addition, it will help to pinpoint the strengths of these assessments.

Ground Water Vulnerability Assessment provides a useful reference for those involved in making management decisions. If followed, the text provides a basic guideline for this process. This report is designed to be of use to those who develop techniques for assessing vulnerability and the science that supports these techniques. The report includes guidance for making informed judgments on whether an assessment provides the necessary information to be useful in the decision-making process and how the assessment might be lacking. This text addresses only contamination resulting from nonpoint sources or a vertically distributed point sources of pollution and does not address individual point sources of pollution nor any situation where a pollutant is purposely placed into the groundwater system. —DAVID D. BOSCH, Southeast Watershed Research Laboratory, USDA Agricultural Research Service, Tifton, GA 31793.

Adaptation of Plants to Soil Stresses


This is the proceedings of a workshop held at Lincoln, NE, from 1 to 4 Aug. 1993, cosponsored by USAID, INTSORMIL, and the University of Nebraska, Lincoln. It contains 20 papers in areas such as plant breeding, soil science, stress physiology, economics, and biotechnology. A recurrent theme is that of tailoring crops to soils to produce sustainable agricultural systems rather than continuing solely with tailoring of soils to crops instead. Such tailoring is repeatedly envisioned as a well-targeted, carefully conducted, truly cooperative (interdisciplinary) breeding effort, including mechanisms for collaborating-scientist recognition at the time of germplasm or cultivar release.

Greatest emphasis of the papers included in the workshop is on the selection of breeding lines for acid-soil tolerance, with less attention to drought and salinity stress, low-fertility (particularly with respect to P) settings, and toxic metal-impacted sites. An informative section on successes in crop-breeding programs to alleviate soil stresses is included, with examples of a maize program for the acid savannah (Cerrados) region of Brazil, a sorghum program for an acid-soil region of Columbia, a rice-breeding program for the Philippines and elsewhere throughout southern Asia, and an acid-tolerant wheat program for portions of northwestern Canada. Examples from other regions include sorghum and millet for the central Africa, and to add and acid-subsoil regions of the highlands of Africa.

Interesting “nuggets” scattered throughout the book include claims or observations that:

1. Adapting corn and wheat to 3°C colder temperatures could potentially access 80 to 90 additional land for each crop in northern Europe, North America, along with corresponding benefits for the Andean valleys of South America and the highlands of Africa.

2. Crop and cultivar selections for adverse situations frequently result in cultivars with less ability to respond to the somewhat higher-input levels that may result from an economics viewpoint.

3. Current average crop yields worldwide is less than 25% of the genetic potential as determined by records, with the major cause of yield reduction to drought and with biotic factors including insects and weeds being responsible for losses representing the potential yields of most species.

4. Soil temperatures at depths greater than 20 cm and CO2 concentrations in the plow layer and at deeper depths critically affect both root growth and genetic root-system expression.

5. 82% of the land area of the American tropics is not in its natural state.

6. Aluminum-tolerant cultivars grown on land that may convert insoluble or unavailable P to organic forms are then available to plants that may be more P-efficient but also potentially more profitable.

The book ends with a discouraging but still hopeful assessment of recent trends in funding for collaborative agricultural research, and the hope that the budget of 1983 may lead to substantially improved support for agricultural-systems research (particularly that with increasing environmental or ecological emphases). —B.L. McNEAL, Department of Soil and Water Science, University of Florida, Gainesville, FL 32611.

Decision Tools for Pest Management


Farming systems management, irrespective of whether it is becoming increasingly complex to remain profitable, is adjusting to a broad-based concern for environmental quality and sustainability. Because integrated pest management conforms to the general concepts of sustainable agriculture, the science that supports these techniques is a useful reference for those involved in making management decisions.