These data support the view that salt formation involving reaction of acidic groupings with the weakly basic urea is responsible for urea retention. The salt formed with the strong acid grouping in the nuclear sulfonic type resin was stable and the urea did not leach at all, whereas the salt formed with the weakly acidic carboxyl grouping was unstable and urea was susceptible to leaching with water, though less so than nitrate.

Extension of the findings obtained with synthetic resins to soil columns is shown in figures 3 and 4. Figure 3 shows that urea was leached less readily from Venice peaty muck in the acid form than from the same column which had been saturated with calcium, again indicating the possibility of salt formation. Recoveries of urea were 99.4% from the acid soil and 98.3% from the calcium soil. A column of Staten peaty muck saturated with barium did not separate urea and nitrate (figure 4), but when this column was hydrogen-saturated, considerable separation of nitrate and urea occurred, with the urea showing evidence of weak retention forces.

Comparisons of degree of urea retention by the two different soils based on effluent volumes cannot be made because the soils were mixed with sand to allow rapid leaching.—F. E. Broadbent, Professor of Soil Microbiology, and T. E. Lewis, formerly Research Assistant, Department of Soils and Plant Nutrition, University of California, Davis.

SOIL WETTABILITY AS A FACTOR IN ERODIBILITY

Many aspects of water movement in soils are affected by soil wettability of which the soil-water contact angle is a measure. Wettability varies for natural soils and can be modified by wetting agents or hydrophobic materials.

Because soil wettability influences soil-water interactions, it was postulated that artificial manipulation of the soil wettability could be used as a means to modify erosion.

A field study was initiated to determine the erosion, surface runoff, and vegetative development on unconsolidated hydrophobic soil as compared to similar soil treated with a wetting agent to make it more wettable.

Results and Discussion

Erosion

The average amount of debris removed from treated and untreated plots is presented in Table 1. Eight rainstorms (erosion from April 20 and 12) were used because it was not measured after the April 19 rainfall. The amount of precipitation for each storm and rainfall intensity for three storms are also presented in Table 1.

In every case, more erosion occurred on the untreated plots as compared to the treated plots. Debris was removed with the runoff water and not measured and slight errors could be introduced in nonuniform packing of debris containing, these errors would be compared to differences in erosion between treated and untreated plots. In fact, debris not removed with water would be greater in the treated cases because more runoff occurred and further magnify the difference between treated and untreated plots.

ANY ASPECTS of water movement in soils are affected by soil wettability of which the soil-water contact angle is a measure. Wettability varies for natural soils and can be modified by wetting agents or hydrophobic materials.

Because soil wettability influences soil-water interactions, it was postulated that artificial manipulation of the soil wettability could be used as a means to modify erosion.

A field study was initiated to determine the erosion, surface runoff, and vegetative development on unconsolidated hydrophobic soil as compared to similar soil treated with a wetting agent to make it more wettable.

Experimental

An area covered with moderately dense chaparral and adjacent to the San Dimas Experimental Forest at Glendora, California, was burned over by a wildfire in July 1962. The soil surface after the burn had an ash layer about 0.5-inch deep underlain by a 2- to 3-inch layer of partially ashed and decomposed litter which was very hydrophobic. The ash on the surface was wettable. The soil is a residual and unclassified soil of weathered and fractured granitic parent material, consisting of a shallow (2 to 3 feet) undifferentiated profile of a sandy loam texture.

Six plots were established on the east side of the ridge. Borders were constructed with lawn edging which was buried 4 inches above the soil surface. The plots were approximately 10 feet wide and 40 feet long.

A trough extending the entire width of the plot was placed at the lower edge of each plot. The runoff water was conducted from the trough by piping buckets for measurement. The debris was removed from the trough and measured on a vane for each storm.

The average slope of each plot was about 56° for one plot which was 56%. There were no measurements in plots. All were at approximately the same position, slope direction, and located close to a road.

The plot with 56% slope and two others were chosen as checks. The other three plots were sprayed with a wetting agent. One part active ingredient of wetting agent mixed with 3,600 parts of water. The plots were sprayed with water, however, approximately half the amount of solution applied to the treated plots could be applied because runoff and erosion treatments were applied on October 24. The plots were thoroughly dried before measurements were made on January 9, 1963.

The burned area surrounding and including the plots was seeded to annual ryegrass by helicopter prior to treatment application. The treatments did not inhibit germination.

A recording rain gauge placed adjacent to the plots was used to measure rainfall.

Table 1.