BOOK REVIEWS

SOIL ENGINEERING

The text is written in simple language for use by under-graduate students and by practicing engineers who may not have had formal training in soil engineering. "Soil," in engineering terminology, includes all the unconsolidated mineral matter of the earth's surface together with air, water, organic matter, and any other matter included in it. Surface soils, recognized by pedologists as the only true soils, are not especially important in engineering works.

The author has approached the subject through appropriate phases of the basic sciences of geology, pedology, soil physics, and physical chemistry and has illustrated the applications of these sciences in soil mechanics and soil engineering. The strength characteristics of the soil are of primary interest to an engineer.

High strength is dependent on such characteristics of the soil as high density, high internal friction and cohesion, and low moisture content. The author illustrates these and other characteristics through discussions of the geologic origin and classification of soils, the soil profile, the soil structure, texture and density, the various forms and characteristics of soil water, the soil-water consistency, and the shearing resistance and strength of soils. The author concludes that these basic phases of soil science are the same for all fields—only applied technologies vary.

The reader soon becomes aware of the tremendous importance of soil in virtually all phases of structural engineering—if he is not so aware at the outset. The author describes the extensive use of the soil as a construction material for highways, railways, earth embankments, dams, and levees. Soil is also important as an underlying material supporting structures of various kinds.

In the case of sewers, culverts, tunnels, retaining walls, revetments, and bulkheads, soil is important both as a major support for these structures and as an enveloping or overlying material which will provide a medium through which loads applied at the surface are transmitted to these underground or partially embedded structures. Control of streams, beaches, and soil erosion are also dependent upon the character of the soil. The author discusses the engineering structures in relation to the soil and offers numerous practical suggestions for construction and design.

Questions and problems at the end of each chapter aid the student in clarifying the subject, and selected bibliographies are valuable for further pursuit of the study. — W. S. Chepil.

AGRICULTURAL HYDROLOGY AS EVALUATED BY MONOLITH LISEMETERS

This excellent bulletin reports work to 1949 on the lysimeter investigations on the North Appalachian Experimental Watershed near Coshocton, Ohio. The hydrologic data were obtained from 11 monolith lysimeters, each 0.002 acres in area and 8 feet deep, 3 of which were weighed automatically. Each of these lysimeters was 6.22 x 15 feet and thus minimized the artificial border effect along the sides of the casings. Three feet of parent rock (shale or sandstone) provided a natural means of transmitting percolating water from overlying soils to free gravity water draining off in the observation tanks. The enclosed undisturbed soil block permitted measurement under natural soil conditions.

Weight records provided data for the determination of condensation-absorption of moisture from the atmosphere, evapotranspiration of soil moisture, and changes in storage of soil moisture. The amount of moisture condensed and absorbed from the atmosphere can be accounted for to over 6 inches of water annually. Of the water added to the soil, precipitation accounted for 81% and condensation-absorption accounted for 19%. From 80 to 85% of the soil moisture depletion was due to evapotranspiration. Percolation accounted for only 2% of the moisture supply. The differences in effect on wheat, corn, and meadow crops were measured on a day to day and season to season basis.

The rainfall amounts measured by the weighing lysimeters exceeded by 4 inches the amounts caught by the recording rain gauges. The differences arose largely during storms of less than 0.6 inch of rainfall daily.

The nutrient elements potassium, calcium, magnesium, nitrogen (nitrate), manganese, and sulfur are reported on an annual basis for prevailing or poor practices and improved or conservation practices. Potassium loss through percolation ranged from 3 to 28 pounds, calcium from 9 to 39 pounds, magnesium from 2 to 31 pounds, nitrate from 0.2 to 14 pounds (as nitrogen), manganese from 0.1 to 0.9 pound, and sulfur from 3 to 44 pounds, annually. The percolation ranged from 2 to 20 inches annually. — M. L. Jackson.

AN INTRODUCTION TO ACAROLOGY

This comprehensive and authoritative book fills an important need for those students and research workers in zoology, entomology, agriculture, and allied fields who desire to become more familiar with a little-known but none the less important group of arthropods, the mites and ticks. Increased interest in mites from an agricultural standpoint during the past decade stems from the wide-spread use of DDT insecticides which in some manner, as yet not adequately explained, permits or enhances the development of large populations of plant-infesting species, some of which were previously unknown as important pests.

A book primarily a book on the taxonomy of the Acarina, this work contains considerable material on morphology, ecology, and host relationships. There may be some who may wish that a host table, in so far as is known for the plant-infesting species, could have been included. The lack of this feature, however, does not detract from the general excellence of the book, although it would seem to limit its use as a reference to those individuals already familiar with the taxonomic position of species under consideration. Keys to all 228 families are provided, together with a list of genera and type species. Line drawings of representatives of each family are important features of the book. — N. D. Blackburn.

IMPROVING THE WORLD'S GRASSLANDS

In preparing this booklet (paper cover) the author consulted freely with grassland experts located in various countries of the World. It was written to call attention to the potentialities of grasslands in supplying food for the world's ever growing population and in conserving valuable cultural and natural resources. It contains useful information for the technician concerned with improving grasslands. The scope of the work is indicated by the following chapter headings: The Importance of Grasslands; The Place of Grass in Agriculture; Range Improvement; Crop Improvement; Seeding and Fertilizing; Some Examples of Mechanical Treatment and Burning; National Programmes of Grassland Improvement; Fodder from Trees and Shrubs; Supplemental Feeding; The Need for Research. — R. J. GABRIEL.

AGRICULTURAL GEOGRAPHY OF THE WORLD

Ecological factors affecting the crop plants of the world are presented in this treatment which includes chapters on plant growth, ecological classification of crops, climates with reference to crop production, plant growth with reference to seasonal rhythm, types and formation of soils, and (much the longest chapter) agricultural regions of the world, their climatic characteristics and crop suitability.

Written in English by a Greek author and published in Argentina, the text is not without linguistic imperfections, but these in no way detract from the extensive factual information concerning world crops, soils, and climates. Four world maps showing world vegetation types, local climate and rainfall map, and agricultural climates, and three sets of graphs showing selected localities the annual march of mean daily temperature, of growth indices, and of water need are included. — H. A. WAIN.