

SOIL AND ATMOSPHERIC SCIENCES

Chair: CHARLES L. RHYKERD
Department of Agronomy
Purdue University, West Lafayette, Indiana 47907 (317) 494-4787

Chair-Elect: JOHN T. CURRAN
National Weather Service
Indianapolis International Airport
P.O. Box 51256, Indianapolis, Indiana 46251 (317) 248-4042

ABSTRACTS

Foliage Extraction Methods for Ion Chromatography. B.H. CARTER, J. DANIEL, M.L. FOX, R.A. PRIBUSH, AND M.J. STEVENSON, Holcomb Research Institute, Butler University, Indianapolis, Indiana 46208.—Quantitative analysis has advanced greatly in recent years with the development of ion chromatography. Through the use of ion-exchange resin columns, the ionic composition of aqueous samples can be quantitatively determined down to the sub ppm level. Unfortunately, new methods of foliage extraction have not progressed as well; older methods prevent complete analysis of samples via ion chromatography. For example, an extraction using nitric acid cannot be analyzed for nitrate, due to the nitric acid interference. In trying to solve this kind of problem, different extraction techniques were investigated, including types of solution used and variations with temperature and solution concentrations. Primary conclusions show that two extraction methods are necessary to account for all ions in a sample. One method involves ashing and an acid extraction of a finely ground sample. The other adds a volumetric amount of 18 megohm water to the ground sample, which then undergoes an extraction via an ultrasonic bath. By using both methods, the major ions can be analyzed and an ion balance applied. Accuracy and precision were evaluated using an NBS check sample.

Real-time Forecast Verification During the 28 March 1985 Severe Weather Outbreak in Northern Indiana. TIMOTHY E. KLINGLER AND DAVID R. SMITH, Purdue University, West Lafayette, Indiana 47907.—In early 1985, a Purdue University storm intercept team was organized in preparation for the 1985 spring storm season. The objective of the team was the verification of short-term severe weather forecasts with actual field observations. Forecasts were generally based on occurrence of severe weather signatures from analyses generated by the Purdue Regional Objective Analysis of the Mesoscale (PROAM) algorithm (Smith and Leslie, 1984). In particular, the forecasters identified features in the surface pressure, temperature, wind and, especially, the moisture convergence fields, which indicated the potential for severe weather.

On the morning of 28 March 1985, the synoptic setting in the upper Great Lakes/Ohio Valley region appeared conducive for severe weather development. A strong surface stationary front extended southwest to northeast through extreme northern Indiana. Surface dew-point temperatures were high in Indiana and upper-air thermodynamic conditions were moderately unstable with instability increasing throughout the day. Winds aloft were strong at all tropospheric levels enhancing vertical wind shear necessary for severe storm development.

PROAM analyses were generated throughout the day with areas of strong moisture convergence consistently occurring in northern Indiana. Intercept teams were dispatched

to this area anticipating severe thunderstorms and hail. National Weather Service summaries for Indiana on 28 March confirmed this with 19 hail reports along with two funnel cloud reports and one probable tornado.

PROAM analyses were very helpful and accurate in determining the location of the severe weather risk areas on 28 March 1985. Moisture convergence gave indication of these areas several hours in advance. This enabled a successful dispatching of intercept teams to these eventual severe weather areas and displayed the potential for PROAM as an important tool for short-term severe weather forecasting.

Determination of Fabric-related Soil Properties Using Samples Collected with a Truck Mounted Core Sampler. L. H. MCGHEE AND D. P. FRANZMEIER, Department of Agronomy, Purdue University, West Lafayette, Indiana 47907.——Soil properties that depend on the natural fabric of the soil, such as bulk density, porosity, hydraulic conductivity and water content at various matric potentials are very important soil properties. However, few measurements of these properties have been made because of the great amount of time required to collect samples in the traditional manner of digging a pit and collecting samples with a small coring device. We used a truck-mounted hydraulic soil-coring machine to extract soil cores 6 to 8 cm in diameter to a depth of 1 m or more. This long core was cut into sections 10 cm high which were coated using liquid Saran plastic. Bulk density, water content at various matric potentials, and saturated hydraulic conductivity by the falling head method were determined on the smaller cores in the laboratory. These cores have an advantage over cores collected in rigid cylinders because the plastic conforms and adheres to the cut surface of the soil sample preventing flow of water and air at the interface. Collecting cores with the hydraulic sampling machine saves much time compared with digging a pit and sampling with a hand sampler.

The Mangrove Swamps of Southern Nigeria, I: A Brief Survey of the Ecosystem. E. M. OSSOM, University of Science and Industry, P.M.B. 5080, Port Harcourt, Nigeria AND C.L. RHYKERD, Department of Agronomy, Purdue University, West Lafayette, Indiana 47907.——Nigeria is bordered to the south by the Atlantic Ocean. This body of water, together with the prevailing winds and soil types, confers on southern Nigeria a number of peculiar ecological habitats ranging from pure coconut sands near Lagos and Badagry to semi-liquid mud on which a number of fresh and salt water organisms thrive in the Niger Delta. A large portion of the coastal part of Southern Nigeria consists of mangrove swamp forests unsuitable for "general agriculture." The soils and most dominant native species found in this ecological zone are named or briefly described; the need to conserve the mangrove swamp forest of Southern Nigeria is stressed.

The Mangrove Swamps of Southern Nigeria, II: Problems and Prospects. E.M. OSSOM, University of Science and Industry, P.M.B. 5080, Port Harcourt, Nigeria AND C.L. RHYKERD, Department of Agronomy, Purdue University, West Lafayette, Indiana 47907.——The ecosystem of the Atlantic seaboard in Southern Nigeria includes a number of wild and cultivated plant species and animals important in agriculture, fisheries and forestry. This paper outlines the major problems posed by the mangrove swamp forests. Such problems as impedance to rapid agricultural conquest of the wetland soils, health hazards, difficulties in estate development and road construction as well as extensive destruction of marine life are discussed. The agricultural and non-agricultural uses to which the mangrove swamp forests may be put are also considered. These uses include crop production, fishing and fish breeding, solid and liquid fuel production, sugar manufacture and recreation.

Differential Response of Maize Inbreds to Nitrogen Fertilizer. R.G. WICHMANN, S.E. HAWKINS, D.B. MENGEL, L.E. SCHWEITZER AND J.L. AHLRICH, Department of Agronomy, Purdue University, West Lafayette, Indiana 47907.——Nitrogen (N) fertility studies on maize (*Zea mays* L.) inbred lines were initiated about ten years ago. N uptake and utilization by inbreds is already known to vary with genotypes. The objectives of this study were to determine: 1) the rate of N required for maximum grain yield, 2) whether combined preplant and late season N applications resulted in higher yields than single preplant N treatments, 3) the differential response of corn inbreds to N fertilizer. The inbreds selected for the study were A632, B73, and OH43 because of their extensive use in hybrid seed corn production.

There were genotypic differences with respect to grain yield with B73 significantly out-yielding A632 and OH43. Grain yields for A632 and OH43 were similar. There was no significant N effect on grain yield. However, there was a trend for higher grain yields as preplant N treatments were increased for B73.

B73 was also most efficient at remobilizing dry matter and N from the stover to the developing ear during the final reproductive phase. OH43 was effective at producing dry matter and accumulating N; however, OH43 and A632 were ineffective at remobilizing these products to the developing ear. Comparable differences among inbreds were also found with three proprietary Pioneer inbreds.

