

Brazil, by far the largest country in South America, has about the same area as continental United States exclusive of Alaska. For twenty-eight hundred miles from east to west and 2,500 miles from north to south, Brazil dominates the continent, both in area and politically.

Stretching as it does from 5 degrees north of the Equator near the mouth of the Amazon to 35 degrees south latitude, climate, vegetation, people and their attitudes, and the effects these have had on development of the country are literally almost as different as day is from night.

Climate and Soils of Northeastern Brazil

By R. R. Humphrey

Individual initiative, use of natural resources, industrialization and urban development increase rather consistently from north to south. The reasons for this are many and, in part because of their interactions, complex.

I shall report solely on the area where I worked the past two years, the so-called arid northeast. Essentially ever since the first white men — the Portuguese — landed and attempted to exploit northeast Brazil, this land of brush, shallow soils and recurrent droughts has been a burden to the rest of the country.

It has been easy in the past to ignore the plight and the needs of the Northeast. Roads were and still are far between, often impassable during the long rainy season, and rough and dusty the rest of the year. Telephone communication has been — and still is — lacking or too poor to be of much value. Telegraph service is little better. Air travel today has eased the situation but commercial lines reach only the principal cities and the cost of plane fares places this means of travel beyond the reach of all except an extremely small minority.

Large As 4 U.S. States

Brazil's Northeast includes parts or all of 8 states: Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, and Bahia. Its 422,000 square miles, larger than Arizona, Colorado, New Mexico and Wyoming combined, account for slightly more than 14 percent of the entire country's area.

Although the topography is not flat in the sense of our western plains, it is essentially a region of few mountains or hills, yet with a distinct drainage pattern, and enough differences in elevation to assure fairly rapid runoff. Most of the mountain masses are small and

do not rise much above 1000 meters.

Except for these occasional mountains there is too little difference in elevation to modify the climate and consequent plant growth appreciably. Other factors, however, affect precipitation and relative humidity, resulting in readily distinguishable zonal differences in the vegetation.

Precipitation Variable

The climate of the entire area except a coastal fringe can perhaps best be described as dry tropical. Although total annual precipitation far exceeds that of our own Southwest, Northeast Brazil has a well-earned reputation for aridity and drought. Mean annual precipitation varies from about 12 to 63 inches. This latter figure was recorded at mountain-top stations and is not typical of most of the region. The general range is between 24 and 39 inches. Precipitation always falls as warm rains; snow is unknown.

Two kinds of drought plague the region: annual and periodic. The typical annual precipitation pattern is one of about six months of rain and six months of drought. The usual rainy season lasts from January through June, the dry season from July into or through December. Although there is little temperature change throughout the year, the rainy season is commonly called "winter" and the dry season "summer."

At indeterminate intervals of perhaps 5 to 10 or more years, there may be periods of two to three years with little rain even during the normally wet season. These periodic droughts have literally been man and animal killers and are the principal reason why the Northeast is known as a region of devastating droughts. The annual dry season is expected, and human activities are geared to it. The periodic droughts, being unpredictable, are usually countered simply by moving out. These periodic migrations have long been noted in historical accounts of the region.

Constant Comfortable Breezes

Although the Northeast has an unsavory reputation because of its droughts, it should be as well known,

(Continued on Next Page)

Dr. Humphrey, professor of range management in this college for nearly 20 years, has just returned after a two-year stint with the AID team of University of Arizona Agricultural scientists in Brazil, attached to the University of Ceará, at Fortaleza. The remarks above are excerpts from an address before a regional meeting of scientists at Las Cruces, New Mexico.

Built With Head, Heart, Hands and Health



On a mountainside near the little mining town of Harshaw, in Santa Cruz County, recently appeared this 4-H emblem of white-painted rocks. This is a symbol of a new 4-H club, its 16 members almost all Spanish-American youngsters of that community.

In the photo are three of the Harshaw 4-H club's members, Adriana de la Ossa, Alvino Majalco and Fernando de la Ossa. An old Forest Service building — at first condemned but now being refurbished — is clubhouse for the group, and the Elgin 4-H club has given the Harshaw group a new 4-H flag, gavel, club banner and other necessities.

(Continued from Previous Page)

though favorably, for its mild climate. The approximate thousand-mile coastline is controlled year-long by the almost continuous trade winds. While these keep the humidity at a fairly high level near the coast, they are also responsible for an equable and comfortable temperature that rarely drops below 75° F. or goes above 85°. These "winds," while essentially never ceasing, are more correctly classified as breezes than as winds. In the two years spent at Fortaleza, I never saw a single day that was truly windy. Even the temporary gusts during rainstorms do not have the velocity of winds in our own Southwest.

Temperatures in the interior are somewhat higher and relative humidity is lower than along the coast. Precipitation is also less by about a third to one-half.

Along the coast and usually for a few miles inland the soils are predominantly sandy, derived from aeolian dune materials. Presumably because of high oxidation rates, a dearth of fibrous-rooted plants and abundant termites, these sands are extremely low in organic matter.

Inland the upland soils are variable in origin and character but are derived largely from granites or more recent basalts. In some places old metamorphic materials or relatively young sandstones and limestones form the parent material. Except for local sandy areas the interior soils have a high percentage of clays that are

Research Cuts Cost Of Beef Production

Research has cut feed costs of producing 400 pounds of gain in a beef animal as much as \$13.86 in the past 11 years, say University of Arizona scientists.

UA's Dr. Bruce Taylor and Dr. W. H. Hale, Arizona Agricultural Experiment Station, report that "modern, 1965 rations produced 31 percent more gain on 21 percent less feed than did a 1954 ration having the same concentrate level."

The improved rations, they said, saved \$3.42 in producing 100 pounds of gain over their counterpart.

"This emphasizes the tremendous nutritional advances of the past 11 years. The reduction in feed requirements of 156 pounds of feed per 100 pounds of gain is remarkable, and the improvement in knowledge of nutrition in this 11-year period no doubt exceeds that of any previous 50-year period in the cattle feeding history," said Dr. Taylor.

You may not think so when you look at your meat bill, but such research as this does help consumers, indirectly, to get the best possible meat buys under the circumstances, said the UA animal researcher.

"It is an inescapable fact of life that the price consumers pay must include the cost of production. And if that production cost is lowered, it will surely be reflected eventually in the retail price," he said.

usually red and slightly acidic. Like the coastal sandy soils, those of the interior upland are also typically low in organic matter.

A rather small fraction of the Northeast has alluvial, streambottom soil. The potential agricultural importance of these areas far overshadows their relative area (an estimated 8% of the region).

For the most part, the interior upland soils are shallow, typically ranging from a few inches to a few (2-5) feet in depth. As a consequence, they soon become saturated to bed rock during the rainy season, but do not have the storage capacity to carry moisture through the dry season. The direct, intense tropical sun, moderately low humidity and constant air movement aggravate the situation.

In contrast with the shallow upland soils, the alluvial bottomlands have a relatively deep fertile soil with considerable humus. Extensive portions may be periodically flooded during the rainy season, and during the balance of the year may have soil moisture within reach of deep-rooted grasses or available for irrigation by pumping.

All available evidence indicates that most of the soils are deficient, and often highly so, in nitrogen, phosphorus, and potash. Although little is known about minor element deficiencies, these also may be serious in some localities. The sandy soils near the coast, in particular, are subject to severe leaching and, consequently, are particularly low in essential minerals.