

Reports and Letters

Correlation of Major Vegetation Climaxes with Soil Characteristics in the Sonoran Desert

Soil characteristics determined from samples taken over a 14-mile transect of desert vegetation in southern Arizona have yielded highly significant differences associated with two distinctly different climax vegetation types. The transect is in the Basin and Range Physiographic Province of the inland Southwest and is over alluvial land, a soil taxonomic unit that in this case refers to the unconsolidated alluvium of a desert climate. This type of alluvium, known as fanglomerate, characterizes most of the soils of the Sonoran Desert.

The transect is located on the western slope of the Tucson Mountains, a low desert range west of Tucson, and the adjacent Avra Valley, from approximately 3400- to 2000-foot elevation. The soil samples analyzed were taken to a depth of 3 feet from 16 soil-sample stations along the transect. Since this type of desert alluvium is generally deep and shows little or no profile development, samples were arbitrarily drawn at 6-inch intervals to indicate any specific soil property to a much greater depth than 3 feet.

The lighter and more rocky soil of the higher slopes supports the relatively complex Paloverde-Sahuaro (*Cercidium-Cereus*, 1) vegetation type, whereas the finer soil of the lower slopes and valley supports the relatively simple Creosotebush-Bur Sage (*Larrea-Franseria*, 1) association. These are the two major climax vegetation types of the Sonoran

Desert in Arizona, the Paloverde-Sahuaro association constituting a distinct tree climax and the Creosotebush-Bur Sage association forming a characteristic shrub climax. The same macroclimate exists for both climax vegetation types.

A broad ecotone extends along the lower western slope of the Tucson Mountains and the adjacent Avra Valley, varying locally in elevation from approximately 2800 to 2200 feet. The difference in slope of less than 4 degrees between the upper portion of the transect and its lower end is insufficient, as is the elevational difference, to constitute a causal factor in the given vegetational difference.

Standard determinations were made for soil texture (mechanical analysis), moisture equivalent, moisture content, capillary rise, dispersion rate, and salinity. Wilting coefficients were determined by the indirect method of Briggs and Shantz (2), inasmuch as the soil samples are variants within a closely related soil group. Results are given in Table 1 for moisture equivalent, wilting coefficient, and moisture content. It is observed that highly significant differences obtain for soil characteristics associated with the two different major vegetation types.

The differences between these soils in pertinent physical and physiological characteristics, such as moisture equivalent and wilting coefficient, are attributable to the significant difference in the texture of these soils. Available soil moisture during the critical dry seasons determines the occurrence of one vegetation type over the other. This is best expressed by the wilting coefficient. The

less colloidal, more sandy, and more rocky soil supporting the *Cercidium-Cereus* association has a wilting coefficient of approximately one-half that of the finer soil of the *Larrea-Franseria* association, whereas the values in moisture equivalent and moisture content for the latter are twice those of the former. This means that with a value of 50 percent less total soil moisture, twice the amount of soil moisture is available for plant use in the Paloverde-Sahuaro association than is available in the Creosotebush-Bur Sage association. Intermediate values in these and other soil properties obtain for the broad area of ecotone where one distinct vegetation type first merges and then gives way to the other.

In summary, from analysis of pertinent soil characteristics and their correlation with climax vegetation types of the Sonoran Desert, it is concluded that here specifically different soil attributes characterize, and are intimately associated with, distinctly different and major climax vegetation types existing under the same macroclimate.

TIEN WEI YANG

CHARLES H. LOWE, JR.

Department of Botany and Department of Zoology, University of Arizona, Tucson

References and Notes

1. *Cercidium microphyllum-Cereus gigantea* and *Larrea tridentata-Franseria dumosa*, respectively.
2. L. J. Briggs and H. L. Shantz, *Bot. Gazette* 53, 25 (1912).

16 September 1955

Detection of Sex of Fetuses by the Incidence of Sex Chromatin Body in Nuclei of Cells in Amniotic Fluid

Identification of genetic sex on the basis of the incidence of the sex chromatin body observed in the nuclei of oral mucosa smears has recently been described (1). The technical concept appears to be directly applicable to the cellular debris in amniotic fluid. Since all such cells are of fetal origin, and since the sex chromatin body incidence is independent of the hormonal milieu (1, 2), it should be possible, therefore, to establish the genetic sex of the fetus *in utero* by this method. This has been done.

Amniotic fluid has been obtained from pregnant women by direct aspiration of the amniotic sac with a needle and syringe. This fluid is centrifuged, and the sediment is spread on a slide treated with egg albumen. The slide is immersed at once in equal parts of 95-percent ethyl alcohol and ethyl ether for 2 to 24 hours.

The fixed smears are passed through 70-percent and 50-percent ethyl alcohol

Table 1. Statistical comparison of soil characteristics of the two major climax vegetation types of the Sonoran Desert in Arizona.

Soil characteristic	N	<i>Larrea-Franseria</i>	N	<i>Cercidium-Cereus</i>	t	P
Moisture equivalent (%)	24	12.2 ± 0.61	24	6.6 ± 0.14	8.9	< .001
Wilting coefficient (%)	24	6.6 ± 0.33	24	3.6 ± 0.08	8.8	< .001
Moisture content* (%)						
Wet (approx. field capacity), summer rainfall season, July	12	9.1 ± 0.90	12	5.5 ± 0.16	7.3	< .001
Dry, postsummer rainfall season, December	12	3.4 ± 0.41	12	1.4 ± 0.09	4.6	< .001

* Moisture content here refers to the amount of water present in a given soil at a given time determined on the basis of a percentage of the oven-dry weight of a given sample at 105°C. For valid comparative purposes, samples were taken simultaneously at different soil stations.