER, V. J., and L. T. ALEXANDER. 1949. Methods of making mechanical analyses of soils. Soil Science 68:15-24.

PAETH, R. C. 1970. Genetic and stability relationships of four Western Cascade soils. Ph.D. thesis, Oregon State University, Corvallis, Or. 126 p.

PAETH, R. C., M. E. HARWARD, E. G. KNOX, and C. T. DYRNESS. 1971. Factors affecting mass movement of four soils in the Western Cascades of Oregon. Soil Science Society of America Proceedings 35:943-947.

PARSONS, R. B., and C. A. BALSTER. 1966. Morphology and genesis of six "red hill" soils in the Oregon Coast Range. Soil Science Society of America Proceedings 30:90-93.

PEECH, M., L. T. ALEXANDER, L. A. DEAN, and J. F. REED. 1947. Methods of soil analysis for soil fertility investigations. USDA Circular No. 757. 25 p.

PETERSEN, R. G. 1972. Exercises in statistical inference. O.S.U. Book Stores, Inc., Corvallis, Or. 258 p.

ROBERTS, S., R. V. VODRASKA, M. D. KAUFFMAN, and E. H. GARDNER. 1971. Methods of soil analysis used in the soil testing laboratory at Oregon State University. Agricultural Experiment Station, Oregon State University, Corvallis, Or. 39 p.

ROTHACHER, J., C. T. DYRNESS, and R. L. FREDRIKSEN. 1967. Hydrologic and related characteristics of three small watersheds in the Oregon Cascades. U.S. Forest Service Pacific Northwest Forest and Range Experiment Station. 54 p.

RUHE, R. V. 1960. Elements of the soil landscape. Transactions of the 7th International Congress of Soil Science, Madison, Wisconsin IV:165-170.

SCHOLLENBERGER, C. J., and R. H. SIMON. 1945. Determination of exchange capacity and exchangeable bases in soil--ammonium acetate method. Soil Science 59:13-24.

SOIL SURVEY STAFF. 1951. Soil survey manual. USDA Handbook No. 18. U.S. Government Printing Office, Washington, D.C. 503 p.

SOIL SURVEY STAFF. 1962. Supplement to agriculture handbook no. 18, soil survey manual, replacing p. 173-188.

SOIL SURVEY STAFF. 1970. Soil taxonomy. Selected chapters from the unedited text. USDA, Soil Conservation Service, Washington, D.C.

THOMAS, B. R. 1970. The role of soil-water depletion and plant-moisture stress in soil classification and cambial activity of Douglas-fir. Ph.D. thesis, Oregon State University, Corvallis, Or. 115 p.

WALKLEY, A., and J. A. BLACK. 1934. An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method. Soil Science 37:29-38.

Table 1. Chemical data for selected soil profiles at the reference stands, Oregon IBP.[a]

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
1	1	A1	0-16	6.8	4.9	9.0	6.8	0.21	9.1	1.2	0.3		23.5
		A3	16-44	5.9	4.7	6.0	3.6	0.09	6.6	1.0	0.2		18.0
		B1	44-73	5.8	4.6	5.7	1.5	0.07	4.5	0.9	0.1		16.2
		B2	73-102	5.8	4.5	6.9	1.2	0.05	6.0	1.0	0.1		15.4
		B3	102-132	5.95	4.6	3.3	1.1	0.03	6.4	1.2	0.1		14.2
		C	132-154	5.85	4.4	3.1	0.8	0.04	9.4	2.1	0.1		18.9
1	2	A1	0-13	5.6	4.6	25.7	6.9	0.27	10.0	2.1	0.8		26.8
		A3	13-31	4.8	4.55	11.4	3.6	0.11	10.1	1.7	0.7		27.2
		B2	31-61	5.4	4.35	8.1	2.2	0.08	2.8	1.0	0.4		23.9
		IIB31	61-91	5.45	4.35	7.9	1.4	0.05	8.6	0.9	0.3		20.7
		IIB32	91-121	5.7	4.3	8.1	1.0	0.04	5.0	1.2	0.3		17.4
		IIC1	121-151	5.7	3.9	4.1	0.9	0.03	19.8	3.0	0.3		25.4
		IIC2	151-181	5.6	3.85	5.0	0.8	0.02	14.0	2.0	0.3		24.3
		IIC3	181-200	5.65	3.9	6.5	0.9	0.05	17.4	3.2	0.3		23.1

[a]Analyses performed at the USFS Forestry Sciences Lab, Corvallis.

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
1	3	A1	0-12	5.4	4.6	29.5	8.4	0.27	6.4	1.1	0.5		26.0
		B2	12-26	5.4	4.65	10.9	7.2	0.23	7.3	1.2	0.3		25.9
1	4	A1	0-12	5.4	4.2	36.0	9.6	0.19	7.1	0.9	0.4		33.4
		B2	12-26	5.3	4.4	21.4	7.7	0.27	7.0	0.8	0.3		24.0
2	1	A1	0-15	5.45	4.6	20.8	4.7	0.16	3.2	0.9	0.5		22.5
		A3	15-33	5.55	4.75	8.0	2.1	0.10	4.4	1.1	0.5		20.8
		IIB1	33-53	5.8	4.8	3.2	1.4	0.09	4.0	1.2	0.5		21.4
		IIB2	53-74	5.8	4.8	1.9	1.0	0.06	3.8	1.2	0.5		20.0
		IIB3	74-94	5.8	5.0	1.4	0.8	0.06	1.9	0.7	0.4		22.8
		IIC	94-119	5.8	4.9	1.1	0.7	0.04	1.7	0.7	0.3		19.0
3	1	A11	0-3	5.4	4.5	6.8	18.7	0.39	4.2	0.5	0.4		31.9
		A12	3-13	5.2	4.5	4.5	9.0	0.24	0.5	0.2	0.2		28.2
		A3	13-28	5.2	4.5	5.9	7.3	0.39	0.3	0.1	0.2		24.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
3	1	B2	28-48	5.65	5.15	1.9	2.5	0.10	0.5	0.1	0.2		24.2
(cont'd)		B3	48-69	5.8	5.3	2.1	1.8	0.08	0.1	0.0	0.1		29.0
		IIC	69-99	5.5	4.9	1.4	1.5	0.08	0.3	0.2	0.2		30.1
4	1	A1	0-25	5.35	5.0	6.9	9.1	0.27	0.2	0.1	0.2		30.2
		A3	25-46	5.6	5.4	4.5	6.8	0.24	0.1	0.0	0.2		34.6
		IIB1	46-66	5.8	5.5	2.1	3.9	0.14	0.0	0.0	0.1		27.8
		IIB2	66-90	5.5	5.35	1.5	2.3	0.11	0.0	0.1	0.1		34.6
		IIB3	90-114	5.5	5.2	0.9	1.9	0.09	0.4	0.6	0.2		32.4
		IIC	114-124	5.55	5.2	0.6	2.2	0.10	0.2	1.1	0.2		37.5
5	1	A1	0-18	5.55	4.85	9.9	4.9	0.13	1.1	1.1	0.4		25.8
		A3	18-30	5.35	4.55	6.1	1.9	0.07	0.6	0.1	0.2		22.9
		IIB1	30-51	5.6	4.65	5.5	1.8	0.08	0.1	0.6	0.2		20.6
		IIB21	51-74	5.3	4.3	1.9	1.1	0.05	9.6	4.1	0.2		24.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
5	1	IIB22	74-97	5.8	4.6	1.4	0.7	0.06	4.5	2.8	0.4		21.4
(cont'd)		IIC	97-122	5.5	4.9	1.4	0.9	0.05	2.1	1.2	0.2		27.0
5	2	A1	0-15	5.1	4.3	23.1	7.7	0.16	1.3	0.8	0.4		26.0
		B1	15-37	5.15	4.4	16.9	2.9	0.11	1.4	0.7	0.4		24.5
		B21	37-49	5.3	4.35	18.3	2.2	0.10	4.0	1.4	0.5		26.3
		B22	49-70	5.1	4.2	6.3	2.2	0.08	3.8	1.6	0.5		26.4
		IIB3	70-92	5.4	4.35	1.9	1.2	0.05	3.0	1.8	0.3		26.6
		IIC	92-115	5.6	4.6	1.8	1.2	0.04	1.6	2.1	0.3		30.4
5	3	A1	0-20	5.0	4.4	9.9	3.3	0.12	1.7	0.7	0.3		22.5
		IIB1	20-44	5.3	4.55	1.3	1.4	0.14	2.3	1.0	0.2		20.8
		IIB2	44-75	4.95	4.35	2.6	0.7	0.04	2.4	1.2	0.2		25.3
		IIIB3	75-100	5.35	4.4	1.6	0.8	0.04	0.6	2.3	0.2		29.5
		IIIC	100-127	5.5	4.5	2.5	0.6	0.04	1.1	0.9	0.2		28.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
5	4	A1	0-15	4.9	4.55	25.0	5.6	0.21	0.5	0.5	0.3		19.8
		A3	15-31	5.3	4.5	20.8	3.9	0.14	0.8	0.4	0.3		20.7
		B21	31-52	4.7	4.05	12.1	3.4	0.12	0.7	0.4	0.2		21.4
		B22	52-69	5.45	4.5	2.1	1.8	0.08	3.2	1.5	0.3		33.0
		IIB3	69-103	5.6	4.4	1.5	0.5	0.03	3.2	2.1	0.2		25.8
		IIC	103-137	5.4	4.4	1.4	0.5	0.02	3.4	2.9	0.2		32.9
6	1	A1	0-23	5.4	4.0	3.3	2.2	0.07	6.8	3.1	0.5	14.3	22.6
		A3	23-46	5.9	4.15	2.8	1.2	0.04	4.2	19.2	0.5	12.2	31.2
		IIB1	46-63	5.5	4.0	2.4	0.8	0.04	7.0	7.6	0.6	12.7	30.4
		IIIB21t	63-81	5.4	4.0	5.0	0.8	0.04	5.6	9.3	0.6	16.5	27.3
		IVB22t	81-109	5.0	3.7	1.2	0.8	0.04	4.4	10.2	0.5	20.4	34.0
		VB23t	109-133	5.3	4.0	3.8	0.5	0.02	5.7	4.3	0.6	16.2	34.0
		VB3t	133-156	4.9	3.3	0.7	0.5	0.02	6.2	15.5	0.4	14.1	35.9
		VC1	156-180	5.65	4.3	2.8	0.3	0.02	4.6	9.7	0.3	11.5	28.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
6	1	VC2	180-210	5.5	3.95	3.3	0.3	0.02	5.4	3.8	0.6	9.9	29.0
(cont'd)		VC3	210-244	5.9	3.6	0.0	0.4	0.02	5.4	8.6	0.3	12.8	34.1
6	2	A1	0-17	5.2	4.1	11.9	4.3	0.10	4.8	10.0	0.5	16.4	22.2
		B1	17-41	5.45	4.3	7.9	2.1	0.06	3.9	1.5	0.7	12.9	19.3
		IIB2	41-61	5.65	4.2	3.4	1.6	0.04	8.4	3.7	1.0	10.4	22.4
		IIB3	61-91	5.6	4.15	1.8	1.4	0.04	6.9	3.0	1.0	12.2	25.3
		IIC1	91-117	5.6	4.15	1.0	0.7	0.02	6.4	2.5	1.0	10.6	21.6
		IIC2	117-142	5.5	4.25	1.5	0.6	0.02	10.9	7.2	1.4	14.8	45.5
7	1	A1	0-23	5.5	4.4	10.3	5.4	0.20	14.9	2.7	0.3		31.4
		A3	23-32	5.6	4.4	6.3	2.9	0.11	4.9	1.8	0.8		27.1
		IIB1	32-48	5.7	4.1	1.7	1.4	0.06	7.9	3.0	0.8		29.2
		IIB21	48-74	5.4	4.0	0.9	0.9	0.05	10.2	6.1	0.9		32.1
		IIB22	74-97	5.8	4.2	1.7	0.5	0.03	18.4	7.6	0.6		34.4

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
7	1	IIB3	97-117	5.4	4.05	1.2	0.6	0.02	13.2	8.2	0.5		23.4
(cont'd)		IIC	117-135	5.25	3.95	0.7	0.4	0.02	18.6	6.1	0.5		35.6
8	1	A1	0-18	5.6	4.7	39.3	13.7	0.19	10.0	2.5	0.5		31.0
8	2	A1	0-14	5.75	4.75	23.2	15.0	0.26	8.8	1.6	0.6		30.6
		B2	14-46	6.2	5.1	7.9	5.0	0.13	7.7	1.6	0.5		27.2
9	1	A1	0-18	5.25	4.1	15.7	9.7	0.17	2.4	0.8	0.4		27.6
		IIB1	18-41	5.4	4.4	7.5	3.2	0.11	2.6	1.0	0.3		20.4
		IIB2	41-71	5.5	4.3	5.5	2.1	0.08	3.6	1.4	0.3		22.0
		IIB3	71-99	5.3	4.2	2.2	1.6	0.06	2.7	1.0	0.3		21.0
		IIIC1	99-129	5.6	4.2	1.9	1.2	0.04	0.0	0.2	0.2		22.7
		IIIC2	129-160	5.5	4.1	2.8	2.8	0.04	2.7	1.2	0.3		22.5
10	1	A1	0-10	5.2	4.1	17.9	3.3	0.10	5.5	2.1	1.1	19.4	25.5
		A3	10-36	5.2	4.0	14.5	2.7	0.10	8.0	1.6	0.7	19.0	29.2

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
10 (cont'd)	1	IIB1	36-66	5.4	4.1	3.4	0.8	0.05	7.8	3.6	0.6	16.6	30.9
		IIB21t	66-86	5.3	3.7	2.2	0.3	0.02	4.6	6.9	0.3	21.8	31.6
		IIB22t	86-107	5.0	3.8	0.3	0.4	0.02	4.4	3.6	0.4	22.8	30.2
		IIB23t	107-130	5.1	3.7	1.0	0.4	0.01	3.8	4.6	0.4	22.2	32.8
		IIB24t	130-152	5.1	3.8	1.7	0.1	0.01	3.2	4.2	0.5	23.0	32.3
		IIC1	152-173	5.1	3.7	0.0	0.2	0.02	3.2	5.5	0.6	27.4	38.4
		IIC2	173-193	5.1	3.6	0.1	0.3	0.02	2.9	2.7	0.5	26.8	41.9
11	1	A1	0-10	5.9	5.05	9.8	4.7	0.16	5.8	1.6	0.5		21.2
		A3	10-25	5.95	5.05	7.9	4.2	0.16	3.3	1.0	0.7		24.8
		IIB1	25-51	5.8	5.0	4.5	2.4	0.11	0.2	0.2	0.1		20.0
		IIB2	51-76	5.15	4.55	19.0	1.8	0.08	1.0	0.9	0.6		20.0
		IIB3	76-102	5.7	4.6	1.4	0.7	0.04	2.0	1.8	0.4		24.3
		IIC	102-124	5.6	4.4	1.7	0.7	0.04	2.1	1.2	0.3		24.5
11	2	A1	0-12	5.8	4.9	4.6	5.5	0.23	5.5	0.5	0.5		21.2
		B1	21-31	5.8	4.95	5.5	3.8	0.13	0.1	0.1	0.3		20.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
11	2	B2	31-60	5.3	4.8	1.9	1.9	0.13	1.6	0.6	0.4		20.1
(cont'd)		B3	60-92	5.35	4.65	1.7	2.2	0.10	2.1	0.7	0.5		27.3
		IIC	92-122	5.2	4.15	4.1	1.0	0.04	4.0	2.2	0.4		26.6
12	1	A1	0-14	5.3	4.75	6.9	6.0	0.24	0.2	0.2	0.2		22.8
		B1	14-42	5.4	4.9	4.4	4.2	0.13	0.0	0.0	0.1		19.4
		B2	42-59	5.7	5.1	3.6	2.6	0.13	0.0	0.2	0.1		19.5
		IIB3	59-81	5.8	5.2	2.2	2.2	0.10	0.1	0.2	0.2		29.2
		IIC1	81-104	5.95	5.4	1.4	1.7	0.08	2.6	1.2	0.1		32.0
		IIC2	104-133	6.0	5.4	1.6	1.6	0.08	0.4	0.3	0.1		33.8
12	2	A1	0-29	5.15	4.6	18.1	5.7	0.15	0.4	0.0	0.1		21.1
		B2	29-58	5.35	4.95	18.6	4.9	0.16	0.0	0.0	0.1		23.8
		B3	58-81	5.7	5.5	6.9	3.3	0.12	0.0	0.0	0.1		33.2
		IIC1	81-107	5.6	5.45	4.0	2.1	0.09	0.4	1.2	0.1		33.9
		IIC2	107-121	6.0	5.6	1.5	2.3	0.09	0.5	0.0	0.1		28.8

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
13	1	A1	0-22	5.45	4.75	6.8	10.0	0.26	0.9	0.2	0.4		30.7
		A3	22-36	5.7	5.05	4.6	7.2	0.23	0.4	0.2	0.4		34.9
		B1	36-49	5.6	5.2	5.0	7.3	0.22	1.6	0.6	0.3		34.2
		B21	49-73	5.75	5.25	2.2	5.2	0.26	0.2	0.2	0.4		34.0
		IIB22	73-94	5.8	5.4	2.1	4.5	0.15	0.5	0.1	0.5		33.8
		IIB3	94-118	5.75	5.3	1.4	4.0	0.15	0.6	0.2	0.6		26.6
		IIC	118-143	5.75	5.4	1.2	2.8	0.12	0.6	0.3	0.4		35.5
14	1	A1	0-6	5.3	4.7	3.1	9.7	0.56	0.0	0.0	0.2		29.8
		B2	6-35	5.85	5.5	3.4	6.0	0.14	0.6	0.3	0.1		29.0
		IIB3	35-55	5.6	5.4	2.7	6.0	0.26	0.1	0.1	0.1		27.8
14	2	A1	0-11	5.35	4.9	5.6	10.4	0.22	0.4	0.2	0.3		28.3
		B2	11-29	5.7	5.45	3.8	4.7	0.12	0.2	0.6	0.2		22.2
		B3	29-50	5.65	5.35	2.5	3.7	0.12	1.0	0.0	0.1		30.0
		C	50-70	5.6	5.4	1.5	2.2	0.10	0.1	0.1	0.1		35.7

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
14	3	A1	0-10	5.3	4.55	5.2	9.4	0.23	1.1	0.6	0.2		24.2
		B2	10-35	5.2	4.95	14.8	4.4	0.14	0.5	0.1	0.2		25.2
		B3	35-62	5.6	5.15	5.6	4.8	0.14	0.7	0.2	0.1		26.6
14	4	A1	0-12	5.7	5.7	3.4	4.0	0.08	0.0	0.0	0.1		18.8
		B2	12-28	5.0	4.3	6.2	4.0	0.10	0.2	0.1	0.2		22.0
		B3	28-53	5.65	5.05	5.1	4.3	0.11	0.1	0.1	0.3		26.9
15	1	A1	0-21	5.65	4.75	53.1	9.9	0.26	3.9	0.4	0.4		21.7
		B1	21-36	5.8	4.9	30.2	4.3	0.29	2.7	0.4	0.3		18.8
		IIB2	36-58	5.75	4.8	17.7	3.4	0.14	1.9	0.5	0.4		19.7
		IIB3	58-76	5.85	4.85	8.7	2.4	0.18	2.5	0.6	0.4		20.4
		IIC1	76-112	5.7	4.8	4.1	2.3	0.12	2.1	0.7	0.4		23.6
		IIIC2	112-129	6.25	5.3	1.4	1.4	0.07	5.6	1.2	0.4		37.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
16	1	A1	0-15	4.85	3.8	3.7	3.7	0.10	7.4	3.4	0.4	19.7	32.2
		A3	15-34	4.8	4.0	5.7	2.2	0.08	8.3	3.8	0.7	16.0	28.8
		B1	34-47	5.5	3.95	5.5	2.1	0.07	6.2	3.3	0.6	16.9	29.2
		B21t	47-62	5.45	4.0	0.8	1.3	0.06	7.3	5.7	0.9	13.8	27.2
		IIB22t	62-81	5.75	4.0	0.8	0.8	0.04	4.7	6.6	0.8	11.6	24.0
		IIB23t	81-103	5.3	4.0	4.2	0.9	0.02	3.9	7.2	0.5	10.6	21.3
		IIB3t	103-120	5.35	3.95	0.6	0.6	0.03	2.0	5.9	1.0	12.1	25.8
		IIC1	120-155	5.5	4.1	2.1	0.5	0.02	5.7	3.2	0.5	9.0	29.0
		IIC2	155-179	5.55	4.0	1.8	0.4	0.02	5.4	9.5	1.0	8.7	27.1
		IIC3	179-200	5.3	4.2	3.4	0.4	0.02	6.0	15.7	0.8	8.1	26.6
17	1	A1	0-8	5.0	4.3	33.4	11.3	0.28	1.5	0.3	0.3		26.2
		A3	8-23	5.0	4.2	17.0	7.0	0.24	1.5	0.3	0.3		25.2
		IIB1	23-36	5.4	4.2	7.8	2.0	0.10	2.6	0.9	0.4		21.9
		IIB21	36-48	5.4	4.0	2.6	1.8	0.08	3.6	1.3	0.4		23.0

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
17 (cont'd)	1	IIB22	48-69	5.4	4.2	1.5	1.0	0.05	3.6	2.1	0.3		21.8
		IIB23	69-86	5.6	4.1	1.4	0.7	0.03	3.1	1.7	0.3		20.9
		IIB3	86-112	5.5	4.3	2.2	0.5	0.03	2.4	1.4	0.3		19.2
		IIC1	112-137	5.2	4.1	2.1	0.7	0.04	1.4	1.0	0.3		18.0
		IIC2	137-162	5.45	4.4	2.6	0.5	0.03	1.7	0.7	0.3		17.4
		IIC3	162-190	5.6	4.2	3.1	0.8	0.04	2.8	0.8	0.4		20.8
18	1	A1	0-18	5.4	4.6	17.7	7.4	0.23	5.4	1.1	0.5		21.0
		B1	18-36	5.7	4.7	6.9	4.2	0.17	3.0	0.7	0.4		19.8
		B2	36-53	5.6	4.6	3.8	1.8	0.12	4.0	0.6	0.4		22.8
		C1	53-71	5.7	4.45	1.9	1.9	0.10	3.4	0.9	0.3		20.4
19	1	A1	0-20	5.8	5.1	57.3	7.8	0.28	5.9	1.1	0.8	18.0	22.4
		A3	20-38	5.6	3.8	31.5	4.1	0.19	3.2	0.6	0.4	15.5	22.0
		IIB1	38-60	6.2	4.9	17.9	2.5	0.11	2.8	0.5	0.4	13.6	18.5
		IIB21t	60-74	5.8	4.85	10.1	0.7	0.09	3.4	0.8	0.4	12.9	15.7

Table 1. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	pH, H_2O	pH, KCl	P, ppm	OM, %	N, %	meq./100g. Ca	Mg	K	H	CEC
19 (cont'd)	1	IIB22t	74-104	5.8	4.7	1.2	0.7	0.04	4.0	1.3	0.4	9.8	17.7
		IIB3t	104-124	5.1	4.2	0.7	0.6	0.04	3.4	1.7	0.5	12.8	16.5
		IIC1	124-144	4.9	4.0	0.3	0.4	0.03	3.5	1.9	0.5	12.1	18.2
		IIC2	144-164	5.7	4.4	1.8	0.4	0.02	6.5	2.4	0.4	11.0	17.6

Table 2. Physical data for major horizons of selected soil profiles at the reference stands, Oregon IBP.[a]

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD,[b] g./cm.^{3}
1	1	A1	0-16	49.3	34.1	16.6	loam	(0.9)
		B2	73-102	58.1	33.5	8.4	sandy loam	(0.9)
		C	132-154	51.6	39.7	8.7	loam	(0.9)
1	2	A1	0-13	50.5	32.9	16.6	loam	(0.9)
		B2	31-61	64.2	27.4	8.4	sandy loam	(0.9)
		IIC1	121-151	48.8	39.1	12.1	loam	(0.9)
1	3	A1	0-12	45.2	37.9	16.8	loam	(0.9)
		B2	12-26	43.8	39.4	16.8	loam	(0.9)
1	4	A1	0-12	54.9	33.9	11.2	sandy loam	(0.9)
		B2	12-26	60.9	31.3	7.8	sandy loam	(0.9)

[a]Analyses performed in the OSU Soil Physics Lab by the senior author.

[b]Values in parentheses approximated.

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
2	1	A1	0-15	29.7	47.3	23.0	loam	0.8
		IIB2	53-74	26.5	53.0	20.5	silt loam	0.8
		IIC	94-119	25.3	57.5	17.2	silt loam	0.7
3	1	A12	3-13	41.5	49.3	9.2	loam	0.6
		B2	28-48	49.4	46.5	4.0	loam	(0.8)
		IIC	69-99	35.5	56.7	7.8	silt loam	(0.8)
4	1	A1	0-25	36.7	56.7	6.6	silt loam	0.5
		IIB2	66-90	30.2	63.0	6.8	silt loam	(0.8)
		IIC	114-124	27.9	65.4	6.7	silt loam	(0.8)
5	1	A1	0-18	42.0	43.4	14.6	loam	0.8
		IIB21	51-74	22.5	53.4	24.1	silt loam	0.8
		IIC	97-122	22.7	65.9	11.4	silt loam	0.7
5	2	A1	0-15	37.8	48.1	14.1	loam	(0.6)

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
5	2	B21	37-49	24.6	49.7	25.7	loam	(0.8)
(cont'd)		IIC	92-115	40.1	49.3	10.6	loam	(0.8)
5	3	A1	0-20	39.7	41.8	18.5	loam	(0.6)
		IIB2	44-75	23.9	54.6	21.5	silt loam	0.8
		IIIC	100-127			10.7	silt loam	0.8
5	4	A1	0-15	46.5	43.6	9.9	loam	(0.6)
		B22	52-69	35.4	54.1	10.5	silt loam	(0.8)
		IIC	103-137	27.4	62.1	10.4	silt loam	0.8
6	1	A1	0-23	31.6	42.6	25.8	loam	1.0
		IIB1	46-63	30.1	42.7	27.2	loam	0.7
		IVB22t	81-109	19.6	40.0	40.4	silty clay	0.7
		VB23t	109-133	8.5	41.6	49.9	silty clay	0.7
		VC1	156-180	11.8	52.7	35.5	silty clay loam	0.7

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
6 (cont'd)	1	VC3	210-244	15.2	55.8	29.0	silty clay loam	0.7
6	2	A1	0-17	41.8	38.9	19.3	loam	(0.9)
		B1	17-41	42.6	37.3	20.1	loam	(0.9)
		IIB2	41-61	41.9	38.3	19.8	loam	(0.9)
		IIB3	61-91	38.6	40.3	21.1	loam	(0.9)
		IIC1	91-117	32.4	43.2	24.4	loam	(0.8)
		IIC2	117-142	30.5	43.4	26.1	loam	(0.8)
7	1	A1	0-23	29.1	46.4	24.5	loam	0.9
		IIB21	48-74	20.0	49.8	30.2	clay loam	0.9
		IIC	117-135	30.6	51.4	18.0	silt loam	0.9
8	1	A1	0-18	35.0	46.8	18.2	loam	(0.9)

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
8	2	A1	0-14	55.0	32.3	12.7	sandy loam	(0.9)
		B2	14-46	51.3	38.8	9.9	loam	(0.9)
9	1	A1	0-18	37.8	41.7	20.5	loam	0.9
		IIB1	18-41	33.5	42.2	24.3	loam	(0.9)
		IIB2	41-71	31.0	43.0	26.0	loam	(0.9)
		IIB3	71-99	33.7	41.4	24.9	loam	(0.9)
		IIIC1	99-129	20.0	46.2	33.8	clay loam	0.9
		IIIC2	129-160	20.8	44.7	34.5	clay loam	0.9
10	1	A1	0-10	33.0	50.2	16.8	silt loam	0.9
		IIB22t	86-107	21.4	44.3	34.3	clay loam	1.1
		IIC1	152-173	25.0	43.1	31.8	clay loam	0.8
11	1	A1	0-10	53.2	36.8	9.9	sandy loam	0.8
		IIB2	51-76	53.7	37.3	9.0	sandy loam	0.8
		IIC	102-124	55.2	35.9	8.9	sandy loam	1.0

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
11	2	A1	0-12	57.8	35.4	6.8	sandy loam	0.8
		B2	31-60	62.4	33.5	4.1	sandy loam	0.6
		IIC	92-122	63.4	33.5	3.1	sandy loam	(0.8)
12	1	A1	0-14	46.3	46.4	7.3	sandy loam	0.6
		B2	42-59	43.4	47.9	8.6	loam	0.8
		IIC1	81-104	37.6	55.7	6.6	silt loam	0.7
12	2	A1	0-29	57.6	38.3	4.1	sandy loam	0.7
		B2	29-58	51.0	45.1	3.9	sandy loam	(0.8)
		IIC1	81-107	51.5	45.6	3.0	sandy loam	0.8
13	1	A1	0-22	38.9	56.9	4.2	silt loam	0.6
		B21	49-73	40.9	56.5	2.6	silt loam	0.7
		IIC	118-143	31.4	62.6	5.9	silt loam	(0.8)

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
14	1	A1	0-6	47.5	48.9	3.6	sandy loam	0.5
		IIB3	35-55	48.4	50.6	1.0	silt loam	0.6
14	2	A1	0-11	53.4	43.6	3.0	sandy loam	0.6
		B2	11-29	57.8	40.0	2.2	sandy loam	0.7
		C	50-70	51.3	46.6	2.1	sandy loam	0.8
14	3	A1	0-10	57.8	38.4	3.8	sandy loam	0.6
		B2	10-35	51.2	46.2	2.6	sandy loam	0.8
14	4	A1	0-12	59.0	38.0	3.0	sandy loam	0.9
		B2	12-28	62.7	35.4	1.9	sandy loam	0.7

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
15	1	Ai	0-21	43.9	45.6	10.5	loam	0.7[c]
		IIB2	36-58	36.0	51.9	12.1	silt loam	(0.8)[c]
		IIC1	76-112	34.9	55.5	9.6	silt loam	(0.8)[c]
16	1	A1	0-15	21.2	54.5	24.3	silt loam	0.8
		IIB22t	62-81	18.8	52.8	28.4	silty clay loam	(0.9)
		IIC1	120-155	34.6	41.8	23.5	loam	(0.9)
17	1	A1	0-8	28.0	49.5	22.6	loam	0.8
		A3	8-23	26.9	47.6	25.6	loam	0.8
		IIB22	48-69	15.4	49.8	34.8	silty clay loam	0.9
		IIC1	112-137	20.0	47.6	32.4	silty clay loam	0.8

[c]The abundance of air space in this fragmental soil may render both the measured and approximated values of BD too high.

Table 2. (cont'd)

Ref. Stand	Pit No.	Horizon	Depth, cm.	% of fine earth (<2 mm.) sand, 2.0-0.05 mm.	silt, .05-.002 mm.	clay, <.002 mm.	Text. class	BD, g./cm.^{3}
18	1	A1	0-18	34.0	57.8	8.2	silt loam	0.9
		B2	36-53	38.8	55.2	6.0	silt loam	1.0
		C1	53-71	37.9	55.8	6.4	silt loam	1.0
19	1	A1	0-20	43.0	39.9	17.1	loam	0.9
		IIB21t	60-74	27.0	45.7	27.4	clay loam	1.1
		IIC1	124-144	20.4	40.2	39.4	clay loam	1.2

Table 3. Soil profile descriptions for representative pedons at the reference stands, Oregon IBP.[†]

Horizon	Depth, cm.	Color,[a] moist	Texture[b]	Structure[b]	Consistence[b]	pH	Boundary[b]	Other Components[b,*]
Ref. Stand 1, Pit No. 1[c] (Typic Dystrochrept)								
O11	3-2	Needles, twigs, cones, etc. (L[d])						
O12	2-0	Partially decomposed needles, twigs, cones, etc. (F[d])						
A1	0-16	7.5YR3/2 5YR3/3	vgl	2m,fgr	so,vfr,ss,ps	6.3	cw	55% pebbles
A3	16-44	5YR3/4	vgl	1f,vfsbk	so,vfr,ss,ps	6.2	cs	55% pebbles
B1	44-73	5YR4/5	vgl	1vfsbk	so,vfr,ss,ps	6.6	cs	55% pebbles; few pumice grains
B2, B3	73-132	5YR4/5	vgl	1vfsbk	so,vfr,ss,ps	6.2	cs	55% pebbles; few pumice grains
C	132-154	5YR4/5	vgl	massive	so,vfr,ss,ps	6.0	gs	60% pebbles; few pumice grains
IIR	154-184+	Highly fractured reddish breccia bedrock						

[†]All field descriptions are by the senior author.

[a]Munsell[R] color notation.

[b]Symbols as given by Soil Survey Staff (1951).

[*]"Shot," where appearing, means rounded pebbles with high sphericity, 2-5 mm. in diameter.

[c]Pit located 8 m. NNE of SW corner Ref. Stand 1, on pediment backslope, slope 60%, aspect 280°.

[d]Organic layers as given by Hoover and Lunt (1952).

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 1, Pit No. 4[e] (Dystric Lithic Xerochrept)								
O11	3-2	Needles, cones, twigs, etc. (L)						
O12	2-0	Partially decomposed needles, cones, twigs, etc. (F)						
A1	0-12	10YR3/4 7.5YR3/2	vgl	1f,vfgr	so,vfr,so,po	6.2	cw	65% pebbles
B2	12-26	10YR3/4 5YR3/4	vgl	1vfsbk	so,vfr,so,ps	6.0	aw	60% pebbles
IIR	26+	Weathered reddish breccia bedrock						

[e]Pit located 17 m. NW of SE corner Ref. Stand 1, on doubly convex ridge spur, slope 30%, aspect 200°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 2, Pit No. 1[f] (Typic Dystrochrept)								
O11	4-3	Twigs, needles, cones, etc. (L)						
O12	3-0	Partially decomposed twigs, needles, cones, etc. (F)						
A1	0-15	7.5YR3/2	gsil	2f,vfgr	vfr,ss,ps	6.5	gs	50% pebbles (shot) & cobbles; few charcoal chips & pumice grains
A3	15-33	7.5YR3/2	gsil	1f,vfgr	vfr,ss,ps	6.6	gs	45% pebbles (shot) & cobbles; few pumice grains
IIB1	33-53	7.5YR4/4	sicl	1f,vfsbk	fr,ss,ps	6.2	gw	18% pebbles, common pumice grains
IIB2	53-74	7.5YR4/4	sicl	1m,fsbk	fr,ss,ps	6.2	gw	18% pebbles, common pumice grains; few charcoal chips
IIB3	74-94	7.5YR4/4	gsicl	1m,fsbk	fr,s,ps	6.4	gw	20% pebbles & cobbles; abundant pumice grains
IIC	94-119+	7.5YR4/4	gsicl	massive	fr,s,ps	6.4		25% pebbles, cobbles; common pumice grains

[f]Pit located 20 m. NE of NE corner Ref. Stand 2, on pediment/fan terrace, slope 33%, aspect 285°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 3, Pit No. 1[g] (Typic Dystrochrept)								
O11	6-4	Leaves, twigs, cones, etc. (L)						
O12	4-0	Partially decomposed leaves, twigs, cones, etc. (F)						
A11	0-3	7.5YR3/2	l	lf,vfgr	vfr,so,po	6.6	cw	10% pebbles; few pumice grains
A12	3-13	7.5YR3/4	gl	lf,vfgr	fr,ss,po	6.5	gw	25% pebbles & cobbles; few pumice grains
A3	13-28	7.5YR3/4	gl	lfgr lvfsbk	vfr,ss,po	6.6	cw	35% pebbles & cobbles; abundant pumice grains
B2	28-48	7.5YR3/4	gl	lm,fsbk	vfr,ss,po	6.6	cw	35% pebbles & cobbles; abundant pumice grains; few charcoal chips
B3	48-69	7.5YR3/4	gl	lf,vfsbk	vfr,ss,po	6.4	gw	45% pebbles, stones, & cobbles; abundant pumice grains
IIC	69-99+	7.5YR3/4 7.5YR4/4	vcsil	massive	fr,ss,p	6.4		55% cobbles, stones, & pebbles; abundant pumice grains

[g]Pit located 20 m. NNE of NW corner Ref. Stand 3, on pediment footslope, slope 18%, aspect 300°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 4, Pit No. 1[h] (Typic Haplumbrept)								
O11	2-1	Needles, twigs, cones, etc. (L)						
O12	1-0	Partially decomposed needles, twigs, cones, etc. (F)						
A1	0-25	7.5YR3/2	gsil	1f,vfgr	vfr,ss,ps	6.4	cw	25% pebbles (shot) & cobbles; common pumice grains
A3	25-46	10YR3/4	csil	1f,vfgr	vfr,ss,ps	6.2	aw	35% cobbles & pebbles (shot); common pumice grains
IIB1	46-66	7.5YR4/4	csicl	1vfsbk	vfr,s,p	6.4	gw	40% cobbles, stones, & pebbles; common pumice grains
IIB2	66-90	7.5YR4/4	csicl	1fsbk	vfr,s,p	6.4	gw	40% cobbles, stones, & pebbles; common pumice grains; few charcoal chips
IIB3	90-114	7.5YR4/4	csicl	1f,vfsbk	fr,s,p	6.2	gw	45% cobbles, pebbles, & stones; common pumice grains; few charcoal chips
IIC	114-124+	7.5YR4/4	vcsicl	massive	fr,s,p	6.2		50% cobbles, stones, & pebbles; common pumice grains

[h]Pit located 15 m. ENE of thermograph at Ref. Stand 4, on pediment backslope, slope 50%, aspect 280°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 5, Pit No. 2[i] (Typic Dystrochrept)								
O11	10-9	Twigs, needles cones, etc. (L)						
O12	9-0	Partially decomposed twigs, needles, cones, etc. (F)						
A1	0-15	7.5YR3/2	gsil	lvfgr	vfr,so,ps	6.6	cw	25% pebbles, few pumice grains & charcoal chips
B1	15-37	7.5YR4/4	gsil	lf,vfgr	fr,ss,ps	6.4	gw	35% pebbles & cobbles; few pumice grains
B21	37-49	7.5YR4/4	gsil	lvfsbk	fr,ss,p	6.2	gw	40% pebbles & cobbles; few pumice grains
B22	49-70	7.5YR4/4	vgsil	lf,vfsbk	fr,ss,p	6.1	gw	50% pebbles & cobbles; few pumice grains
IIB3	70-92	7.5YR4/4	gsil	lvfsbk	fr,ss,ps	5.8	cs	35% pebbles; few pumice grains & charcoal chips
IIC	92-115+	7.5YR4/4	gsil	massive	vfr,ss,ps	5.6		35% pebbles, common pumice grains; few charcoal chips

[i]Pit located 20 m. ENE of SW corner Ref. Stand 5, on pediment backslope (high portion of ref. stand), slope 15%, aspect 275°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 5, Pit No. 3[j] (Typic Dystrochrept)								
O11	3-2	Needles, twigs, cones, etc. (L)						
O12	2-0	Partially decomposed needles, twigs, cones, etc. (F)						
A1	0-20	7.5YR3/2	vgsil	1f,vfgr	vfr,ss,ps	6.4	cs	50% pebbles (shot) & stones; few charcoal chips; 5YR3/4m pocket of loam with abundant pumice
IIB1	20-44	7.5YR4/4	gsil	1f,vfgr	fr,ss,ps	6.0	cw	20% pebbles (shot) & stones; abundant pumice grains; few charcoal chips
IIB2	44-75	7.5YR4/4	stsil	1f,vfsbk 1f,vfgr	fr,s,p	5.8	gw	35% stones, pebbles (shot), & cobbles; common pumice grains; few charcoal chips; 5YR4/6m pocket with abundant pumice
IIIB3	75-100	7.5YR4/4	gsil	1vfsbk 1vfgr	fr,ss,p	6.2	gw	20% pebbles & cobbles; few pumice grains & charcoal chips; common 4-8 cm. chunks of extr. firm soil in friable matrix

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 5, Pit No. 3[j] (cont'd)								
IIIC	100-127+	7.5YR4/4	gsil	massive	fr,ss,p	6.2		25% pebbles & cobbles; few pumice grains & charcoal chips; common 4-8 cm. chunks of extr. firm soil in friable matrix

[j]Pit located 4 m. E of SW corner Ref. Stand 5, in saddle (possible old road bed), slope 0%.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 5, Pit No. 4[k] (Typic Haplumbrept)								
O11	6-5	Needles, leaves, twigs, cones, etc. (L)						
O12	5-0	Partially decomposed needles, leaves, twigs, cones, etc. (F)						
A1	0-15	7.5YR3/2 7.5YR2/0	gl	1f,vfgr	so,vfr,ss,ps	6.4	cw	30% pebbles (shot) & cobbles; few pumice grains
A3	15-31	7.5YR3/2	gl	1vfgr,sbk	vfr,ss,ps	6.2	gw	45% pebbles (shot) & cobbles; few pumice grains & charcoal chips
B21	31-52	7.5YR4/4	vgl	1f,vfsbk 1vfgr	vfr,ss,ps	6.0	gw	50% pebbles (shot) & cobbles; abundant pumice grains; common charcoal chips; 5YR4/6m pocket with abundant pumice grains
B22	52-69	7.5YR4/4	gsil	1f,vfsbk	fr,ss,ps	5.6	cw	45% pebbles (shot) & cobbles; abundant pumice grains; few charcoal chips; 5YR 4/6m pockets with abundant pumice grains

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 5, Pit No. 4[k] (cont'd)								
IIB3	69-103	7.5YR4/4	sil	lf,vfsbk	fr,s,p	5.6	gs	Trace of pebbles (shot); variegations cld 7.5YR2/0m
IIC	103-137+	7.5YR4/4	sil	massive	fi,s,p	5.6		No coarse fragments; few pumice grains; variegations cld 7.5YR2/0m

[k]Pit located 12 m. ESE of NE corner Ref. Stand 5, on pediment backslope, slope 15%, aspect 305°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 6, Pit No. 2[1] (Typic Dystrochrept)								
O11	5-4	Twigs, bark, leaves, needles, etc. (L)						
O12	4-0	Partially decomposed twigs, bark, leaves, needles, etc. (F)						
A1	0-17	10YR4/4 10YR2/1	gsil	1f,vfgr	so,vfr,ss,ps	6.0	cw	30% pebbles (shot)
B1	17-41	10YR4/4	gsil	1vfsbk 1vfgr	so,fr,ss,ps	6.0	gw	30% pebbles (shot)
IIB2	41-61	10YR4/4	gsil	1f,vfsbk	so,fr,ss,ps	6.0	gw	35% pebbles (shot)
IIB3	61-91	10YR4/4 7.5YR4/4	gcl	1vfsbk	fi,ss,ps	5.9	gw	45% pebbles (shot) & cobbles; variegations f1f 7.5YR5/6m
IIC1	91-117	7.5YR4/4	gsicl	massive	fi,s,p	6.0	gw	40% pebbles & cobbles; variegations f1f 7.5YR5/6m & f1d 7.5YR2/0m
IIC2	117-142+	10YR5/8	gsicl	massive	fr,s,p	5.8		40% pebbles & cobbles; variegations f1d 7.5YR4/6m & f1d 10YR2/1m

[1]Pit located at (13.4, 12.2) Watershed 10, on shoulder to pediment backslope, slope 65%, aspect 170°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 7, Pit No. 1[m] (Dystric Eutrochrept)								
O11	4-3	Twigs, cones, needles, etc. (L)						
O12	3-0	Partially decomposed twigs, cones, needles, etc. (F)						
A1	0-23	7.5YR3/2	gsil	2f,vfgr	vfr,ss,ps	6.0	cw	25% pebbles (shot)
A3	23-32	7.5YR3/2	gsicl	2fgr	vfr,ss,ps	6.1	cs	25% pebbles (shot)
IIB1	32-38	7.5YR4/4	sicl	1f,vfsbk	vfr,ss,p	6.1	cs	15% pebbles
IIB21	48-74	7.5YR4/4	sicl	2f,vfsbk	fr,s,p	6.2	gs	15% pebbles
IIB22	74-97	7.5YR4/4	gsicl	2m,fsbk	fr,s,p	6.6	gw	30% pebbles & cobbles; variegations f1d 7.5YR7/2m & f1f 7.5YR6/6m
IIB3	97-117	7.5YR4/4	gsicl	1m,fsbk	fr,ss,p	6.5	gw	40% pebbles & cobbles; variegations f2d 5YR4/6m
IIC	117-135+	7.5YR5/6	vgsil	massive	fr,ss,p	6.4		50% pebbles & cobbles; variegations f2d 5YR4/8m

[m]Pit located 30 m. SSW of Ref Stand 7, on convex pediment backslope, slope 60%, aspect 355°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 8, Pit No. 2[n] (Lithic Dystrochrept)								
O11	3-2	Needles, twigs, cones, etc. (L)						
O12	2-0	Partially decomposed needles, twigs, cones, etc. (F)						
A1	0-14	5YR2/2	vgl	1f,vfgr	so,vfr,ss,ps	6.2	cw	65% pebbles & cobbles; common pumice grains; few charcoal chips
B2	14-46	5YR3/4	vgsl	1vfsbk	so,vfr,ss,ps	6.4	as	65% pebbles & cobbles; few pumice grains & charcoal chips
IIR	46-70+	Weathered reddish breccia bedrock						

[n]Pit located 12 m. E of SW corner Ref. Stand 8, on pediment backslope near draw, slope 75%, aspect 295°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 9, Pit No. 1[o] (Typic Dystrochrept)								
O11	3-1	Needles, twigs, cones, etc. (L)						
O12	1-0	Partially decomposed needles, twigs, cones, etc. (F)						
A1	0-18	7.5YR3/2 7.5YR4/4	vgcl	1f,vfgr	vfr,ss,ps	6.2	cw	50% pebbles (shot); few charcoal chips
IIB1	18-41	7.5YR4/4	gcl	1fgr	vfr,s,p	6.2	cs	35% pebbles (shot) & cobbles
IIB2	41-71	7.5YR4/4	gsicl	1f,vfsbk	vfr,s,p	6.2	gs	45% pebbles (shot) & cobbles
IIB3	71-99	7.5YR4/4	gsicl	1vfsbk	vfr,s,p	6.0	gs	40% pebbles (shot) & cobbles; few pumice grains
IIIC	99-160+	7.5YR4/4	gsicl	massive	fr,s,p	5.6		35% pebbles (few shot) & cobbles; few pumice grains & charcoal chips

[o]Pit located at (3.1, 3.6) Watershed 10, on pediment surface, slope 80%, aspect 310[o].

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 10, Pit No. 1P (Eutric Glossoboralf)								
O11	5-4	Needles, leaves, twigs, etc. (L)						
O12	4-0	Partially decomposed needles, leaves, cones, etc. (F)						
A1	0-10	7.5YR3/2	gsil	2fgr,sbk	vfr,ss,ps	6.0	cs	20% pebbles (shot)
A3	10-36	7.5YR3/2	sicl	2msbk 1fgr	fr,ss,p	6.2	cs	10% pebbles
IIB1	36-66	7.5YR3/4	sicl	2fsbk	fi,ss,p	6.0	gs	5% pebbles, common pumice grains
IIB21t, IIB22t	66-107	7.5YR4/4	sicl	2c,msbk	fi,ss,p	5.9	as	Trace of pebbles; clay films in pores & on peds; common pumice grains; few charcoal chips
IIB23t	107-130	7.5YR4/4	sicl	2c,msbk	fi,ss,p	5.2	cs	Trace of pebbles & cobbles; clay films in pores & on peds; common pumice grains; Mn coatings fld 7.5YR2/0m

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 10, Pit No. 1[P] (cont'd)								
IIB24t	130-152	7.5YR4/4	sicl	2c,msbk	fi,ss,p	5.2	cs	Trace of pebbles & cobbles; clay films in pores & on peds; common pumice grains; Mn coatings cld 7.5YR2/0m
IIC	152-193+	7.5YR4/6	gcl	massive	fe,ss,p	5.4		40% pebbles & cobbles; few clay films in pores; Mn coatings fld 7.5YR2/0m

[P]Pit located 2 m. W of road 1580, 200 m. NE of Ref. Stand 10, on ridge spur, slope 22%, aspect 150°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 11, Pit No. 2[q] (Andic Dystrochrept)								
O11	5-4	Needles, leaves, twigs, cones, etc. (L)						
O12	4-0	Partially decomposed needles, leaves, twigs, cones, etc. (F)						
A1	0-12	10YR2/2	gl	1f,vfgr	vfr,ss,ps	6.2	cw	25% pebbles (shot); few pumice grains; burned out root with abundant charcoal chips
B1	12-31	7.5YR3/2	gl	1f,vfgr	vfr,ss,ps	6.2	gw	25% pebbles (shot); few pumice grains & charcoal chips
B2	31-60	7.5YR3/2	gl	1vfsbk 1vfgr	vfr,ss,ps	6.4	gw	30% pebbles (shot) & cobbles; common pumice grains
B3	60-92	7.5YR3/2	gl	1vfgr	vfr,ss,ps	5.7	gs	45% pebbles (few shot) & cobbles; common pumice grains; few charcoal chips; variegations f2f 10YR3/3m & c3d 5YR4/4m
IIC	92-122+	7.5YR3/2	vgl	massive	vfr,ss,ps	5.6		60% pebbles & cobbles; common pumice grains; variegations f3f 10YR3/3m & f2d 5YR3/4m

[q]Pit located 22 m. NNE of SW corner Ref. Stand 11, in convex portion of NNE-SSW draw in Watershed 7, slope 37%, aspect 160°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 12, Pit No. 2^r (Typic Dystrochrept)								
O11	14-13	Needles, cones, twigs, etc. (L)						
O12	13-10	Partially decomposed needles, cones, twigs, etc. (F)						
O13	10-0	Partially decomposed wood and bark from fallen tree (F)						
A1	0-29	5YR3/3	gsl	lf,vfgr	vfr,ss,po	5.4	cw	45% pebbles (few shot), cobbles, & stones; abundant pumice grains
B2	29-58	5YR3/3	vgsl	lf,vfsbk	fr,ss,ps	6.0	gw	55% pebbles, stones, & cobbles; abundant pumice grains
B3	58-81	5YR3/4	vgl	lvfsbk	fr,ss,ps	6.4	cw	50% pebbles, cobbles, stones, & boulders; abundant pumice grains; few charcoal chips
IIC1	81-107	5YR3/4	vgl	massive	fr,ss,ps	6.4	gw	60% pebbles, cobbles, stones, & boulders; abundant pumice grains; common 4-8 cm. chunks of extr. firm soil in friable matrix

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 12, Pit No. 2[r] (cont'd)								
IIC2	107-121+	5YR3/4	vstl	massive	fr,ss,ps	6.4		65% stones, boulders, pebbles, & cobbles; abundant pumice grains; common 4-8 cm. chunks of extr. firm soil in friable matrix

[r]Pit located 25 m. W of SE corner Ref. Stand 12, on locally concave footslope, slope 30%, aspect 280°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 13, Pit No. 1[s] (Typic Dystrandept)								
O11	3-2	Leaves, needles, twigs, etc. (L)						
O12	2-0	Partially decomposed leaves, needles, twigs, etc. (F)						
A1	0-22	7.5YR2/2	l	1f,vfgr	vfr,so,ps	6.2	aw	10% pebbles; common pumice grains
A3	22-36	7.5YR3/2	l	1f,vfgr	vfr,ss,ps	6.1	cw	15% pebbles; common pumice grains
B1	36-49	7.5YR3/2	l	1vfsbk	vfr,ss,ps	5.8	cw	15% pebbles; common pumice grains
B21	49-73	7.5YR3/2	l	2f,vfsbk	fr,ss,ps	5.9	cw	15% pebbles; abundant pumice grains
IIB22	73-94	7.5YR3/2	gl	2m,fsbk	fr,ss,ps	5.8	gs	20% pebbles; abundant pumice grains
IIB3	94-118	7.5YR3/2	gl	1vfsbk	fr,ss,ps	6.0	cs	35% pebbles & cobbles; abundant pumice grains
IIC	118-143+	7.5YR3/4	vgl	massive	fr,ss,ps	5.8		50% pebbles & cobbles; few pumice grains

[s]Pit located 20 m. NE of thermograph at Ref. Stand 13, on pediment backslope, slope 40%, aspect 220°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 14, Pit No. 1[t] (Entic Cryandept)								
O11	3-2	Needles, twigs, cones, etc. (L)						
O12	2-0	Crisp, homogeneous layer of partially decomposed needles, twigs, cones, etc. (F)						
A1	0-6	7.5YR2/2 7.5YR3/2	l	lf,vfgr	vfr,ss,ps	6.2	cw	15% pebbles (shot) & cobbles; few pumice grains
B2	6-35	7.5YR3/2	gl	lvfsbk	vfr,ss,ps	6.3	cb	30% pebbles & cobbles; common pumice grains
IIB3	35-55	7.5YR3/2	l	lvfsbk lvfgr	vfr,ss,ps	6.4	ab	Trace of pebbles (few shot); abundant pumice grains
IIIR	55-84+	Slightly weathered, gray, porphyritic flow bedrock						

[t]Pit located 13 m. SSE of NW corner Ref. Stand 14, on backslope, slope 50%, aspect 325°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 14, Pit No. 4[u] (Andic Cryochrept)								
O11	6-5	Needles, twigs, cones, etc. (L)						
O12	5-0	Crisp, homogeneous layer of partially decomposed twigs, cones, bark, etc. (F)						
A1	0-12	7.5YR3/2 7.5YR4/4	1	1vfgr 1vfsbk	so,vfr,so,ps	6.1	cw	5% pebbles (few shot); few pumice grains & charcoal chips
B2	12-28	7.5YR3/2 7.5YR4/4	1	1f,vfsbk	so,vfr,ss,ps	6.2	gw	10% pebbles (few shot); common pumice grains
B3	28-53	7.5YR3/2 7.5YR4/4	gsl	1f,vfsbk	so,vfr,ss,ps	5.8	ai	40% pebbles (few shot); common pumice grains
IIR	53-75+	Weathered, pink, porphyritic flow bedrock						

[u]Pit located 19 m. NE of SE corner Ref. Stand 14, on shoulder, slope 35%, aspect 320°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 15, Pit No. 1[V] (Typic Dystrochrept)								
O11	2-1	Leaves, twigs, cones, etc. (L)						
O12	1-0	Partially decomposed leaves, twigs, cones, etc. (F)						
A1	0-21	10YR2/2 7.5YR2/0	gl	1f,vfgr	vfr,ss,po	6.7	gw	40% pebbles (few shot) & cobbles; common pumice grains; few coarse & medium vesicular pores
B1	21-36	7.5YR3/2	gsicl	1fgr	vfr,ss,ps	6.8	gw	45% pebbles (few shot) & cobbles; common pumice grains; few coarse & medium vesicular pores
IIB2	36-58	7.5YR3/2	gsicl	1f,vfsbk	vfr,ss,ps	6.4	gw	45% pebbles & cobbles; abundant pumice grains
IIB3	58-76	7.5YR3/2	gsicl	1fsbk	vfr,ss,ps	6.4	cw	45% pebbles & cobbles; common pumice grains; common coarse & medium vesicular pores

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 15, Pit No. 1[v] (cont'd)								
IIC1	76-112	7.5YR3/2 7.5YR4/4	vgsil	massive	vfr,ss,ps	6.4	cs	65% pebbles, stones, & cobbles; abundant pumice grains; few coarse & medium vesicular pores
IIIC2	112-129+	10YR4/4	vgsil	massive	vfr,ss,ps	6.2		60% pebbles, stones, & cobbles; abundant pumice grains

[v]Pit located 10 m. WNW of thermograph at Ref. Stand 15, on pediment backslope, slope 65%, aspect 355°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 16, Pit No. 1[W] (Typic Hapludalf)								
O11	4-3	Leaves, twigs, cones, etc. (L)						
O12	3-0	Partially decomposed leaves, twigs, cones, etc. (F)						
A1	0-15	10YR4/3	gsicl	2f,vfgr	fr,ss,ps	5.8	cw	20% pebbles
A3	15-34	10YR4/3	gsicl	2mgr	fr,ss,ps	5.9	gw	40% pebbles & cobbles
B1	34-47	10YR4/4	gsicl	2f,vfsbk	fr,ss,ps	5.6	gw	40% pebbles & cobbles
B21t	47-62	10YR4/4	gsicl	2fsbk	fr,ss,p	5.7	cs	25% pebbles & cobbles; few clay films in pores
IIB22t	62-81	10YR4/4	sic	2msbk	fr,ss,p	5.4	gw	10% pebbles; few clay films on peds & in pores
IIB23t	81-103	10YR4/4	sic	2c,msbk	fr,ss,ps	5.4	cs	10% pebbles; clay films in pores & on peds
IIB3t	103-120	10YR4/4	gsicl	1fsbk	fr,ss,p	5.8	cs	20% pebbles; clay films in pores

(cont'd)

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 16, Pit No. 1[W] (cont'd)								
IIC1	120-155	10YR4/4	gsicl	massive	fr,ss,ps	5.7	cw	35% pebbles & cobbles; few clay films in pores; few charcoal chips; variegations f1/2d 7.5YR5/6m
IIC2	155-179	10YR4/4	gsicl	massive	fr,ss,ps	5.8	cs	40% pebbles & cobbles; few clay films in pores; variegations c1/2d 7.5YR5/6m & f1f 2.5Y4/4m
IIC3	179-200+	10YR4/4	vgsicl	massive	fr,ss,ps	5.9		50% pebbles & cobbles; few clay films in pores; variegations c1/2f 7.5YR4/4m, c1/2f 7.5YR5/6m, & c1f 2.5Y4/4m

[W]Pit located at SW corner Ref. Stand 16 (slope failure above trail), on pediment backslope, slope 70%, aspect 210°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 17, Pit No. 1[x] (Typic Dystrochrept)								
O11	5-4	Leaves, bark, cones, etc. (L)						
O12	4-0	Partially decomposed leaves, bark, cones, etc. (F)						
A1	0-8	7.5YR3/2	gsil	1f,vfgr	so,vfr,so,po	6.6	cw	45% pebbles (shot)
A3	8-23	7.5YR4/4	vgsicl	1fgr 1fsbk	vfr,ss,ps	6.4	ci	50% pebbles (few shot) & cobbles; few pumice grains
IIB1	23-36	7.5YR4/4	gsicl	2m,fsbk	fr,ss,p	6.0	gw	20% pebbles & cobbles; few pumice grains
IIB21	36-48	7.5YR4/4	sicl	2m,fsbk	fr,ss,p	6.0	cw	15% pebbles; few pumice grains
IIB22, IIB23	48-86	7.5YR4/4	gsicl	2m,fsbk	fr,s,p	6.1	cw	20% pebbles & cobbles; few pumice grains
IIB3	86-112	7.5YR4/4	gsicl	1msbk	fr,s,p	6.1	gw	30% pebbles & cobbles; few pumice grains
IIC	112-190+	7.5YR4/4	gsicl	massive	fr,s,p	6.1		35% pebbles & cobbles; few pumice grains & charcoal chips

[x]Pit located 20 m. ESE of thermograph at Ref. Stand 17, on pediment footslope, slope 35%, aspect 325°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 18, Pit No. 1[y] (Andic Dystrochrept)								
O11	5-4	Leaves, twigs, needles, cones, etc. (L)						
O12	4-0	Partially decomposed leaves, twigs, needles, cones, etc. (F)						
A1	0-18	10YR2/2	gsil	2fgr	fr,ss,ps	6.4	cs	30% pebbles (few shot)
B1	18-36	10YR2/2	gsil	1vfsbk	vfr,ss,ps	6.4	cs	25% pebbles (few shot)
B2	36-53	10YR2/2	gl	1fsbk	vfr,ss,ps	6.0	gs	20% pebbles (few shot)
C1	53-71	10YR3/3	gl	massive	vfr,ss,ps	6.4	cw	30% pebbles (few shot)
IIC2	71-104+	10YR5/1 7.5YR4/2				5.4		Saprolitic andesite bedrock

[y]Pit located 15 m. SW of SW corner Ref. Stand 18, on pediment footslope, slope 45%, aspect 200°.

Table 3. (cont'd)

Horizon	Depth, cm.	Color, moist	Texture	Structure	Consistence	pH	Boundary	Other Components
Ref. Stand 19, Pit No. 1[z] (Ultic Hapludalf)								
O11	4-2.5	Leaves, needles, cones, bark, etc. (L)						
O12	2.5-0	Partially decomposed leaves, needles, cones, bark, etc. (F)						
A1	0-20	7.5YR3/2	gsil	2f,vfgr	vfr,ss,ps	7.0	cw	35% pebbles (few shot)
A3	20-38	5YR3/4	gsil	2f,vfgr	vfr,ss,ps	6.6	gw	35% pebbles & cobbles
IIB1	38-60	5YR3/4 5YR4/4	gsicl	2f,vfsbk	fr,ss,p	6.4	gw	25% pebbles & cobbles
IIB21t	60-74	5YR4/4	sicl	2m,fsbk	fr,ss,p	6.4	gw	15% pebbles; clay films in pores
IIB22t	74-104	5YR4/4	sicl	1m,fsbk	fr,ss,p	6.2	gw	15% pebbles, clay films in pores & on peds
IIB3t	104-124	5YR4/4	gsicl	1f,vfsbk	fr,ss,p	6.2	dw	20% pebbles & cobbles; clay films in pores
IIC	124-164+	5YR4/4	gsicl	massive	fr,ss,p	6.2		20% pebbles & cobbles; clay films in pores

[z]Pit located at SE corner Ref. Stand 19, on small landslide on pediment surface, slope 50%, aspect 120°.

Table 4. Nutrient capital for selected nutrients in soils of the reference stands, Oregon IBP.

Ref. Stand	Pit No.	Depth,[a] cm.	kg./ha. Extr. P. (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
1	1	100	2.8	1.2	3.9	5.2	5.1	2.6
1	2	100	3.2	1.0	3.6	5.3	6.	7.
1	3	26	2.1	0.8	2.6	1.4	1.5	1.6
1	4	26	2.5	0.8	2.2	1.3	1.0	1.3
1	$\bar{X}$[b]	63	2.6	1.0	3.1	3.3	3.3	3.1
1	s[b]		0.47	0.19	0.8	2.2	2.5	2.6
1	CV[b]		18%	19%	26%	67%	76%	84%
2	1	100	2.9	0.9	4.9	4.0	7.	11.
3	1	100	1.3	1.9	7.	0.4	0.7	3.4

[a]Determined to a depth of 1 m. of mineral soil, or to hard bedrock, whichever is shallower.

[b]Values of $\bar{X}$ (= sample mean), s (= sample std. dev.), and CV (= coef. of variation), as per Petersen (1972), are included for those reference stands at which more than one pedon were sampled.

Table 4. (cont'd)

Ref. Stand	Pit No.	Depth, cm.	kg./ha. Extr. P (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
4	1	100	1.5	2.3	8.	0.10	0.6	2.8
5	1	100	2.4	1.1	4.5	5.1	16.	7.
5	2	100	6.	1.4	4.6	2.6	8.	8.
5	3	100	1.5	0.7	4.4	2.0	10.	4.7
5	4	100	4.6	1.2	4.7	2.5	9.	15.
5	$\bar{X}$	100	3.6	1.1	4.6	3.0	11.	9.
5	s		2.0	0.31	0.14	1.4	3.7	4.3
5	CV		56%	28%	3%	47%	34%	48%
6	1	100	2.1	0.9	3.5	8.	92.	15.
6	2	100	2.2	1.2	3.2	7.	29.	19.
6	$\bar{X}$	100	2.2	1.1	3.4	8.	60.	17.
6	s		0.07	0.22	0.21	0.8	44.	2.6

Table 4. (cont'd)

Ref. Stand	Pit No.	Depth, cm.	Extr. P (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
			kg./ha.					
6 (cont'd)	CV		3%	20%	6%	10%	73%	15%
7	1	100	2.8	1.5	6.	18.	43.	19.
8	1	18	2.4	0.8	1.2	1.2	1.8	1.2
8	2	46	1.9	1.2	2.6	2.5	3.0	3.2
8	$\bar{X}$	32	2.2	1.0	1.9	1.8	2.4	2.2
8	s		0.35	0.30	1.0	0.9	0.8	1.4
8	CV		16%	30%	53%	50%	33%	64%
9	1	100	3.6	1.9	5.2	3.1	7.	7.
10	1	100	6.	1.3	6.	13.	48.	2.3

Table 4. (cont'd)

Ref. Stand	Pit No.	Depth, cm.	kg./ha. Extr. P (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
11	1	100	5.3	1.5	6.	2.3	8.	10.
11	2	100	2.0	1.7	8.	2.4	4.2	10.
11	$\bar{X}$	100	3.6	1.6	7.	2.4	6.	10.
11	s		2.3	0.17	1.2	0.10	2.5	0.35
11	CV		64%	11%	17%	4%	42%	4%
12	1	100	2.0	1.9	7.	0.47	1.8	2.7
12	2	100	5.3	1.7	5.5	0.15	1.0	1.6
12	$\bar{X}$	100	3.6	1.8	6.	0.31	1.4	2.2
12	s		2.3	0.11	1.2	0.22	0.6	0.8
12	CV		64%	6%	20%	71%	43%	36%

Table 4. (cont'd)

Ref. Stand	Pit No.	Depth, cm.	kg./ha. Extr. P (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
13	1	100	2.3	4.0	14.	0.8	1.7	10.
14	1	55	0.9	1.8	7.	0.18	0.6	1.2
14	2	70	1.2	1.9	5.4	0.39	1.1	2.6
14	3	62	3.4	1.8	5.3	0.46	0.9	2.2
14	4	53	1.8	1.4	3.4	0.07	0.29	2.8
14	$\bar{X}$	60	1.8	1.8	5.2	0.28	0.7	2.2
14	s		1.1	0.23	1.4	0.18	0.36	0.7
14	CV		62%	13%	27%	65%	51%	31%
15	1[c]	100	10.	2.0	8.	2.2	2.7	6.
16	1	100	2.2	1.2	3.9	8.	46.	18.

[c]The abundance of air space in this fragmental soil may render the computed values for nutrient capital to be too high.

Table 4. (cont'd)

Ref. Stand	Pit No.	Depth, cm.	kg./ha. Extr. P (X10)	OM ($X10^5$)	N ($X10^3$)	Exch. Ca ($X10^3$)	Exch. Mg ($X10^2$)	Exch. K ($X10^2$)
17	1	100	4.0	1.5	6.	3.8	11.	8.
18	1[d]	71	3.6	1.8	8.	4.0	5.0	8.
19	1	100	16.	1.7	10.	6.	9.	15.

[d]The sample of saprolitic IIC2 horizon from Ref. Stand 18, Pit No. 1 was not subjected to lab analysis. The horizon possessed a relative dearth of roots, but may be a source of readily available nutrient capital within the conventional 100 cm. rooting depth. Thus the values for nutrient capital given here may be low.