SOIL AND ATMOSPHERIC SCIENCE

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Abstracts

Comparison of Methods for Determining Exchangeable Bases in Soils. RUSSELL K. STIVERS, Department of Agronomy, Purdue University, West Lafayette, Indiana 47907.——The Purdue Plant and Soil Analysis Laboratory offers two types of tests for exchangeable soil bases. One is the standard procedure in which samples are weighed, leached overnight with neutral, normal ammonium acetate, filtered, and elements determined by atomic absorption spectrophotometry. In our rapid procedure for K, Ca, Mg, and Na, samples are scooped, shaken five minutes in neutral, normal ammonium acetate, filtered, and the elements determined by atomic absorption spectrophotometry. This rapid procedure is used in our laboratory as the basis for K fertilizer recommendations and, in part, liming recommendations. The purpose of this research report is to compare results of the standard procedure with results of the rapid procedure for exchangeable K, Ca, Mg, and Na on the same soil samples. Two sets of data, each of 77 different soil samples tested in our laboratory during 1976 and 1977, were compared. One set of 77 samples from the surface soil on seven different Indiana farms, averaged 3.79% organic matter and 25.1 milliequivalents of cation exchange capacity per 100 grams of soil. The other set of 77 samples from coal strip mines, averaged 1.02% organic matter and 20.5 milliequivalents of cation exchange capacity per 100 grams of soils. Regression coefficients relating rapid soil test cations to the leaching procedure for the same cations were determined. The regression coefficients of the farmers' samples were all significantly lower ($P < 001$) than those of the strip mine samples for all four cations. These coefficients for farmers' samples were 402 for K, 271 for Ca, 197 for Mg and 93 for Na. All values are parts per two million per milliequivalent per 100 grams of soil. They were 51.5%, 67.8%, 82.1% and 20.2% respectively of the expected values. The corresponding respective values for the strip mine soil samples were 84.9%, 89.0%, 89.2% and 59.5%.

Application of Satellite Remote Sensing Data For Mapping Vegetation. S. J. KRISTOF and R. A. WEISMILLER.——Computer-assisted statistical pattern recognition techniques of Landsat-2 data have been used to detect, identify and locate vegetative ground cover.

Using the nonsupervised cluster routine technique and ground truth information, seven different crop classes were selected for classification and testing. Variations in spectral response in the visible and in the reflective infrared electromagnetic spectrum resulted from differences in the type of vegetative cover, densities of the cover, stage of physiological development, geographic

orientation, and soil background. The response of plants to incident radiation varies with wavelength. Plants strongly absorb incoming radiation in the green and red portions of the spectrum, but absorb weakly in the reflective infrared region of the spectrum. The high absorption of visible radiation is attributed to the high absorption by chlorophylls and other leaf pigments (Gates, 1965). Under such circumstances the ratio between relative reflectance of the visible spectrum (0.5 to 0.7 μ m) and relative reflectance of the infrared region will be low. Nonvegetated areas in general reflect more energy in the visible spectrum than in the reflective infrared; thus their ratio will be high. Association of nonsupervised cluster classes with their corresponding cover type was facilitated by the use of these characteristics. Almost all classes of vegetation differ in their reflective behavior from the ideal Lambertian law, mostly because of incomplete plant cover, moisture content, zenith and azimuth angles.

Soil Science Atmospheric Science, Teaching Devices for Solar Heater and Methane Generator. JAMES MITCHELL SMITH, Liberty, Indiana 47353.——Used with adult classes in agriculture, New Castle, Indiana Vocational School, two models were found to be of value.

Methane generator consists of a distillation flask, stopper in top opening and rubber tubing fastened to small outlet to the side. The rubber tubing leads to a bunsen burner and there is a clamp between flask and burner. Animal manure placed in flask and when clamp is released enough methane is generated to produce a small flame for a short time.

Solar heater consists of flat plastic tray, in this tray is placed a quarter of an inch of water. Over the water is placed a black roofing sheet and over the roofing a plate of glass. When placed in the sun, water temperatures will rise 40° F in an hour.

The Status of Tornado Preparedness Planning in Indiana's Institutions of Higher Education. STEPHEN A. JUSTHAM, Department of Geography and Geology, Ball State University, Muncie, Indiana 47306.——Institutions of higher education commonly function as communities isolated from the larger communities of which they are generally a part. Because institutions furnish duplicate services, such as health and police agencies, it is suggested that they have an equal responsibility to provide separate alerting systems to warn their communities of an impending tornado. The majority of Indiana's institutions, located in a "high risk" state, seem to be inadequately prepared to warn their populations of an approaching tornado. An institution's attitude toward the possibility of a tornado disaster may be related to the institution's chief administrator's perception of the probability of a tornado striking the institutional community. Several survey questions were designed to try to determine if there is any association between the chief administrator's perceptions and whether or not the institution has a tornado preparedness plan. The preliminary results of these aspects of the research are examined.

Phosphate Chemistry of Indiana Lake and Reservoir Sediments. E. D. ORME and D. W. NELSON, Purdue University.——Soluble inorganic phosphorus is presumed to be a vital element in the process of lake eutrophication.

Information available on Wisconsin lakes indicates that some sediment properties control sediment-water phosphorus exchange. Studies were conducted on Indiana lake and reservoir sediments to relate general sediment properties to the nature of the dynamic inorganic phosphate equilibrium between the sediment and water phases. The concept of equilibrium phosphate concentration (EPC) was introduced and evaluated as the sediment property which measures the ability of a sediment to maintain a concentration of P in the water phase. Data from reservoir and lake sediments were compared and parameters for each class of sediments statistically correlated. These correlations revealed that the sediment EPC was directly related to the degree of eutrophication in the body of water. The oxalate-extractable fractions appeared to be responsible for the majority of P adsorptive capacity of sediments. Oxalate and NH_4F-extractable fractions of P in lake sediments appeared to be involved as pools of P for the dynamic equilibrium between sediment and water. The labile pool of P for reservoir sediments, though, appeared to involve only the NH_4F-extractable fraction.

The Influence of a Synoptic Scale Cyclone on Boundary Layer Winds Over Lake Michigan in Early Summer, 1976. PAUL E. CIESIELSKI, Department of Atmos Sciences, Colorado State Univ., Ft. Collins, CO 80521, PHILLIP J. SMITH, Dept. of Geosciences, Purdue University, West Lafayette, IN 47097.—The description of low level air flow over large bodies of water is a problem of major commercial and scientific importance. Insufficient and sporadic data often hamper adequate description of these wind fields. Progress though has been made by utilizing and relating relatively abundant synoptic scale data to low-level wind fields over water. Realizing that particularly significant winds and wind-driven waves are produced by snoptic scale systems moving over the Great Lakes, a case study was conducted for a cyclone system which moved across Lake Michigan on June 30—July 1, 1976.

Objectives are (1) to present a synoptic analysis of the system, and (2) to formulate and test the validity of a simple model for estimating the low-level wind field over water. The primary components of the model are gradient winds determined at the top of the boundary layer and the power law wind profile relationship. The results from this model, which show relatively good agreement with the observed synoptic wind field, are discussed. The agreement in results is shown to be especially good under conditions of strong atmospheric turbulence when neutral stability existed.