edings

PROCEEDINGS OF THE 1995
FERTILIZER, AGLIME AND PEST MANAGEMENT CONFERENCE

17-18 January 1995, Holiday Inn - Madison West

Middleton, Wisconsin

Volume 34

Program Co-Chairs:

K.A. Kelling and J.L. Wedberg

Department of Soil Science
Department of Entomology

CREDITS

Appreciation is expressed to the Wisconsin fertilizer industry for the support provided through the Wisconsin Fertilizer Research Fund for research work conducted by staff members in the Departments of Soil Science and Agronomy. Appreciation for the financial support from the Wisconsin Aglime Association through the tonnage fee for research work on aglime is also gratefully expressed.

The professionalism shown by Mary Kay Acker in typing portions of this document and in helping organize its preparation is acknowledged and appreciated.

Cooperative Extension
University of Wisconsin-Extension

and

College of Agricultural and Life Sciences
University of Wisconsin-Madison

Illinois Climate Atlas for Integrated Agricultural Systems. S. E. HOLLINGER*, L. KUCHAR. Illinois State Water Survey, and Univ. of Illinois.

Weather is a major factor in managing agricultural systems. Timing of management practices are often delayed because of unfavorable weather at critical times. Weather also determines the diseases and insects that might attack crops. Climate data (the mean, standard deviation, and probabilities of daily weather) provide a tool to assess the risk of weather events to agricultural production. A climate atlas has been developed to assist agricultural producers and consultants in evaluating the probable timing of the disease and insect outbreaks in Illinois. Included in the atlas are tables showing critical weather thresholds for important diseases and insects. Maps and tables show the probability of temperature stress, precipitation amounts, and probable number of days with rainfall during each month of the growing season.

S.E. Hollinger (217) 244-2939

Integrated Compaction Management System.K. Eradat OSKOUI* and Ward B. VOORHEES. West Central Environmental Consultants,Inc., and USDA, ARS, MWA, Morris, MN.

During growing seasons with excessive rainfall and below normal air temperatures, farmers are faced with several management decisions concerning the impact of soil compaction on overall farm revenues. An integrated compaction management system, COMPAC (Compaction Optimization and Management Program for Agricultural Crops), was developed to evaluate soil, crop and machinery factors under different weather scenarios for different locations. The four major components of this software are: process control mechanisms (such as weather, soil, and equipment), processes (such as load transfer from the machine to the soil, crop growth and field operations), process units (such as farm, field, machine), and resources (such as water, equipment, labor, soil nutrients). COMPAC facilitates the management of these components to maximize farm profit. Farm revenue is maximized by minimizing adverse effects of soil compaction by adopting alternative management strategies such as reduced tillage or controlled traffic system. The program is available for evaluation as an educational tool from the second author.

K. Eradat-Oskoui, (612) 589-2039

Fostering Adoption of STEEP Cropping Systems Technology. D.J. WYSOCKI* and R.J. VESETH, Oregon State Univ. and Washington State Univ./Univ. of Idaho.

Adoption of research results and cropping systems technologies requires getting well-packaged information to the appropriate audience in a timely manner. Information is presented in several forms and extended through a network of growers, State and Federal agencies, and agricultural industry support groups. Methods of packaging and offering information to reach the appropriate audience will be presented. The use of region-wide publications, videos, on-farm trials, and symposia will be discussed. Coordinated efforts among faculty working across state boundaries greatly facilitate the program. Interaction and cooperation among educators in the region will be reviewed. Developing a regional network of multiplier groups is critical to a successful program. Groups in the current network will be identified and evolution and development of the network will be discussed.

D.J. Wysocki, (503) 278-4186

Whole-farm Nutrient Cycling and Distribution. R.T. PROOST*, J.A. WYMAN and L.K. BINNING, Univ. of Wisconsin.

Textbook nutrient cycles can provide a sound understanding of the dynamics of crop nutrients. However, the complex nature of these nutrient cycles precludes their use when trying to understand nutrient cycling from the whole-farm level. A method to study whole-farm nutrient cycling was developed using two tiers of detail, farm and field level. Both farm and field level nutrient cycles identified the major pathways responsible for nutrient movement entering and exiting the farm, and movement within the farm. Nutrient distribution was obtained though the use of soil tests at the project start and again at the project end. Two Wisconsin dairy farms, one large and ll were used to demonstrate this approach to nutrient cycling. This paper will discuss the nutrient budget for these farms in terms of phosphorus and potassium. Nutrient cycles and distribution information provided details that allowed the farms involved in this project to maximize the use of on farm resources, increasing farm profits and protecting water quality

R.T. Proost, (608) 262-7845

Diversity in Human Activity and the Rural/Urban Interface. L. MICHAEL BUTLER* and C. DEPHELPS, Washington State Univ.

The range of interest groups debating the sustainability of food systems attests to human variation. Peoples views about their surroundings and technologies change over time and are reflected in the systems of that period. Communities are culturally diverse, consisting of vastly different peoples and life styles, each impacting their environment as a result of shared values, goals and behaviors. Knowledge of agriculture's diverse constituents is essential to the acceptability and effectiveness of agricultural and natural resource programs and policies. The paper will discuss the involvement of stakeholders in achieving more sustainable agricultural and natural resource systems, drawing on experiences with participatory agroecology, ecofeminism and theories of human ecology.

L. Michael Butler, (206) 840-4551

Adaptability Analysis for Diverse Environments. P.E. HILDEBRAND* and J.T. RUSSELL, Univ. of Florida.

By coordinating groups of farmers interested in a common set of treatments, on-farm research can be more efficient and productive compared to individual trials which provide results for specific farms. Adaptability analysis effectively examines treatment adaptability to specific biophysical and socioeconomic niches including differences in management, soils and climate; and reduces the number of years trials are needed before reliable recommendations can be made. For extension purposes, results can b extrapolated to many more farms and farmers tha just those involved in the trials. Examples ar taken from published and unpublished data.

P.E. Hildebrand (904) 392 5830

Use of Fodder Radishes in Sugarbeet Rotations to Control the Cyst Nematode. D.W. KOCH*, F.A. GRAY, and J.M. KRALL, Univ. of Wyoming.

Current sugarbeet production relies heavily on nematicide use for control of the sugarbeet nemato (*Hederodera schachtii*). A cyst nematode-resistant variety of radish, 'Pegletta', was grown following malt barley, silage corn and dry beans in 1992 as alternative control method. Sugarbeets were grown 1993. Following barley, corn and dry beans, radi shoot dry matter production was 1.56, .42 and .10 ha^{-1}, respectively. Including radishes in barley an corn rotations maintained egg and/or juvenile popu tions below the economic threshold of $3/cm^3$ of soi until midseason of sugarbeets. Even at sugarbeet harvest there were fewer nematodes than with the barley-fallow-sugarbeet rotation. There were no s ficant differences in nematode populations with the use of radishes in the dry bean rotation. In the barley and corn rotations, substituting radishes aldicarb improved sugarbeet yields 11.0 and 4.3 ha^{-1}, respectively. This was adequate to offset co of growing radishes. Radishes did not significan affect sugarbeet yields in the dry bean rotation

D.W. Koch (307) 766-3242

Managing Soil Fertility to Control Weeds. E.A. DYCK* and M.L. LIEBMAN, Univ. of Maine.

Four years of field experiments comparing the use of a leguminous N to that of synthetic N fertilizer indicate that soil fertility management can strongly influence the level of weed interference with crop growth Incorporation of crimson clover (Trifolium incarnatum L.) residue as manure was found to suppress lambsquarters (Chenopodium album L emergence and drymatter accumulation in a subsequent sweet corn (Zea mays L.) crop in comparison to a control treatment where no N

WHOLE-FARM NUTRIENT DISTRIBUTION AND CYCLING[1]

R.T. Proost[2], F.W. Madison J.A. Wyman, and L.K. Binning.

As nutrient management plans become increasing important to Wisconsin farmers, a method to forecast nutrient movement within the farm as well as nutrients entering and exiting the farm becomes an important nutrient management tool. Soil tests currently guide a farmer when making nutrient management decisions. However, these tests reflect past management decisions. If a system could be devised to accurately estimate the influence of current practices, this, in addition to soil tests, could give a farmer better information for decision making. Systems such as this have been used widely in European countries and could be developed for this country.

Textbook nutrient cycles can provide a sound understanding of the dynamics of crop nutrients. However, the complex nature of these nutrient cycles precludes their use when trying to understand nutrient cycling from the whole-farm level. A method to study whole-farm nutrient cycling was developed using two tiers of detail, farm level and field level. At the individual field level, the major sources in nutrient movement are fertilizers, manures, fixed nitrogen from legumes, crop removal and crop residue. While soil erosion can play a major role in nutrient loss, if a properly prepared conservation plan is followed, this loss is minimal. At the whole-farm level the major nutrient sources leaving the farmstead are milk, grain, livestock sold and manures applied to other farms. The major nutrients entering the farmstead are fertilizers, grain, feed and livestock purchased.

Once the sources of nutrients at each level have been identified, the next step is to calculate the weighted farm average for phosphorus and potassium. (Nitrogen is not addressed due to the complex transformations nitrogen can make and the inability to accurately estimate these transformations.) This calculation is made by taking the number of acres of an individual field and multiplying it by the soil test number of that field, then dividing that number by the total farm cropland acreage. Do this for each field on the farm and sum the numbers. This is the weighted farm average for the nutrient in question. See example.

---

[1] This work was supported by a grant from the United States Department of Agriculture and the Environmental Protection Agency, Agriculture in Concert with the Environment Program.

[2] Senior Outreach Specialist, Professor, Professor, and Professor, respectively. Nutrient and Pest Management Program; Department of Soil Science and the Wisconsin Geological and Natural History Survey; Department of Entomology; and the Department of Horticulture, UW - Madison

An Example of Calculating Weighted Farm Averages for Nutrients - Phosphorus.

Example Data: Total farm cropland acres = 100.
Field 1 = 10.0 acres; soil test P = 25 ppm; soil test K = 90 ppm
Field 2 = 45.0 acres; soil test P = 18 ppm; soil test K = 125 ppm
Field 3 = 25.0 acres; soil test P = 30 ppm; soil test K = 135 ppm
Field 4 = 30.0 acres; soil test P = 15 ppm; soil test K = 95 ppm

Calculations:

	Phosphorus	Potassium
Field 1	= (10.0 x 25)/100 = 2.5	(10.0 x 90)/100 = 9
Field 2	= (45.0 x 18)/100 = 8.1	(45.0 x 125)/100 = 56.25
Field 3	= (25.0 x 30)/100 = 7.5	(25.0 x 135)/100 = 33.75
Field 4	= (30.0 x 15)/100 = 4.5	(30.0 x 95)/100 = 28.50
Weighted farm averages:	22.6 ppm	127.5 ppm

Once the weighted averages have been found, the next step is to determine if these values are optimum for the farm's crop rotation. If not, additional nutrients must be applied. If they are, the next step is to balance the farm's nutrient export with nutrient import. (This is a more complex calculation that cannot be discussed here.) If nutrient export is more than nutrient import, then additional nutrients must be imported on the farm, otherwise the nutrient status of the farm will decrease. If nutrient export is less than nutrient import, then nutrient import must be reduced, otherwise the nutrient status of the farm will increase.

Equally important is the nutrient distribution within the farm. This is done by comparing the soil test report forms of the individual farm fields. A large number of fields can easily be done by graphing the nutrient level of all the individual fields. By comparing the soil test levels, one can see which fields are in need of a certain nutrient and which fields are in excess. The next step is to redistribute the nutrients. This can be accomplished by cropping a high soil test field down and using manure to redistribute the nutrients to a low testing field.

This method can allow farmers and consultants to forecast what may happen to the farm's nutrient status if certain cropping practices and rotation are applied to the farm. This method of nutrient balance is not fully developed, however it does show that it can be an effective method of nutrient management when used with routine soil testing. This method will continue to be developed and be made available to farmers in the near future. Any comments, questions or concerns about this approach will be most helpful in the development of this method. Please direct them to the author.

American Society of Agronomy

Crop Science Society of America Soil Science Society of America

November 13–18, 1994 Seattle, Washington

Agronomic Divisions

Crop Science Divisions

Soil Science Divisions

Branch Meeting Abstracts

Published by
AMERICAN SOCIETY OF AGRONOMY
677 South Segoe Road, Madison, WI 53711