CONTENTS

INFILTRATION RATES OF SOUTH CAROLINA SOILS DURING SIMULATED RAINFALL

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INTRODUCTION

The entry of water into the soil is a special interest of agriculturalists. Infiltration and runoff measurements are relative indices of the susceptibilities of soils to erosion, and improvement of water intake and reduction of runoff are prime objectives of all soil conservationists. Infiltration rates of different soils for various land use practices are valuable information for engineers, technicians, and farmers who design, develop, and use sprinkler irrigation equipment and systems.

Parr and Bertrand (6) reported a comprehensive review of literature pertaining to water infiltration of the soil. Methods and equipment for measuring infiltration rates and factors that influence rates were discussed.

Erie (1) studied evaluations of infiltration measurements, emphasizing those for gravity-irrigation. Methods of rate measurements and soil and water variables which affect measurements were discussed.

Many types and designs of equipment to measure quantity and rate of water intake in situ have been developed over the past 30 years. The measuring procedure and equipment used depend to a considerable degree on the proposed application of the data obtained. The gross water infiltration of soils in a watershed has been calculated as the difference between the total rainfall and runoff. Rates have been determined by flooding the soil surface within cylinders that were pressed into the soil, and by sprinkling the soil surface in plots of various shapes and sizes with applicators that simulated rainfall. The type F and type FA infiltrometers, developed by the Soil Conservation Service, have been widely used. Others have been developed for runoff and erosion studies that simulate rainfall intensities up to 5 inches per hour with the approximate kinetic energy of rainfall at these intensities (5).

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Peele and Beale (9) reported a procedure for determining the infiltration rates of small disturbed soil samples in the laboratory. The type F nozzles were used to deliver simulated rainfall. Adaptation of the method for studying the relative effects of field treatments on infiltration rates was indicated.

Some of the dominant conditions and properties of soil and water that affect infiltration are soil texture, structure, compaction, porosity, and organic matter content; land use and tillage; antecedent soil moisture; temperature and quality of water; and prolongation of water application.

Hanks and Bowers (3) presented a numerical procedure for deriving rate measurements, which involved the relation of moisture content to pressure head and moisture diffusivity. Results indicated that infiltration was governed by flow through the least permeable soil layer. Green *et al.* (2) compared the theoretical method of Hanks and Bowers (3) with measured infiltration of a field soil. Calculated rates and those measured with a sprinkling infiltrometer were comparable. They concluded that the numerical procedure was not designed to displace the field measurements, but was useful for special evaluations that were difficult to obtain from field measurements.

Hanks (4) reported a procedure for computing infiltration rates from the predetermined properties: hydraulic conductivity, water tension, water contents at various depths, and permeability and homogeneity of the soil profile. Although the computed rates and those measured in the field were similar, field measurements were recommended for practical use.

The research reported in this bulletin was initiated and conducted by the Soil Conservation Service and the Soil and Water Conservation Research Division, Agricultural Research Service, in cooperation with the South Carolina Agricultural Experiment Station. The objectives of this study were to determine the infiltration rates of some of the dominant soil types in South Carolina and to relate the effects of land use and soil properties to the infiltration rates determined by simulated rainfall. Applicable data for criteria in designing sprinkler irrigation equipment and field systems were a special consideration. Data on several South Carolina soils were reported in 1948 (7).

METHODS AND MATERIALS

Test sites were selected by soil series, texture, and land use. Textures of some surface soils were determined by field observations, but most of them were classified according to the USDA textural classification based on the mechanical analyses. Subsoil textures were classified by field observations.

Site areas were cultivated before plots were installed; and sod areas, unless otherwise indicated, were not disturbed. In some instances, grasses, forages, and weeds were clipped to the height of the plot borders and clippings were removed from the plot area.

The type FA infiltrometer was used for all infiltration rate measurements. The plot size was 30.5 inches (level measurement) long by 12 inches wide.

Calibration pans, 3 inches wide by 30.5 inches long by 2 inches deep, were placed on each side of the test plot about 2 inches from the borders. The relationship of water sprinkled in the side pans to that falling on the plot was determined by measuring the quantities of water applied in the side pans and in the plot pan (exactly the size of the plot) for several minutes before actual determinations. After the calibration was completed, the plot pan was removed. The side pans provided a continuous measurement of water applied during determination of the infiltration rate.

The type F nozzle delivered approximately 1.5 inches of water per hour at 20 p. s. i. on the plot area. The riser was constructed with positions for using one nozzle alone or two nozzles at the same time. The riser was adjusted to such height that drops fell from about 7 feet above the soil surface. A windbreak of canvas, about 11 feet high, was erected around the plot area to reduce air movement during the calibration and test. Runoff from the test-plot and side-calibration pans was measured during intervals ranging from 1 to 30 minutes for 1 or more hours.

Mechanical analyses of the soils were determined by the pipet method. The particle size separations were 0.05 to 2.00, 0.002 to 0.05, and <0.002 mm. in diameter for sand, silt, and clay, respectively.

Total carbon contents of the soils were determined by the dry combustion method, and organic matter was calculated by multiplying the organic carbon content by the conventional factor, 1.72. The glass electrode was used to determine the pH of the soils.

Field capacity was calculated from the moisture equivalent by using the regression equation relating field capacity to moisture equivalent (8), $Y = 2.62 + 0.865X$, in which $Y =$ field capacity and $X =$ moisture equivalent. The wilting percentage was determined by using the regression equation relating wilting percentage to percent moisture retained at 15 atmospheres pressure, $Y = 0.99 + 0.97X$, in which $Y =$ wilting percentage and $X =$ percent moisture retained at 15 atmospheres pressure (8).

RESULTS AND DISCUSSION

Infiltration Rates

The soils of the test sites, crops growing or land use, plot preparation before testing, estimates of soil moisture content, and site locations are listed in table 1.

Soil moisture was estimated in the 0- to 3-foot depth. Dry indicates <20 percent; low, from 20 to 30 percent; and moderate, from 30 to 40 percent available moisture in the soil when the infiltration rates were determined.

Infiltration rates of the Piedmont soils during the defined time intervals are shown in table 2. The water application rate for a test was relatively constant, but the rates varied to some degree for different sites. A rate during a time interval followed by "+" indicates that runoff had not occurred and the infiltration rate was either equal to or more than the water application rate. Other values are measured infiltration rates for that definite time interval.

Although runoff from the cultivated and sod soils usually occurred within 18 minutes after start of the test, some of these soils absorbed all applied water for 30 or more minutes before runoff occurred. Low antecedent soil moisture, exceptionally good tilth, and other contributive factors probably accounted for these high intake rates.

During the 30- to 60-minute interval, rates of some soils decreased to <0.20 inch per hour. Infiltration rates of soils on which cover crops or established sods were growing were usually greater than those of the cultivated soils, and intake rates of most sod soils decreased more slowly than those of the cultivated soils. Rates of several of the sod soils were either equal to or greater than the rate of application during periods up to 3 hours. However, infiltration rates of other sod soils decreased to very low values within the first hour. Figure 1 illustrates the effects of lengths of time of water application on infiltration rates of typical Piedmont soils. The initial constant rates before runoff occurred are water application rates.

TABLE 1.—DESCRIPTION OF INFILTRATION TEST SITES: SOIL NAME, TEXTURE, DEPTH AND SLOPE, SOIL MOISTURE CONTENT, CROPS GROWING OR LAND USE, PLOT PREPARATION, AND SITE LOCATIONS

Site No.	Soil series	Surface soil (A horizon) Texture	Surface soil (A horizon) Depth	Surface soil (A horizon) Slope	Subsoil (B horizon) Texture	Soil moisture	Crops growing or land use	Depth of cultivation	Site location (county)
			Inches	%				*Inches*	
1	Vaucluse	Sand	20	4	Sandy clay loam	Low	Tobacco	8	Darlington
2	Charleston	Loamy fine sand	12	3	Sandy loam	Moderate	Horticultural	8	Charleston
3	Yonges	Loamy fine sand	10	3	Clay loam	Moderate	Crabgrass	8	Charleston
4	Yonges	Loamy fine sand	10	3	Sandy clay loam	Moderate	Crabgrass	*	Charleston
5	Cecil	Sandy loam	6	6	Clay	Moderate	Peaches	6	Spartanburg
6	Cecil	Loamy sand	12	6	Clay	Low	Peaches-clover	*	Spartanburg
7	Cecil	Loamy sand	12	6	Clay	Low	Peaches	8	Spartanburg
8	Davidson	Sandy loam	6	6	Clay	Low	Peaches	6	Spartanburg
9	Davidson	Clay loam	6	8	Clay	Low	Fescuegrass-clover	*	Spartanburg
10	Davidson	Sandy clay loam	6	6	Clay	Low	Peaches	6	Spartanburg
11	Cecil	Sandy loam	8	6	Clay	Low	Peaches	6	Greenville
12	Cecil	Sandy clay loam	4	6	Clay	Low	Peaches	5	Greenville
13	Cecil	Loamy sand	12	6	Clay	Low	Peaches	6	Spartanburg
14	Cecil	Clay loam	6	6	Clay	Low	Peaches	6	Spartanburg
15	Eulonia	Loamy fine sand	14	3	Sandy clay loam	Moderate	Truck crops	6	Charleston
16	Yonges	Loamy fine sand	14	3	Sandy clay loam	Moderate	Truck crops	6	Charleston
17	Edisto	Loamy fine sand	14	3	Sandy clay loam	Moderate	Truck crops	6	Charleston
18	Faceville	Loamy sand	10	4	Sandy clay	Low	Fescuegrass-clover	*	Orangeburg
19	Wagram	Loamy sand	24	3	Sandy clay loam	Low	Ryegrass-clover	*	Orangeburg
20	Herndon	Loam	10	4	Silty clay	Dry	Peaches-vetch-peas	*	Lancaster
21	Iredell	Sandy loam	6	3	Clay	Dry	Fescuegrass-clover	*	York
22	Durham	Loamy sand	14	4	Sandy clay loam	Dry	Mixed weeds	7	York
23	Dunbar	Sandy loam	8	3	Sandy clay loam	Dry	Row crops	6	Darlington
24	Troup	Sand	36+	3	Sand	Low	Peaches-cover crop	8	Lexington
25	Herndon	Silt loam	10	3	Silty clay	Moderate	Peaches	6	Lexington
26	Blaney	Loamy sand	24	3	Sandy clay loam	Dry	Fescuegrass-clover	*	Calhoun

* Not cultivated.

TABLE 1.—DESCRIPTION OF INFILTRATION TEST SITES: SOIL NAME, TEXTURE, DEPTH AND SLOPE, SOIL MOISTURE CONTENT, CROPS GROWING OR LAND USE, PLOT PREPARATION, AND SITE LOCATIONS—Continued

Site No.	Soil series	Surface soil (A horizon) Texture	Depth	Slope	Subsoil (B horizon) Texture	Soil moisture	Crops growing or land use	Depth of cultivation	Site location (county)
			Inches	%				*Inches*	
27	Orangeburg	Loamy sand	14	2	Sandy loam	Dry	Grass-clover	*	Calhoun
28	Ocilla	Loamy fine sand	30	2	Sandy clay loam	Low	Lespedeza	*	Jasper
29	Georgeville	Silt loam	6	3	Silty clay	Moderate	Millet	4	Saluda
30	Wagram	Sand	30	2	Sandy loam	Low	Row crops	6	Sumter
31	Norfolk	Loamy sand	16	2	Sandy clay loam	Low	Cotton	4	Sumter
32	Herndon	Silt loam	10	3	Silty clay	Low	Fescuegrass-clover	*	Saluda
33	Alamance	Silt loam	10	5	Silt clay loam	Moderate	Carpetgrass	*	Saluda
34	Herndon	Silt loam	10	5	Silty clay	Low	Cotton	6	Saluda
35	Mecklenburg	Fine sandy loam	14	5	Clay loam	Low	Grass-clover	*	Greenwood
36	Mecklenburg	Sandy loam	5	5	Clay loam	Low	Corn	5	Greenwood
37	Iredell	Sandy loam	6	5	Clay	Low	Dallisgrass-lespedeza	*	Greenwood
38	Davidson	Sandy clay loam	10	5	Clay	Low	Dallisgrass-lespedeza	*	Greenwood
39	Helena	Loamy sand	7	5	Sandy clay loam	Low	Mixed grasses-lespedeza	*	Greenwood
40	Cecil	Sandy clay loam	3	3	Clay	Moderate	Fescuegrass-clover	*	Greenwood
41	Congaree	Loam	8	3	Loam	Moderate	Mixed grasses-clover	*	Greenwood
42	Georgeville	Silt loam	10	3	Silty clay	Moderate	Fescuegrass-clover	*	Saluda
43	Alamance	Silt loam	6	3	Silty clay	Moderate	Crabgrass	*	Saluda
44	Congaree	Silt loam	8	3	Silty clay	Moderate	Mixed grasses-clover	*	Saluda
45	Congaree	Silt loam	8	3	Loam	Moderate	Corn	5	Saluda
47	Orangeburg	Loamy sand	17	3	Sandy clay loam	Dry	Bermudagrass	*	Calhoun
48	Norfolk	Loamy sand	18	2	Sandy clay loam	Dry	Fescuegrass	*	Orangeburg
49	Izagora	Loamy fine sand	15	2	Sandy clay loam	Moderate	Carpetgrass	*	Orangeburg
50	Orangeburg	Loamy sand	16	3	Sandy clay loam	Dry	Fescuegrass	*	Orangeburg
51	Norfolk	Loamy sand	18	2	Sandy clay loam	Moderate	Forage crops	6	Allendale
52	Madison	Sandy loam	5	6	Clay	Moderate	Peaches	6	Cherokee
53	Tatum	Fine sandy loam	7	6	Silty clay	Dry	Fescuegrass-clover	*	Cherokee
54	Lockhart	Sandy loam	8	6	Sandy clay loam	Dry	Bermudagrass-clover	*	Union

55	Cecil	Sandy loam	5	3	Clay	Dry	Alfalfa	*	Laurens
56	Appling	Loamy sand	8	3	Sandy clay	Moderate	Crabgrass	*	Laurens
57	Congaree	Silt loam	8	2	Silt loam	Low	Mixed grasses-lespedeza	*	Greenwood
58	Cecil	Sandy loam	10	3	Clay	Low	Alfalfa	*	Newberry
59	Congaree	Fine sandy loam	8	3	Sandy clay loam	Moderate	Oat stubble	6	Kershaw
60	Wickham	Sandy loam	12	3	Sandy clay loam	Moderate	Alfalfa	*	Kershaw
62	Cecil	Loamy sand	6	3	Clay	Dry	Bermudagrass	*	Fairfield
63	Cecil	Loamy sand	6	3	Clay	Dry	Bermudagrass	6	Fairfield
64	Iredell	Loamy fine sand	8	3	Clay	Dry	Cotton	6	York
65	Iredell	Fine sandy loam	8	3	Clay	Dry	Mixed grasses	*	York
66	Iredell	Fine sandy loam	5	3	Clay	Dry	Row crops	6	York
67	Mecklenburg	Clay loam	5	5	Clay loam	Dry	Lespedeza	5	York
68	Davidson	Clay loam	6	3	Clay	Dry	Row crops	5	Anderson
69	Cecil	Clay loam	6	3	Clay	Dry	Row crops	6	Anderson
70	Cecil	Sandy clay loam	4	3	Clay	Dry	Bermuda-Dallisgrass	*	Anderson
71	Appling	Loamy sand	8	3	Sandy clay	Dry	Cotton	6	Anderson
72	Cecil	Sandy loam	6	3	Clay	Dry	Cotton	5	Anderson
73	Cecil	Sandy loam	8	3	Clay	Dry	Bermudagrass	*	Anderson
74	Helena	Loamy sand	8	4	Sandy clay loam	Low	Small grain-lespedeza	6	Newberry
75	Georgeville	Silt loam	6	3	Silty clay	Dry	Cotton	6	Saluda
76	Alamance	Silt loam	7	3	Silty clay	Dry	Corn	6	Saluda
77	Hayesville	Sandy loam	5	7	Clay	Moderate	Cotton	5	Oconee
78	Chewacla	Silt loam	7	3	....	Dry	Mixed grasses-clover	*	Abbeville
79	Chewacla	Silt loam	7	3	....	Low	Fescuegrass-clover	6	Abbeville
80	Mecklenburg	Clay loam	3	5	Clay	Dry	Bermudagrass	*	Abbeville
81	Cataula	Sandy loam	6	4	Clay	Dry	Cotton	6	Abbeville
82	Cataula	Sandy clay loam	5	4	Clay	Dry	Row crops	5	Abbeville
83	Cataula	Sandy loam	6	5	Clay	Dry	Bermudagrass	*	Abbeville
84	Cataula	Clay loam	4	5	Clay	Dry	Bermudagrass-lespedeza	*	Abbeville
85	Halewood	Loamy sand	8	7	Clay	Low	Bermudagrass-lespedeza	*	Oconee
86	Hayesville	Sandy loam	12	5	Clay	Dry	Row crops	5	Oconee
87	Cecil	Sandy loam	6	3	Clay	Dry	Row crops	6	Oconee
88	Flint	Sandy loam	6	3	Sandy clay	Low	Mixed grasses-clover	*	Richland
89	Leaf	Sandy loam	5	3	Sandy clay	Dry	Fescuegrass-clover	*	Richland

* Not Cultivated.

TABLE 2.—INFILTRATION RATES OF PIEDMONT SOILS DURING APPLICATION OF SIMULATED RAINFALL

Site No.	Soil type	Land use	Infiltration rates [1] during time intervals in minutes							
			0–6	6–9	9–12	12–18	18–30	30–42	42–60	60–90
			Inches per hour							
33	Alamance silt loam	Sod	2.37	0.46	0.23	0.24	0.11	0.07	0.05	. . .
43	Alamance silt loam	Sod	2.79	1.98	1.55	0.96	0.64	0.51	0.39	. . .
76	Alamance silt loam	Row crops	1.58+	0.26	0.23	0.17	0.14	0.18	0.17	. . .
56	Appling loamy sand	Sod	2.14+	2.14+	2.14+	2.14+	1.88	1.92	1.93	. . .
71	Appling loamy sand	Row crops	1.95+	1.95+	1.95+	1.95+	1.49	1.25	1.13	1.08
84	Cataula clay loam	Sod	2.28+	2.02	1.00	0.63	0.53	0.42	0.44	0.30
82	Cataula sandy clay loam	Row crops	1.67+	1.67+	1.67+	1.67+	0.85	0.49	0.45	0.39
81	Cataula sandy loam	Row crops	1.28+	1.28+	1.28+	1.13	0.51	0.35	0.32	0.27
83	Cataula sandy loam	Sod	2.17+	1.72	1.50	1.27	1.29	1.33	1.39	1.44
14	Cecil clay loam	Orchard [2]	2.09+	2.09+	2.09+	1.60	0.80	0.53	0.37	0.33
69	Cecil clay loam	Row crops	1.40+	1.40+	1.40+	1.40+	1.40+	1.40+	0.80	0.34
6	Cecil loamy sand	Orchard	2.27+	2.27+	2.27+	2.27+	2.27+	2.27+	2.27+	2.27+
7	Cecil loamy sand	Orchard [2]	2.15	0.85	0.81	0.62	0.59	0.63	0.62	. . .
13	Cecil loamy sand	Orchard [2]	2.48	1.38	0.96	0.74	0.59	0.51	0.49	. . .
62	Cecil loamy sand	Sod	2.22+	2.22+	2.22+	1.88	1.67	1.52	1.54	1.43
63	Cecil loamy sand	Sod [2]	2.11+	2.11+	1.96	1.22	0.88	0.75	0.66	0.60
12	Cecil sandy clay loam	Orchard [2]	2.95+	1.64	0.85	0.74	0.54	0.47	0.47	. . .
40	Cecil sandy clay loam	Sod	2.50	1.75	1.20	1.15	0.73	0.44	0.28	0.16
70	Cecil sandy clay loam	Sod	2.00+	2.00+	2.00+	2.00+	2.00+	1.63	0.89	0.68
5	Cecil sandy loam	Orchard [2]	2.36+	0.69	0.58	0.20	0.21	0.23	0.24	. . .
11	Cecil sandy loam	Orchard [2]	2.29	0.63	0.63	0.46	0.43	0.45	0.43	. . .
55	Cecil sandy loam	Sod	2.00	1.80	1.05	1.04	1.07	1.18	1.22	1.33
58	Cecil sandy loam	Sod	2.89+	2.89+	2.89+	2.86	2.52	1.44	0.84	0.71
72	Cecil sandy loam	Row crops	1.72+	1.72+	1.72+	1.03	0.81	0.63	0.52	0.51
73	Cecil sandy loam	Sod	1.57+	1.57+	1.57+	1.57+	1.57+	1.57+	1.57+	1.57+
87	Cecil sandy loam	Row crops	1.84+	1.84+	1.84+	1.18	0.59	0.44	0.33	0.31
78	Chewacla silt loam	Sod	2.26+	1.36	0.90	0.84	0.74	0.57	0.27	0.08
79	Chewacla silt loam	Sod [2]	1.98+	1.98+	1.98+	1.98+	1.47	0.91	0.64	. . .
59	Congaree fine sandy loam	Row crops	2.16+	1.06	0.62	0.40	0.37	0.31	0.34	0.29
41	Congaree loam	Sod	2.63+	2.57	2.30	2.12	1.76	1.48	1.18	. . .

44	Congaree silt loam	Sod	2.81	1.34	0.70	0.29	0.12	0.06	0.03	0.02
45	Congaree silt loam	Row crops	2.30	0.75	0.49	0.46	0.42	0.44	0.38	0.39
57	Congaree silt loam	Sod	1.59+	1.59+	1.59+	1.27	0.74	0.39	0.22	. . .
9	Davidson clay loam	Sod	2.50	1.08	0.92	0.65	0.46	0.42	0.33	. . .
68	Davidson clay loam	Row crops	1.02+	1.02+	1.02+	1.02+	1.02+	0.88	0.44	0.25
10	Davidson sandy clay loam	Orchard [2]	2.05+	2.05+	1.29	0.59	0.25	0.16	0.09	. . .
38	Davidson sandy clay loam	Sod	2.11+	2.05	1.63	1.36	0.71	0.32	0.25	0.16
8	Davidson sandy loam	Orchard [2]	2.38+	1.31	0.87	0.67	0.53	0.49	0.51	. . .
22	Durham loamy sand	Sod [2]	2.13+	2.13+	2.13+	2.13+	2.06	1.89	1.59	1.40
29	Georgeville silt loam	Row crops	0.93	0.80	0.52	0.38	0.29	0.22	0.18	0.14
42	Georgeville silt loam	Sod	2.46	1.69	0.93	0.69	0.42	0.34	0.27	0.27
75	Georgeville silt loam	Row crops	1.08+	1.08+	1.08+	1.08+	1.08+	0.70	0.70	0.55
85	Halewood loamy sand	Sod	1.50+	1.50+	1.50+	1.22	0.88	0.67	0.65	0.65
77	Hayesville sandy loam	Row crops	1.77+	1.77+	1.60	1.04	0.64	0.49	0.42	0.38
86	Hayesville sandy loam	Row crops	1.75+	1.75+	1.75+	1.75+	1.71	1.25	1.01	. . .
39	Helena loamy sand	Sod	2.39+	2.32	2.09	1.85	1.92	1.96	1.93	1.07
74	Helena loamy sand	Row crops	2.10+	2.10+	2.10+	2.10+	0.86	0.47	0.41	0.42
20	Herndon loam	Orchard	2.27+	2.26	2.26	2.18	1.96	1.19	0.45	. . .
25	Herndon silt loam	Orchard [2]	1.59	1.10	1.04	0.90	0.71	0.47	0.37	0.31
32	Herndon silt loam	Sod	2.49	0.61	0.51	0.44	0.54	0.22	0.21	0.17
34	Herndon silt loam	Row crops	1.55+	1.37	0.63	0.57	0.27	0.22	0.18	0.20
65	Iredell fine sandy loam	Sod	2.24+	2.24+	1.99	1.86	1.30	1.84	1.80	1.65
66	Iredell fine sandy loam	Row crops	2.41+	2.41+	2.41+	1.97	1.19	0.66	0.45	0.41
64	Iredell loamy fine sand	Row crops	1.88+	1.88+	1.82	1.46	1.16	0.87	0.78	0.67
21	Iredell sandy loam	Sod	2.22+	1.05	0.64	0.48	0.31	0.21	0.16	. . .
37	Iredell sandy loam	Sod	3.38	1.50	0.95	0.58	0.24	0.15	0.20	0.13
54	Lockhart sandy loam	Sod	1.94+	1.33	1.43	1.45	1.43	1.45	1.49	1.23
52	Madison sandy loam	Orchard [2]	2.35+	2.35+	1.82	1.39	1.01	0.71	0.53	0.45
67	Mecklenburg clay loam	Sod [2]	1.12+	1.12+	1.12+	1.12+	1.12+	1.12+	1.12+	1.15+
80	Mecklenburg clay loam	Sod	1.87+	1.87+	1.87+	1.87+	1.87+	1.87+	1.87+	1.87+
35	Mecklenburg fine sandy loam	Sod	1.65	1.80	2.19	2.16	2.14	2.08	2.06	. . .
36	Mecklenburg sandy loam	Row crops	2.21+	2.21+	1.85	1.42	0.77	0.56	0.54	0.44
53	Tatum fine sandy loam	Sod	2.98	1.39	2.15	0.34	0.11	0.10	0.04	0.02
60	Wickham sandy loam	Sod	1.17+	1.17+	1.17+	1.17+	1.17+	1.03	1.00	1.03

[1] "+" following a value indicates runoff had not occurred.

[2] Cultivated.

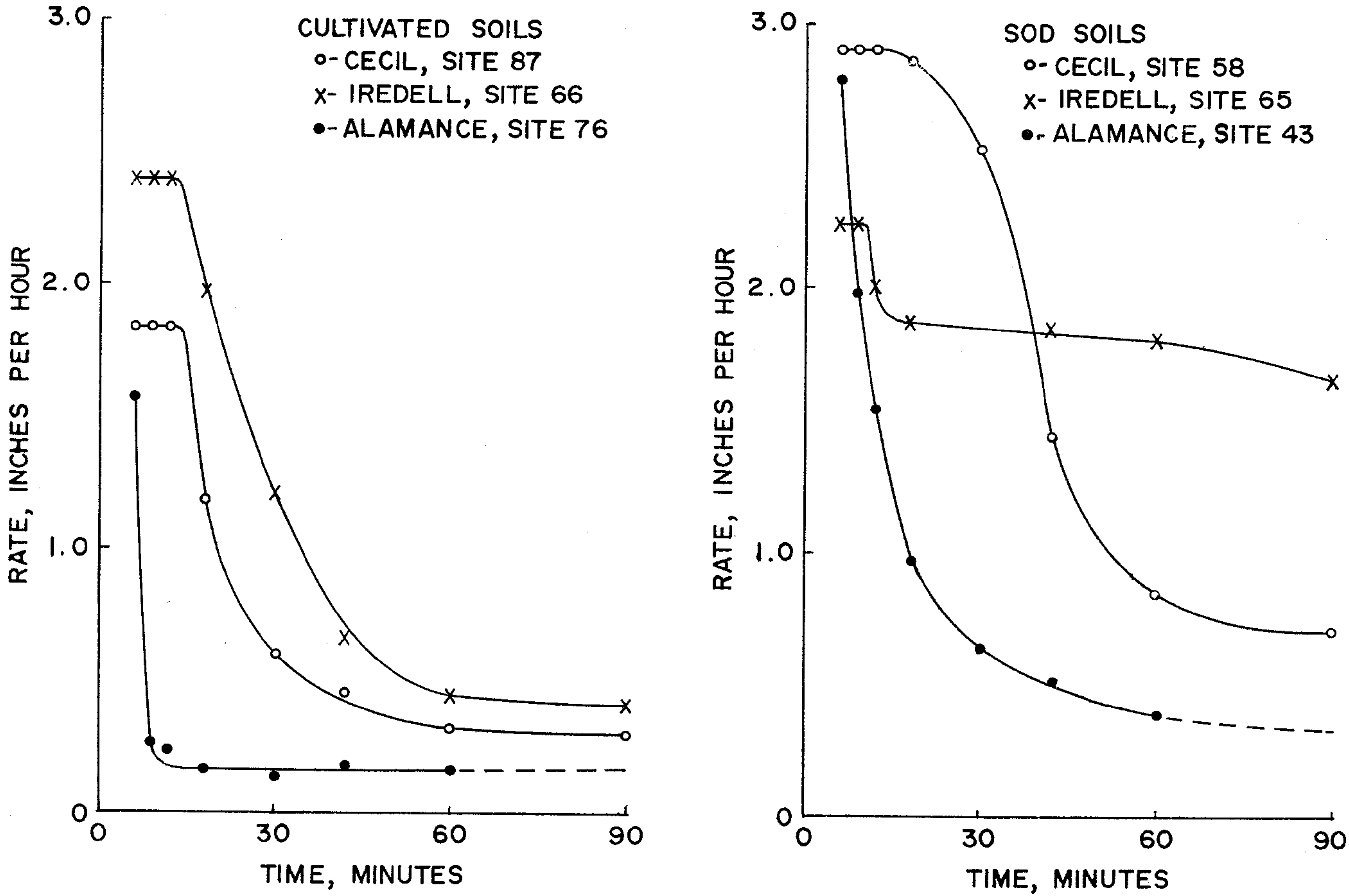

Figure 1.—The effects of lengths of time of water application on infiltration rates of Piedmont soils.

Infiltration rates of the Coastal Plain soils during fixed time intervals are presented in table 3. Rates of the Coastal Plain soils were generally higher than those of the Piedmont soils. The lowest rates were for the sod soils of sites 88 (Flint sandy loam), 49 (Izagora loamy fine sand), and 89 (Leaf sandy loam). Intensive grazing, when these soils were very wet, caused puddled and compacted surface soils, which lowered the intake rates. Figure 2 shows effects of lengths of time of water application on infiltration rates of typical Coastal Plain soils.

Cumulative Infiltration

Cumulative infiltrations of the Piedmont and Coastal Plain soils are shown in tables 4 and 5. The gross intake of most of the soils was greater than 0.75 surface inch during the first hour of application. Quantities of water absorbed by some of the Piedmont soils during the entire hour were 2 to 10 times larger than those that would have been absorbed if the water had been applied by sprinkler rates based on averages of the terminal rates measured between 30 and 60 minutes (table 2).

Cumulative infiltration during the first hour was related to types of soil parent materials. The average cumulative infiltration of the Piedmont soils derived from acidic crystalline rock was 1.36 inches; from basic rock, 1.18 inches; from mixed acidic and basic rocks, 1.36 inches; and from Carolina slate, 0.65 inch during the 1-hour period. The average gross intake of the terrace soils, Congaree and Chewacla, was 0.93 inch in the same period.

The average cumulative infiltration of the Coastal Plain upland soils was 1.66 inches of water in the first hour, about 50 percent greater than the amount that would have been absorbed if the water had been applied by sprinkler irrigation rates based on the rates measured during the 30- to 60-minute period (table 3). The terrace soils, Izagora, Leaf, and Flint, absorbed an average of 0.66 inch in this period.

Infiltration rates based on the cumulative infiltration of the Piedmont and Coastal Plain soils are shown in tables 6 and 7, respectively.

TABLE 3.—INFILTRATION RATES OF COASTAL PLAIN SOILS DURING APPLICATION OF SIMULATED RAINFALL

Site No.	Soil type	Land use	Infiltration rates [1] during time intervals in minutes						
			0–6	6–12	12–18	18–30	30–42	42–60	60–90
			Inches per hour						
26	Blaney loamy sand	Sod	1.76+	1.76+	1.70	1.08	0.98	0.97	1.27
2	Charleston loamy fine sand	Row crops	3.60+	3.34	2.07	1.38	1.19	1.05	...
23	Dunbar sandy loam	Row crops	2.36+	2.24	1.76	1.22	0.96	0.93	0.77
17	Edisto loamy fine sand	Row crops	1.91+	1.91+	1.21	0.95	0.82	0.69	...
15	Eulonia loamy fine sand	Row crops	1.38+	1.38+	0.80	0.57	0.49	0.46	...
18	Faceville loamy sand	Sod	2.77+	2.77+	2.00	1.40	1.19	1.13	...
88	Flint sandy loam	Sod	2.00+	1.63	1.00	0.63	0.30	0.18	0.15
49	Izagora loamy fine sand	Sod	1.97+	1.97+	1.34	0.36	0.25	0.18	0.17
89	Leaf sandy loam	Sod	2.06+	0.89	0.54	0.49	0.31	0.21	...
31	Norfolk loamy sand	Row crops	3.64+	2.32	1.70	1.39	1.27	1.20	1.21
48	Norfolk loamy sand	Sod	2.51+	2.09	2.16	2.20	2.30	2.39	...
51	Norfolk loamy sand	Row crops	3.78+	2.37	2.01	1.79	1.66	1.57	...
28	Ocilla loamy fine sand	Sod	2.06+	2.06+	2.06+	2.06+	2.06+	2.06+	...
47	Orangeburg loamy sand	Sod	2.50+	2.43	2.17	2.05	2.00	1.99	2.00
27	Orangeburg loamy sand	Sod	1.57+	1.57+	1.57+	1.57+	1.57+	2.86+	2.86+
50	Orangeburg loamy sand	Sod	1.98+	1.98+	1.98+	1.98+	1.98+	1.98+	...
24	Troup sand	Orchard [2]	3.45	2.86	2.76	2.67	2.50	2.39	2.28
1	Vaucluse sand	Row crops	3.12+	1.48	1.19	0.89	0.84	...	...
30	Wagram sand	Row crops	2.16+	2.16+	2.16+	2.16+	2.16+	2.16+	2.00
19	Wagram loamy sand	Sod	2.50+	1.87	1.64	1.64	1.71	1.98	...
3	Yonges loamy fine sand	Sod [2]	3.36+	0.98	0.78	0.65	0.69	0.71	...
4	Yonges loamy fine sand	Sod	3.47+	1.35	1.03	1.04	0.98	0.93	...
16	Yonges loamy fine sand	Row crops	1.63+	1.27	0.89	0.75	0.72	0.69	...

[1] "+" following a value indicates runoff had not occurred.

[2] Cultivated.

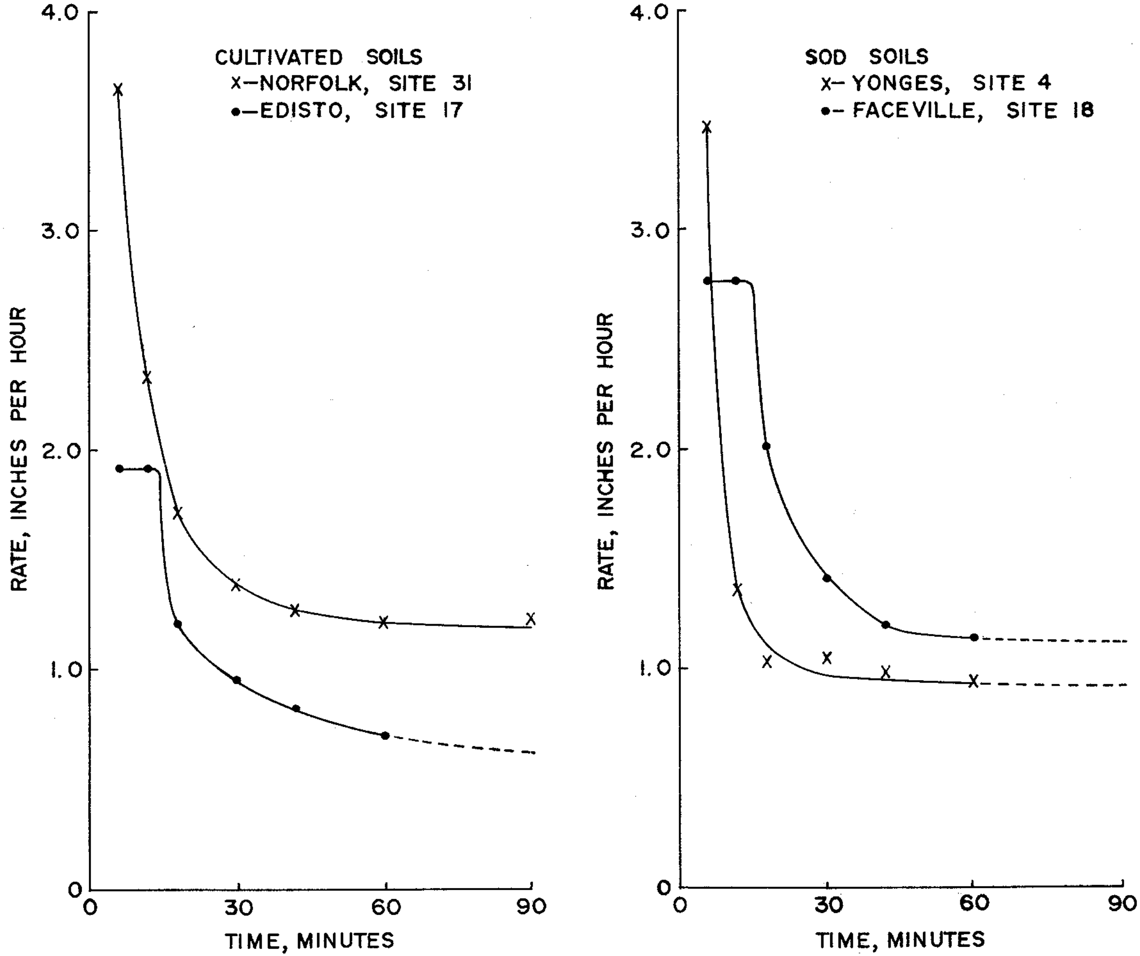

Figure 2.—The effects of lengths of time of water application on infiltration rates of Coastal Plain soils.

TABLE 4.—CUMULATIVE INFILTRATION OF PIEDMONT SOILS DURING APPLICATION OF SIMULATED RAINFALL

Site No.	Soil type	Land use	Infiltration at end of time intervals in minutes								Moisture penetration
			0–6	0–9	0–12	0–18	0–30	0–42	0–60	0–90	
			Inches								*Inches*
33	Alamance silt loam	Sod	0.24	0.27	0.28	0.30	0.32	0.33	0.35	. . .	3
43	Alamance silt loam	Sod	0.28	0.38	0.46	0.56	0.69	0.79	0.91	. . .	4
76	Alamance silt loam	Row crops	0.16	0.17	0.18	0.20	0.23	0.27	0.31	. . .	5
56	Appling loamy sand	Sod	0.21	0.32	0.43	0.64	1.02	1.40	1.98	. . .	12
71	Appling loamy sand	Row crops	0.20	0.30	0.40	0.60	0.90	1.15	1.49	2.03	14
84	Cataula clay loam	Sod	0.23	0.33	0.38	0.44	0.55	0.63	0.76	0.91	16
82	Cataula sandy clay loam	Row crops	0.17	0.25	0.33	0.50	0.67	0.77	0.91	1.11	9
81	Cataula sandy loam	Row crops	0.13	0.19	0.25	0.36	0.46	0.53	0.63	0.77	5
83	Cataula sandy loam	Sod	0.22	0.31	0.39	0.52	0.78	1.05	1.47	2.19	14
14	Cecil clay loam	Orchard [1]	0.21	0.31	0.41	0.57	0.73	0.84	0.95	1.12	. .
69	Cecil clay loam	Row crops	0.14	0.21	0.28	0.42	0.70	0.98	1.22	1.39	12
6	Cecil loamy sand	Orchard	0.23	0.34	0.45	0.68	1.13	1.58	2.26	3.40	. .
7	Cecil loamy sand	Orchard [1]	0.22	0.26	0.30	0.36	0.48	0.61	0.80	. . .	. .
13	Cecil loamy sand	Orchard [1]	0.25	0.32	0.37	0.44	0.56	0.66	0.81	. . .	. .
62	Cecil loamy sand	Sod	0.22	0.33	0.44	0.63	0.96	1.26	1.72	2.44	18
63	Cecil loamy sand	Sod [1]	0.21	0.32	0.42	0.54	0.72	0.87	1.07	1.37	8
12	Cecil sandy clay loam	Orchard [1]	0.30	0.38	0.42	0.49	0.60	0.69	0.83	. . .	. .
40	Cecil sandy clay loam	Sod	0.25	0.34	0.40	0.52	0.67	0.76	0.84	0.92	3
70	Cecil sandy clay loam	Sod	0.20	0.30	0.40	0.60	1.00	1.33	1.60	1.94	8
5	Cecil sandy loam	Orchard [1]	0.24	0.27	0.30	0.32	0.36	0.41	0.48	. . .	. .
11	Cecil sandy loam	Orchard [1]	0.23	0.26	0.29	0.34	0.43	0.52	0.65	. . .	. .
55	Cecil sandy loam	Sod	0.20	0.29	0.34	0.44	0.65	0.89	1.26	1.93	14
58	Cecil sandy loam	Sod	0.29	0.43	0.57	0.86	1.36	1.65	1.90	2.26	22
72	Cecil sandy loam	Row crops	0.17	0.26	0.35	0.45	0.61	0.74	0.90	1.16	5
73	Cecil sandy loam	Sod	0.16	0.24	0.32	0.48	0.79	1.10	1.57	2.36	14
87	Cecil sandy loam	Row crops	0.18	0.27	0.36	0.48	0.60	0.69	0.79	0.95	5
78	Chewacla silt loam	Sod	0.23	0.30	0.35	0.43	0.58	0.69	0.77	0.81	5
79	Chewacla silt loam	Sod [1]	0.20	0.30	0.40	0.60	0.89	1.07	1.26	. . .	12
59	Congaree fine sandy loam	Row crops	0.22	0.27	0.30	0.34	0.41	0.47	0.57	0.72	6

41	Congaree loam	Sod	0.26	0.39	0.51	0.72	1.07	1.37	1.72	. . .	6
44	Congaree silt loam	Sod	0.28	0.35	0.39	0.42	0.44	0.45	0.46	0.47	1
45	Congaree silt loam	Row crops	0.23	0.27	0.29	0.34	0.42	0.51	0.62	0.82	2
57	Congaree silt loam	Sod	0.16	0.24	0.32	0.45	0.60	0.68	0.75	. . .	4
9	Davidson clay loam	Sod	0.25	0.30	0.35	0.42	0.51	0.59	0.69	. . .	3
68	Davidson clay loam	Row crops	0.10	0.15	0.20	0.30	0.50	0.68	0.81	0.94	14
10	Davidson sandy clay loam	Orchard [1]	0.21	0.31	0.37	0.43	0.48	0.51	0.55	. . .	. .
38	Davidson sandy clay loam	Sod	0.21	0.31	0.39	0.53	0.67	0.73	0.81	0.89	. .
8	Davidson sandy loam	Orchard [1]	0.24	0.31	0.35	0.42	0.53	0.63	0.78	. . .	. .
22	Durham loamy sand	Sod [1]	0.21	0.32	0.43	0.64	1.05	1.43	1.91	2.61	8
29	Georgeville silt loam	Row crops	0.10	0.14	0.17	0.21	0.27	0.31	0.36	0.43	3
42	Georgeville silt loam	Sod	0.24	0.32	0.37	0.44	0.52	0.59	0.67	0.81	3
75	Georgeville silt loam	Row crops	0.11	0.16	0.21	0.32	0.54	0.68	0.89	1.17	8
85	Halewood loamy sand	Sod	0.15	0.23	0.31	0.43	0.61	0.74	0.94	1.27	9
77	Hayesville sandy loam	Row crops	0.18	0.27	0.35	0.45	0.58	0.68	0.81	1.00	7
86	Hayesville sandy loam	Row crops	0.18	0.27	0.36	0.54	0.88	1.13	1.43	. . .	10
39	Helena loamy sand	Sod	0.24	0.36	0.46	0.65	1.03	1.42	2.00	2.54	. .
74	Helena loamy sand	Row crops	0.21	0.32	0.43	0.64	0.81	0.90	1.02	1.23	11
20	Herndon loam	Orchard	0.23	0.34	0.45	0.67	1.06	1.30	1.44	. . .	8
25	Herndon silt loam	Orchard [1]	0.16	0.22	0.27	0.36	0.50	0.59	0.70	0.86	. .
32	Herndon silt loam	Sod	0.25	0.28	0.31	0.35	0.46	0.50	0.56	0.65	. .
34	Herndon silt loam	Row crops	0.16	0.23	0.26	0.32	0.37	0.41	0.46	0.56	. .
65	Iredell fine sandy loam	Sod	0.22	0.33	0.43	0.62	0.88	1.25	1.79	2.62	. .
66	Iredell fine sandy loam	Row crops	0.24	0.36	0.48	0.68	0.92	1.05	1.19	1.40	. .
64	Iredell loamy fine sand	Row crops	0.19	0.28	0.37	0.52	0.75	0.92	1.15	1.49	. .
21	Iredell sandy loam	Sod	0.22	0.27	0.30	0.35	0.41	0.45	0.50	. . .	3
37	Iredell sandy loam	Sod	0.34	0.42	0.47	0.53	0.58	0.61	0.67	0.74	. .
54	Lockhart sandy loam	Sod	0.19	0.26	0.33	0.48	0.77	1.06	1.51	2.13	15
52	Madison sandy loam	Orchard [1]	0.24	0.36	0.45	0.59	0.79	0.93	1.09	1.32	15
67	Mecklenburg clay loam	Sod [1]	0.11	0.16	0.22	0.33	0.55	0.77	1.87	2.45	5
80	Mecklenburg clay loam	Sod	0.19	0.28	0.37	0.56	0.93	1.30	1.86	2.80	20
35	Mecklenburg fine sandy loam	Sod	0.17	0.26	0.37	0.59	1.02	1.44	2.06	. . .	. .
36	Mecklenburg sandy loam	Row crops	0.22	0.33	0.42	0.56	0.71	0.82	0.98	1.20	. .
53	Tatum fine sandy loam	Sod	0.29	0.37	0.48	0.51	0.53	0.55	0.56	0.57	5
60	Wickham sandy loam	Sod	0.12	0.18	0.24	0.36	0.61	0.81	1.11	1.62	. .

[1] Cultivated.

TABLE 5.—CUMULATIVE INFILTRATION OF COASTAL PLAIN SOILS DURING APPLICATION OF SIMULATED RAINFALL

Site No.	Soil type	Land use	Infiltration at end of time intervals in minutes							Moisture penetration
			0–6	0–12	0–18	0–30	0–42	0–60	0–90	
			Inches							Inches
26	Blaney loamy sand	Sod	0.18	0.35	0.52	0.74	0.93	1.23	1.86	26
2	Charleston loamy fine sand	Row crops	0.36	0.69	0.90	1.16	1.40	1.71	...	..
23	Dunbar sandy loam	Row crops	0.23	0.45	0.63	0.87	1.07	1.35	1.73	8
17	Edisto loamy fine sand	Row crops	0.18	0.38	0.50	0.69	0.84	1.04	...	..
15	Eulonia loamy fine sand	Row crops	0.13	0.28	0.36	0.47	0.57	0.69	...	..
18	Faceville loamy sand	Sod	0.28	0.55	0.75	1.03	1.27	1.61	...	..
88	Flint sandy loam	Sod	0.20	0.36	0.46	0.59	0.65	0.70	0.78	6
49	Izagora loamy fine sand	Sod	0.20	0.39	0.53	0.60	0.65	0.70	0.79	14
89	Leaf sandy loam	Sod	0.21	0.30	0.35	0.45	0.51	0.57	...	4
31	Norfolk loamy sand	Row crops	0.36	0.60	0.77	1.04	1.30	1.66	2.26	..
48	Norfolk loamy sand	Sod	0.25	0.46	0.68	1.12	1.58	2.29	...	20
51	Norfolk loamy sand	Row crops	0.38	0.62	0.82	1.18	1.51	1.97	...	24
28	Ocilla loamy fine sand	Sod	0.21	0.41	0.62	1.03	1.44	2.06	...	..
47	Orangeburg loamy sand	Sod	0.25	0.49	0.71	1.12	1.52	2.12	3.12	18
27	Orangeburg loamy sand	Sod	0.16	0.31	0.47	0.79	1.10	1.96	3.39	60
50	Orangeburg loamy sand	Sod	0.20	0.40	0.59	0.99	1.39	1.98	...	24
24	Troup sand	Orchard[1]	0.35	0.63	0.91	1.44	1.94	2.66	3.80	..
1	Vaucluse sand	Row crops	0.31	0.46	0.58	0.76	0.93	...	...	..
19	Wagram loamy sand	Sod	0.25	0.44	0.60	0.93	1.27	1.87	...	..
30	Wagram sand	Row crops	0.22	0.43	0.65	1.08	1.51	2.16	2.17	..
3	Yonges loamy fine sand	Sod[1]	0.34	0.43	0.51	0.64	0.78	0.99	...	..
4	Yonges loamy fine sand	Sod	0.35	0.48	0.59	0.79	0.99	1.27	...	..
16	Yonges loamy fine sand	Row crops	0.16	0.29	0.38	0.53	0.67	0.88	...	..

1 Cultivated.

TABLE 6.—INFILTRATION RATES OF PIEDMONT SOILS BASED ON CUMULATIVE INFILTRATION

Site No.	Soil type	Land use	Infiltration rates during time intervals in minutes: 0–6	0–9	0–12	0–18	0–30	0–42	0–60	0–90
			Inches per hour							
33	Alamance silt loam	Sod	2.37	1.80	1.40	1.00	0.64	0.47	0.35	. . .
43	Alamance silt loam	Sod	2.79	2.53	2.30	1.87	1.38	1.13	0.91	. . .
76	Alamance silt loam	Row crops	1.58	1.13	0.90	0.67	0.46	0.39	0.31	. . .
56	Appling loamy sand	Sod	2.14	2.13	2.15	2.13	2.04	2.00	1.98	. . .
71	Appling loamy sand	Row crops	1.95	2.00	2.00	2.00	1.80	1.64	1.49	1.35
84	Cataula clay loam	Sod	2.28	2.20	1.90	1.47	1.10	0.90	0.76	0.61
82	Cataula sandy clay loam	Row crops	1.67	1.67	1.65	1.67	1.34	1.10	0.91	0.74
81	Cataula sandy loam	Row crops	1.28	1.72	1.25	1.20	0.92	0.76	0.63	0.52
83	Cataula sandy loam	Sod	2.17	2.07	1.95	1.73	1.56	1.50	1.47	1.47
14	Cecil clay loam	Orchard [1]	2.09	2.07	2.05	1.90	1.46	1.20	0.95	0.75
69	Cecil clay loam	Row crops	1.40	1.40	1.40	1.40	1.40	1.40	1.22	0.93
6	Cecil loamy sand	Orchard	2.27	2.27	2.25	2.27	2.26	2.26	2.26	2.28
7	Cecil loamy sand	Orchard [1]	2.15	1.73	1.50	1.20	0.96	0.87	0.80	. . .
13	Cecil loamy sand	Orchard [1]	2.48	2.13	1.85	1.47	1.12	0.94	0.81	. . .
62	Cecil loamy sand	Sod	2.22	2.20	2.20	2.10	1.92	1.80	1.72	1.63
63	Cecil loamy sand	Sod [1]	2.11	2.13	2.10	1.80	1.44	1.24	1.07	0.92
12	Cecil sandy clay loam	Orchard [1]	2.95	2.53	2.10	1.63	1.20	0.99	0.83	. . .
40	Cecil sandy clay loam	Sod	2.50	2.27	2.00	1.73	1.34	1.09	0.84	0.62
70	Cecil sandy clay loam	Sod	2.00	2.00	2.00	2.00	2.00	1.90	1.60	1.30
5	Cecil sandy loam	Orchard [1]	2.36	1.80	1.50	1.07	0.72	0.59	0.48	. . .
11	Cecil sandy loam	Orchard [1]	2.29	1.73	1.45	1.13	0.86	0.74	0.65	. . .
55	Cecil sandy loam	Sod	2.00	1.93	1.70	1.47	1.30	1.27	1.26	1.29
58	Cecil sandy loam	Sod	2.89	2.87	2.85	2.87	2.72	2.36	1.90	1.51
72	Cecil sandy loam	Row crops	1.72	1.73	1.75	1.50	1.22	1.06	0.90	0.78
73	Cecil sandy loam	Sod	1.57	1.60	1.60	1.60	1.58	1.57	1.57	1.57
87	Cecil sandy loam	Row crops	1.84	1.80	1.80	1.60	1.20	0.99	0.79	0.64
78	Chewacla silt loam	Sod	2.26	2.00	1.75	1.43	1.16	0.99	0.77	0.54
79	Chewacla silt loam	Sod [1]	1.98	2.00	2.00	2.00	1.78	1.53	1.26	. . .
59	Congaree fine sandy loam	Row crops	2.16	1.80	1.50	1.13	0.82	0.67	0.57	0.48
41	Congaree loam	Sod	2.63	2.60	2.55	2.40	2.14	1.96	1.72	. . .
44	Congaree silt loam	Sod	2.81	2.33	1.95	1.40	0.88	0.64	0.46	0.31

[1] Cultivated.

TABLE 6.—INFILTRATION RATES OF PIEDMONT SOILS BASED ON CUMULATIVE INFILTRATION—Continued

Site No.	Soil type	Land use	Infiltration rates during time intervals in minutes							
			0–6	0–9	0–12	0–18	0–30	0–42	0–60	0–90
			Inches per hour							
45	Congaree silt loam	Row crops	2.30	1.80	1.45	1.13	0.84	0.73	0.62	0.55
57	Congaree silt loam	Sod	1.59	1.60	1.60	1.50	1.20	0.97	0.75	. . .
9	Davidson clay loam	Sod	2.50	2.00	1.75	1.40	1.02	0.84	0.69	. . .
68	Davidson clay loam	Row crops	1.02	1.00	1.00	1.00	1.00	0.97	0.81	0.63
10	Davidson sandy clay loam	Orchard [1]	2.05	2.07	1.85	1.43	0.96	0.73	0.55	. . .
38	Davidson sandy clay loam	Sod	2.11	2.07	1.95	1.77	1.34	1.04	0.81	0.60
8	Davidson sandy loam	Orchard [1]	2.38	2.07	1.75	1.40	1.06	0.90	0.78	. . .
22	Durham loamy sand	Sod [1]	2.13	2.13	2.15	2.13	2.10	2.04	1.91	1.75
29	Georgeville silt loam	Row crops	1.01	0.93	0.85	0.70	0.54	0.44	0.36	0.29
42	Georgeville silt loam	Sod	2.36	2.13	1.85	1.47	1.04	0.84	0.67	0.54
75	Georgeville silt loam	Row crops	1.08	1.07	1.05	1.07	1.08	0.97	0.89	0.78
85	Halewood loamy sand	Sod	1.50	1.53	1.55	1.43	1.22	1.06	0.94	0.85
77	Hayesville sandy loam	Row crops	1.77	1.80	1.75	1.50	1.16	0.97	0.81	0.67
86	Hayesville sandy loam	Row crops	1.75	1.80	1.80	1.80	1.76	1.61	1.43	. . .
39	Helena loamy sand	Sod	2.39	2.40	2.30	2.17	2.06	2.03	2.00	1.69
74	Helena loamy sand	Row crops	2.10	2.13	2.15	2.13	1.62	1.29	1.02	0.82
20	Herndon loam	Orchard	2.27	2.27	2.25	2.23	2.12	1.86	1.44	. . .
25	Herndon silt loam	Orchard [1]	1.59	1.47	1.35	1.20	1.00	0.84	0.70	0.58
32	Herndon silt loam	Sod	2.49	1.87	1.55	1.17	0.92	0.71	0.56	0.44
34	Herndon silt loam	Row crops	1.55	1.53	1.30	1.07	0.74	0.59	0.46	0.38
65	Iredell fine sandy loam	Sod	2.24	2.20	2.15	2.07	1.76	1.79	1.79	1.75
66	Iredell fine sandy loam	Row crops	2.41	2.40	2.40	2.27	1.84	1.50	1.19	0.93
64	Iredell loamy fine sand	Row crops	1.88	1.87	1.85	1.73	1.50	1.31	1.15	0.99
21	Iredell sandy loam	Sod	2.22	1.80	1.50	1.17	0.82	0.64	0.50	. . .
37	Iredell sandy loam	Sod	3.38	2.80	2.35	1.77	1.16	0.87	0.67	0.49
54	Lockhart sandy loam	Sod	1.94	1.73	1.65	1.60	1.54	1.51	1.51	1.42
52	Madison sandy loam	Orchard [1]	2.35	2.40	2.25	1.96	1.58	1.33	1.09	0.88
67	Mecklenburg clay loam	Sod [1]	1.12	1.06	1.10	1.10	1.10	1.10	1.87	1.64
80	Mecklenburg clay loam	Sod	1.87	1.87	1.85	1.86	1.86	1.86	1.86	1.88
35	Mecklenburg fine sandy loam	Sod	1.65	1.73	1.85	1.96	2.04	2.06	2.06	. . .
36	Mecklenburg sandy loam	Row crops	2.21	2.20	2.10	1.87	1.42	1.17	0.98	0.80
53	Tatum fine sandy loam	Sod	2.98	2.47	2.40	1.70	1.06	0.79	0.56	0.38
60	Wickham sandy loam	Sod	1.17	1.20	1.20	1.20	1.22	1.16	1.11	1.09

[1] Cultivated.

TABLE 7.—INFILTRATION RATES OF COASTAL PLAIN SOILS BASED ON CUMULATIVE INFILTRATION

Site No.	Soil type	Land use	Infiltration rates during time intervals in minutes						
			0–6	0–12	0–18	0–30	0–42	0–60	0–90
			Inches per hour						
26	Blaney loamy sand	Sod	1.76	1.75	1.73	1.48	1.33	1.23	1.24
2	Charleston loamy fine sand	Row crops	3.60	3.45	3.00	2.34	2.00	1.71	. . .
23	Dunbar sandy loam	Row crops	2.36	2.30	2.13	1.76	1.53	1.35	1.15
17	Edisto loamy fine sand	Row crops	1.91	1.90	1.67	1.38	1.22	1.04	. . .
15	Eulonia loamy fine sand	Row crops	1.38	1.40	1.20	0.94	0.82	0.69	. . .
18	Faceville loamy sand	Sod	2.77	2.75	2.50	2.06	1.81	1.61	. . .
88	Flint sandy loam	Sod	2.00	1.80	1.53	1.18	0.93	0.70	0.52
49	Izagora loamy fine sand	Sod	1.97	1.95	1.77	1.20	0.93	0.70	0.53
89	Leaf sandy loam	Sod	2.06	1.50	1.17	0.90	0.73	0.57	. . .
31	Norfolk loamy sand	Row crops	3.64	3.00	2.57	2.08	1.86	1.66	1.51
48	Norfolk loamy sand	Sod	2.51	2.30	2.27	2.24	2.26	2.29	. . .
51	Norfolk loamy sand	Row crops	2.78	3.10	2.73	2.36	2.16	1.97	. . .
28	Ocilla loamy fine sand	Sod	2.06	2.05	2.07	2.06	2.06	2.06	. . .
47	Orangeburg loamy sand	Sod	2.50	2.45	2.37	2.24	2.17	2.12	2.08
27	Orangeburg loamy sand	Sod	1.57	1.55	1.57	1.58	1.57	1.96	2.27
50	Orangeburg loamy sand	Sod	1.98	2.00	1.97	1.98	1.99	1.98	. . .
24	Troup sand	Orchard [1]	3.45	3.15	3.03	2.88	2.77	2.66	2.53
1	Vaucluse sand	Row crops	3.12	2.30	1.93	1.52	1.33	. . .	. . .
19	Wagram loamy sand	Sod	2.50	2.20	2.00	1.86	1.81	1.87	. . .
30	Wagram sand	Row crops	2.16	2.15	2.17	2.16	2.16	2.16	1.45
3	Yonges loamy fine sand	Sod [1]	3.36	2.15	1.70	1.28	1.11	0.99	. . .
4	Yonges loamy fine sand	Sod	3.47	2.40	1.97	1.58	1.41	1.27	. . .
16	Yonges loamy fine sand	Row crops	1.63	1.45	1.27	1.06	0.96	0.88	. . .

[1] Cultivated.

Factors Affecting Infiltration

The infiltration rates were measured when the soil moisture ranged from moderate to dry. The subsoils were unsaturated and could absorb considerable moisture. Under these conditions, infiltration rates were influenced, principally, by the physical properties of the surface soils, the kind and density of the plant cover growing on the soil, and the amount of plant residues on the soil or mixed with the surface soil. The infiltration rates of clean-tilled soils of this region usually are governed by surface sealing when the subsoil is relatively dry and permeability of the soil profile is not a limiting factor. Surface sealing is affected by soil texture, degree of aggregation, stability of soil aggregates, kind and amount of clay minerals, compaction, and the amount, intensity, and drop size of the rainfall.

Soil Texture.—The relations of the surface soil textures to infiltration rates of the Piedmont and Coastal Plain soils are shown in tables 8 and 9. The 0- to 60-minute rates of the Piedmont row-crop and sod soils were markedly affected by texture. Texture had little influence on the rates of the Piedmont orchard soils. Correlation coefficients of rates and silt plus clay contents for the row-crop Piedmont and Coastal Plain soils were —0.73 and —0.90, respectively. Both were significant at the 1-percent level. The regression

TABLE 8.—THE RELATION OF TEXTURES TO INFILTRATION RATES OF PIEDMONT SOILS

Textural classification	Average infiltration rates during first hour		
	Row crops	Sods	Orchards
	Inches per hour		
Loamy sand	1.39	1.54	0.81
Sandy loam	0.96	1.31	0.75
Sandy clay loam	0.91	1.08	0.71
Clay loam	1.01	0.73	. . .
Silt loam	0.65	0.69	. . .

TABLE 9.—THE RELATION OF TEXTURES TO INFILTRATION RATES OF COASTAL PLAIN SOILS

Textural classification	Average infiltration rates during first hour	
	Row crops	Sods
	Inches per hour	
Sand	2.05	. . .
Loamy sand	1.75	1.91
Loamy fine sand	1.06	1.34
Sandy loam	1.35	0.64

equations for the row-crop soils were: $Y = 1.42 - 0.0098X$ (Piedmont) and $Y = 3.22 - 0.0094X$ (Coastal Plain). The correlation coefficient of the Piedmont sod soil rates and silt plus clay contents was —0.56, significant at the 5-percent level, and the regression equation was $Y = 1.91 - 0.0144X$. Y is the estimated 0- to 60-minute rate and X is the percent silt plus clay. The sample regression coefficients, 0.0098, 0.0940, and 0.0144, were significant at the 5-percent level. The correlation of rates and silt plus clay contents of the Coastal Plain sod soils was not significant. The correlations of rates and clay contents of the Piedmont and Coastal Plain cultivated and sod soils were not significant.

These data indicate that the silt and clay in combination influence infiltration rates to a greater extent than the clay contents alone. Peele *et al.* (7) reported that infiltration rates of sands and loamy sands decreased as the sand content decreased from 99 to 78 percent.

Land Use and Tillage.—The relations of land uses to infiltration rates during the first hour of testing are presented in table 10. Land use substantially affected rates of water intake of the Piedmont soils but had minor effects on the rates of the sandy Coastal Plain soils. Comparisons of rates of sites 6 and 7 (Cecil loamy sands) illustrate the effects of land use and management on water intake. Both sites were in the same orchard; and conditions were approximately the same when the tests were conducted, except that a cover crop of ladino clover was growing on the soil of site 6. The intial rate of site 6 (with clover) during the 0- to 6-minute period was 2.27 inches per hour and that of site 7 (bare, cultivated, without clover) was 2.15 inches per hour (table 2). At the end of 1 hour, the rate of the site 6 soil was 2.26 inches per hour and that of the site 7 soil was 0.80 inch per hour (table 4).

Other experimental results have shown that infiltration rates of soils on which nongrazed covers are growing are much higher and runoff lower than those of clean-cultivated areas of similar soils.

TABLE 10.—THE RELATIONS OF LAND USES TO INFILTRATION RATES

Land use	Average infiltration rates during first hour	
	Piedmont soils	Coastal Plain soils
	Inches per hour	
Sods	1.19	1.49
Orchards	0.95	. . .
Row crops	0.87	1.42

Intensive grazing when sod soils are wet causes compaction, which materially influences infiltration. The low infiltration rates of the soils of sites 9, 49, 88, and 89 reflect the effects of such compaction. Rates of soils that contain colloids, which shrink and swell greatly when dried and wetted, may not be affected substantially by compaction due to heavy grazing. However, compaction probably causes considerable reduction of infiltration rates of most pasture soils of South Carolina.

Tables 11, 12, and 13 are summary arrangements of the infiltration data that will facilitate comparisons of rates and cumulative infiltration of different soil types under similar cover and tillage conditions.

Infiltration data of the cultivated soils that had been clean tilled for a number of years are shown in table 11. Rates were in the same general order as those of table 8. Cumulative infiltration in 1 hour and rates during the 18- to 30-minute and 42- to 60-minute periods of the sands and loamy sands, most of which were Coastal Plain soils, were highest, and those of the silt loams were lowest, excepting some soil types that were affected by other factors. Total infiltration in 1 hour ranged from 0.31 to 2.16 inches.

The infiltration values of soils in which cover crops or sods were incorporated immediately before infiltration measurements are shown in table 12. During the first hour, the lowest total infiltration of these soil types was 0.99 inch, whereas the values of most of the clean-tilled soils (table 11) were between 0.31 and 0.98 inch. However, this comparison is based on 8 cultivated sod and cover-crop soils, and 36 clean-tilled soils.

Total infiltration in 1 hour and infiltration rates of undisturbed soils on which sods, cover crops, or forage crops were growing are shown in table 13. The total infiltration during the first hour varied from 0.35 to 2.29 inches. About half of these soils absorbed less than 1.0 inch of water in 1 hour. The infiltration rates of some similar soil types varied considerably. The major differences among rates of the similar soil types probably were due to degree of compaction, kind and amount of vegetative cover, antecedent soil moisture, and other factors.

Physical and Chemical Properties of Surface Soils.—The physical and chemical properties of the Piedmont and Coastal Plain soils are listed in tables 14 and 15. Although the soils of all sites were not analyzed, those given are typical of the major soils of South Carolina. Organic matter contents of the Piedmont and the Coastal

Plain soils ranged from about 1 to 3 percent. Organic matter contents had no consistent effects on infiltration rates of either the Piedmont or Coastal Plain soils. The pH of the Piedmont and Coastal Plain soils averaged about 6.0, and any effects of pH on rates were not conclusive. In general, the infiltration rates increased as the available water capacity decreased. However, this relationship probably reflects textural differences, and the amounts and types of colloids in the soils. The correlation coefficient, r = —0.41, was significant at the 5-percent level.

TABLE 11.—TOTAL INFILTRATION AND INFILTRATION RATES OF CLEAN-TILLED CULTIVATED SOILS

Site No.	Soil type	Total infiltration in 1 hour	Infiltration rates[1] during time intervals in minutes 18–30	42–60
		Inches	*— Inches per hour —*	
30	Wagram sand	2.16	2.16+	2.16+
2	Charleston loamy fine sand	1.71	1.38	1.05
31	Norfolk loamy sand	1.66	1.39	1.20
71	Appling loamy sand	1.49	1.49	1.13
86	Hayesville sandy loam	1.43	1.71	1.01
23	Dunbar sandy loam	1.35	1.22	0.93
69	Cecil clay loam	1.22	1.40	0.80
1	Vaucluse sand	1.20	0.89	0.80
66	Iredell fine sandy loam	1.19	1.19	0.45
64	Iredell loamy fine sand	1.15	1.16	0.78
52	Madison sandy loam	1.09	1.01	0.53
17	Edisto loamy fine sand	1.04	0.95	0.69
36	Mecklenburg sandy loam	0.98	0.77	0.54
14	Cecil clay loam	0.95	0.80	0.37
82	Cataula sandy clay loam	0.91	0.85	0.45
72	Cecil sandy loam	0.90	0.81	0.52
75	Georgeville silt loam	0.89	1.08+	0.70
16	Yonges loamy fine sand	0.88	0.75	0.69
12	Cecil sandy clay loam	0.83	0.54	0.47
13	Cecil loamy sand	0.81	0.59	0.49
77	Hayesville sandy loam	0.81	0.64	0.42
68	Davidson clay loam	0.81	1.02+	0.44
7	Cecil loamy sand	0.80	0.59	0.62
87	Cecil sandy loam	0.79	0.59	0.33
8	Davidson sandy loam	0.78	0.53	0.51
25	Herndon silt loam	0.70	0.71	0.37
15	Eulonia loamy fine sand	0.69	0.57	0.46
11	Cecil sandy loam	0.65	0.43	0.43
81	Cataula sandy loam	0.63	0.51	0.32
45	Congaree silt loam	0.62	0.37	0.34
59	Congaree fine sandy loam	0.57	0.42	0.38
10	Davidson sandy clay loam	0.55	0.25	0.09
5	Cecil sandy loam	0.48	0.21	0.24
34	Herndon silt loam	0.46	0.27	0.18
29	Georgeville silt loam	0.36	0.29	0.18
76	Alamance silt loam	0.31	0.11	0.05

1 "+" following a value indicates runoff had not occurred.

TABLE 12.—TOTAL INFILTRATION AND INFILTRATION RATES OF CULTIVATED SOILS WITH COVER CROPS OR SODS TURNED UNDER IMMEDIATELY PRECEDING THE INFILTRATION TEST

Site No.	Soil type	Total infiltration in 1 hour	Infiltration rates [1] during time intervals in minutes	
			18–30	42–60
		Inches	*— Inches per hour —*	
24	Troup sand	2.66	2.67	2.39
51	Norfolk loamy sand	1.97	1.79	1.57
22	Durham loamy sand	1.91	2.06	1.59
67	Mecklenburg clay loam	1.87	1.12+	1.12+
79	Chewacla silt loam	1.26	1.47	0.64
63	Cecil loamy sand	1.07	0.88	0.66
74	Helena loamy sand	1.02	0.86	0.41
3	Yonges loamy fine sand	0.99	0.65	0.71

[1] "+" following a value indicates runoff had not occurred.

TABLE 13.—TOTAL INFILTRATION AND INFILTRATION RATES OF SOILS WITH UNDISTURBED SOD COVER

Site No.	Soil type	Total infiltration in 1 hour	Infiltration rates [1] during time intervals in minutes	
			18–30	42–60
		Inches	*— Inches per hour —*	
48	Norfolk loamy sand	2.29	2.20	2.39
6	Cecil loamy sand	2.26	2.27+	2.27
47	Orangeburg loamy sand	2.12	2.05	1.99
28	Edisto loamy fine sand	2.06	2.06+	2.06+
35	Mecklenburg fine sandy loam	2.06	2.14	2.06
39	Helena loamy sand	2.00	1.92	1.93
50	Ruston loamy sand	1.98	1.98+	1.98+
56	Appling loamy sand	1.98	1.88	1.93
27	Ruston loamy sand	1.96	1.57+	2.86+
58	Cecil sandy loam	1.90	2.52	0.84
19	Norfolk loamy sand	1.87	1.64	1.98
80	Mecklenburg clay loam	1.86	1.87+	1.87+
65	Iredell fine sandy loam	1.79	1.30	1.80
41	Congaree loam	1.72	1.76	1.18
62	Cecil loamy sand	1.72	1.67	1.54
18	Faceville loamy sand	1.61	1.40	1.13
70	Cecil sandy clay loam	1.60	2.00+	0.89
73	Cecil sandy loam	1.57	1.57+	1.57+
54	Lockhart sandy loam	1.51	1.43	1.49
83	Cataula sandy loam	1.47	1.29	1.39
20	Herndon loam	1.44	1.96	0.45
4	Weston loamy fine sand	1.27	1.04	0.93
55	Cecil sandy loam	1.26	1.07	1.22
26	Vaucluse loamy sand	1.23	1.08	0.97
60	Wickham sandy loam	1.11	1.17+	1.00
85	Halewood loamy sand	0.94	0.88	0.65
43	Alamance silt loam	0.91	0.64	0.39
40	Cecil sandy clay loam	0.84	0.73	0.28
38	Davidson sandy clay loam	0.81	0.71	0.25
78	Chewacla silt loam	0.77	0.74	0.27
84	Cataula clay loam	0.76	0.53	0.44

[1] "+" following a value indicates runoff had not occurred.

TABLE 13.—TOTAL INFILTRATION AND INFILTRATION RATES OF SOILS WITH UNDISTURBED SOD COVER—Continued

Site No.	Soil type	Total infiltration in 1 hour	Infiltration rates [1] during time intervals in minutes	
			18–30	42–60
		Inches	— *Inches per hour* —	
57	Congaree silt loam	0.75	0.74	0.22
49	Izagora loamy fine sand	0.70	0.36	0.18
88	Flint sandy loam	0.70	0.63	0.18
9	Lloyd clay loam	0.69	0.46	0.33
42	Georgeville silt loam	0.67	0.42	0.27
37	Iredell sandy loam	0.67	0.24	0.20
89	Leaf sandy loam	0.57	0.49	0.21
32	Herndon silt loam	0.56	0.54	0.21
53	Tatum fine sandy loam	0.56	0.11	0.04
21	Iredell sandy loam	0.50	0.31	0.16
44	Congaree silt loam	0.46	0.12	0.03
33	Alamance silt loam	0.35	0.11	0.05

TABLE 14.—PHYSICAL AND CHEMICAL PROPERTIES OF THE SURFACE LAYERS OF PIEDMONT SOILS

Site No.	Soil type	Mechanical analysis			Moisture at field capacity	Moisture at wilting point	Organic matter	pH
		Sand	Silt	Clay				
		%	%	%	%	%	%	
33	Alamance silt loam	25.7	67.1	7.2	21.89	10.40	4.79	6.32
43	Alamance silt loam	22.9	71.9	5.2	18.20	4.56	2.15	5.96
76	Alamance silt loam	8.4	79.1	12.5	21.64	6.82	1.39	5.63
56	Appling loamy sand	77.3	16.0	6.7	11.31	3.79	1.49	6.51
71	Appling loamy sand	85.4	9.0	5.6	7.87	2.45	0.72	5.76
84	Cataula clay loam	42.7	21.2	36.1	22.90	14.55	1.55	6.47
69	Cecil clay loam	38.3	25.1	36.6	23.62	17.92	1.49	6.71
62	Cecil loamy sand	84.6	9.8	5.6	9.57	3.12	1.26	5.73
63	Cecil loamy sand	84.6	9.8	5.6	9.57	3.12	1.26	5.73
70	Cecil sandy clay loam	49.3	15.9	34.8	18.75	12.84	1.37	5.88
55	Cecil sandy loam	75.7	16.6	7.7	13.34	4.65	2.52	5.86
72	Cecil sandy loam	64.8	23.1	12.1	14.75	4.90	2.16	5.66
73	Cecil sandy loam	57.7	25.9	16.4	16.75	6.67	1.96	5.74
78	Chewacla silt loam	19.8	58.3	22.0	28.11	15.41	2.01	5.97
79	Chewacla silt loam	19.8	58.3	22.0	28.11	15.41	2.01	5.97
59	Congaree fine sandy loam	60.6	24.8	14.6	20.14	7.23	1.54	6.44
41	Congaree loam	44.5	38.5	17.0	25.78	13.38	4.15	6.77
44	Congaree silt loam	33.5	60.0	6.5	19.56	9.40	3.11	5.98
45	Congaree silt loam	16.3	74.5	9.2	21.66	10.97	1.88	6.65
38	Davidson sandy clay loam	48.6	28.4	23.0	20.65	11.37	3.02	6.21
29	Georgeville silt loam	24.9	58.6	16.5	16.53	8.58	1.34	5.45
42	Georgeville silt loam	27.0	58.0	14.0	18.41	7.14	2.07	6.55
75	Georgeville silt loam	19.5	70.3	10.2	18.24	5.79	1.41	6.22
85	Halewood loamy sand	77.5	14.9	7.6	11.75	3.78	1.66	5.28
77	Hayesville sandy loam	64.8	16.9	18.3	15.02	8.33	2.59	5.24

39	Helena loamy sand	74.0	21.4	4.6	12.70	8.80	2.86	6.00
74	Helena loamy sand	77.0	19.7	3.3	10.02	3.10	0.93	6.66
20	Herndon loam	44.8	38.3	16.9	....	....	...	...
25	Herndon silt loam	30.2	60.4	9.4	....	....	...	...
32	Herndon silt loam	12.1	72.4	15.5	22.72	8.05	2.67	5.25
34	Herndon silt loam	34.2	51.8	14.0	18.60	8.61	2.01	5.77
65	Iredell fine sandy loam	55.4	33.5	11.1	18.42	11.40	4.06	5.93
66	Iredell fine sandy loam	57.0	30.3	12.7	16.39	8.48	2.00	7.01
64	Iredell loamy fine sand	76.5	19.8	3.7	9.19	2.61	0.88	7.51
37	Iredell sandy loam	66.5	21.2	12.3	14.72	10.40	1.80	6.41
54	Lockhart sandy loam	74.8	15.2	10.0	14.51	5.51	3.02	6.27
52	Madison sandy loam	57.1	26.3	16.6	21.07	9.17	4.83	6.36
67	Mecklenburg clay loam	35.0	28.2	36.8	23.99	15.92	2.23	5.93
80	Mecklenburg clay loam	43.0	30.0	27.0	23.20	14.30	1.54	5.84
35	Mecklenburg fine sandy loam	56.7	33.4	9.9	16.60	10.84	2.78	6.45
36	Mecklenburg sandy loam	68.5	20.4	11.1	13.34	7.53	1.03	6.18
53	Tatum fine sandy loam	57.9	31.8	10.3	16.51	5.74	3.32	6.47
60	Wickham sandy loam	68.6	22.4	9.0	11.47	3.77	1.21	6.60

TABLE 15.—PHYSICAL AND CHEMICAL PROPERTIES OF THE SURFACE LAYERS OF COASTAL PLAIN SOILS

Site No.	Soil type	Mechanical analysis			Moisture at field capacity	Moisture at wilting point	Organic matter	pH
		Sand	Silt	Clay				
		%	%	%	%	%	%	
2	Charleston loamy fine sand	80.4	10.5	9.0	12.16	4.17	2.37	5.42
17	Edisto loamy fine sand	77.8	15.6	6.6	....	....	...	...
49	Izagora loamy fine sand	87.1	8.6	4.3	11.16	6.83	3.39	6.79
31	Norfolk loamy sand	84.1	11.9	3.9	9.06	2.55	1.55	5.90
48	Norfolk loamy sand	85.7	9.6	4.7	7.90	4.51	1.79	5.65
51	Norfolk loamy sand	85.1	10.6	4.4	9.03	4.24	1.73	6.01
50	Orangeburg loamy sand	86.2	8.7	5.1	7.70	3.51	1.08	6.41
24	Troup sand	91.2	4.5	4.3	....	....	...	...
30	Wagram sand	92.3	4.7	3.0	6.12	2.23	0.81	6.01
3	Yonges loamy fine sand	78.9	17.9	3.2	....	....	...	...

INFILTRATION RATES FOR SPRINKLER IRRIGATION

Sprinkler irrigation application rates, based on infiltrometer measurements, generally have been determined from the lowest infiltration rates approaching constancy after the sharp decrease of the rates when runoff occurred. These application rates were probably conservative, since the relatively high initial infiltration rates preceding runoff were not considered.

Water application on the infiltrometer test areas was usually at rates considerably greater than the final constant infiltration rates, causing rapid deterioration of the structure of the surface soil layer during the test period. The kinetic energy of the water drops, at the high application rate, released enough force on impact to disperse, sort, and rearrange the sand, silt, and clay into a less permeable surface layer.

A sprinkler irrigation rate should reflect the amounts of water infiltrating the soil during the initial as well as the terminal periods of measurement. Intake rates of most soil types did not substantially change after 30 minutes, and inclusion of the rates measured during the first hour or part of the hour will provide a basis for estimating the sprinkler application rates. Differential rates for application of a given amount of water during a predetermined period of time may be more desirable, but probably are impractical.

The amount of water to be applied, time required for application, soil texture, slope, land use, and other factors should be considered in estimating a sprinkler application rate. Generally, the sprinkler application rate should be reduced as the silt plus clay content of the soil, land slope, amount of water to be applied, and time required for application increase. Application rates may be increased on forage and pasture land if the surface layer of soil has not been compacted by intensive grazing. Water infiltration of the soil is increased considerably by mulches and incorporation of plant residues in the surface layer. However, the maximal effects of these management practices on water intake rates are dependent to a large degree, on the kind and amounts of residues utilized.

The cumulative infiltration of the Piedmont soils during 1 hour varied from 0.31 to 2.26 inches and that of the Coastal Plain soils from 0.57 to 2.66 inches (tables 4 and 5). These data indicate that sprinkler irrigation rates that would supply approximately these amounts in 1 hour could be used efficiently, provided that the conditions of irrigation approximate those of the tests.

The infiltration rates measured during the 0- to 30- or 0- to 60-minute intervals are suggested for sprinkler irrigation, if small quantities of water are to be applied in short periods of time on dry, loose soil. An average of infiltration rates measured between 30 and 60 minutes is suggested if somewhat larger quantities of water are to be applied over a longer period of time.

SUMMARY

Infiltration rates of 87 soil types of the Piedmont and Coastal Plain areas of South Carolina were measured with the type FA infiltrometer. Test sites were selected by soil series, soil textures, and land uses.

A summary of results follows:

1. Infiltration rates of the Piedmont sod and cultivated soils, during the first hour, ranged from 0.31 to 2.26 inches per hour, and rates of the Coastal Plain sod and cultivated soils varied from 0.57 to 2.66 inches per hour.
2. The gross water intakes of most Piedmont and Coastal Plain soils exceeded 0.75 surface inch during the first hour. Soil parent materials were related to cumulative infiltration. During 1 hour the average cumulative infiltration of the Piedmont soils derived from the different parent materials varied from 0.65 to 1.36 inches. The average gross intake of the Coastal Plain upland soils was 1.66 inches during the first hour.
3. Correlation coefficients of the silt plus clay contents and the 0- to 60-minute infiltration rates of the Piedmont and Coastal Plain row-crop soils were significant at the 1 percent level. The correlation coefficient of the Piedmont sod soil rates and silt plus clay content was significant at the 5-percent level, but that of the Coastal Plain soils was not. Correlations of rates and clay contents were not significant.
4. Land use affected infiltration rates of the Piedmont soils to a considerable degree. Average intake rates per hour of these soils were: sods, 1.19 inches; orchard, 0.95 inch; and row-crop, 0.87 inch. Effects of land use on infiltration rates of the Coastal Plain soils were minor.
5. Organic matter contents had no consistent effects on rates. The pH of the Piedmont and Coastal Plain soils had no conclusive effects on infiltration rates. The correlation coefficient of available water capacities and infiltration rates was significant at the 5-percent level, but probably reflected differences in soil texture and types of colloids in the soils.

6. Factors that can influence estimation of sprinkler irrigation application rates are discussed. Use of the measured infiltration rates to estimate infiltration rates for sprinkler irrigation are suggested.

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