Myakka

A Soil and Water Science Department Publication

Volume 2 Number 1 | Institute of Food and Agricultural Sciences | Spring 2002

Featuring SWSD Thrust Area:

Nutrient Management

Students, staff and faculty conducting research at dairy spray field in the Suwannee River Basin

Organic subsidence (2002) in the Everglades Agricultural Area

Editors:

Pam Marlin
Darryl Palmer
Dr. Vimala Nair

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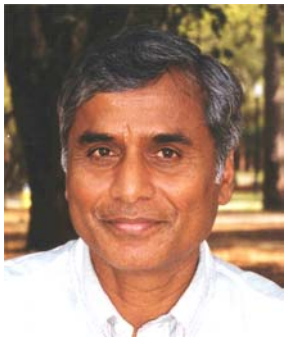

From the Chair...

Non-point source pollution of our streams, rivers, groundwater, lakes, wetlands, and estuaries is closely linked to the management practices used in agricultural and urban land ecosystems. The question of immediate concern is: *Are the current practices used in these ecosystems compatible or adequate to sustain or improve the quality and productivity of our natural resources?* Many current practices are compatible, but not all are adequate to sustain natural resource quality. Our stakeholders demand that natural resource quality be protected, placing a greater demand on producers to deliver environmentally sound goods. Understanding the ability of the soil resource to maintain sustainable productivity and to buffer or improve water quality is fundamental to meeting this challenge. A holistic, integrated approach to research, education, and outreach is required to develop alternative practices that will maintain environmentally sound nutrient management in these ecosystems. This expanded Soil and Water Science Department (SWSD) newsletter primarily focuses on our efforts in addressing nutrient management issues in a wide range of agricultural ecosystems in the State of Florida and beyond.

All nutrient management programs in the SWSD are multi-disciplinary, or regional, national and international in nature. Our faculty are located at all the major IFAS Research and Education Centers statewide providing localized solutions for efficiency enhancement in nutrient management while integrating with statewide efforts to create and disseminate cutting-edge science based tools. In addition to several UF-departments, our collaborators in the state also include the FDACS, FDEP, NRCS, Water Management Districts, county governments, Waste Management agencies, and private industry.

Some examples of nutrient management programs are highlighted in this newsletter. These include: Suwannee River Basin, citrus ecosystems, Everglades Agricultural Area, vegetable and horticultural crop production, turfgrass and topical fruits ecosystems. In collaboration with departments of Agricultural and Biological Engineering and Environmental Engineering Sciences, we have initiated a major research and education effort in the Okeechobee Basin to address phosphorus management and remediation issues. This program is funded by FDACS, FDEP, and the South Florida Water Management District.

In the past three decades, we have made major efforts in addressing environmental issues related to soil and water quality in a number of ecosystems in agricultural lands. The SWSD continues to lead IFAS in resolving critical and sensitive nutrient management issues for current day agricultural, natural resources and environmental stakeholders.

The SWSD is facing some new challenges. With our senior faculty retiring or leaving for other positions, replacement of these positions is vital to maintaining the department's ability to serve our clientele. The department is blessed with excellent faculty, staff and students and as this group has done in the past, once more they will be ready to meet any new challenges.

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Teaching

NEW GRADUATE STUDENTS Spring 2002

Noel Cawley, *Ph.D., Advisor, W.F. DeBusk*
Chakesha Martin, *M.S., Advisor, J.R. White*
Monika Tkaczyk, *Ph.D., Advisor, J. W. Jawitz*
Isabella Torres, *Ph.D., K.R. Reddy*

GRADUATES Spring 2002

James Bonczek, *Ph.D., Advisor, P. Nkedi-Kizza*
Quentin Clark, *M.S., Advisor, K.R. Reddy*
Larry Ellis, *M.S., Advisor, M.E. Collins*
Iuri Herzfeld, *M.S., Advisor, W.F. DeBusk*
Mark Ou, *M.Ag., Advisor, P. Nkedi-Kizza*
Michelle Rau, *M.S., Advisor, K.R. Reddy*

UNDERGRADUATE STUDENTS Spring 2002

Scott Prospect

GRADUATES Spring 2002

Andrew Strickland

Off-Campus Distance Education Master of Science Degree with Environmental Science Track

The UF-SWSD off-campus Master of Science degree (non-thesis or thesis option) with Environmental Science Track is available beginning Fall term 2002. Courses are offered via distance education to accommodate place-bound students interested in environmental issues related to the soil and water quality of agricultural lands, forested lands, range lands, urban lands, or wetlands. The program is offered in conjunction with faculty at the off-campus Research and Education Centers (REC) located statewide.

Students wishing to enroll in this graduate track should have a bachelor's degree from an accredited college or university with a major in soil and water science or an equivalent degree in an allied field such as geology, natural resources, biology, ecology, hydrology, microbiology, environmental science, horticultural science, environmental engineering, agricultural engineering or agronomy. Those students who do not meet these requirements will be expected to make up deficiencies early in their graduate programs. Admission criteria include a B average or better for the last two years of the baccalaureate program, and satisfactory scores (total of 1000 in verbal and quantitative portions) on the General Test of the Graduate Record Examinations (GRE).

Dr. Sabine Grunwald, Assistant Professor of Land Resources assumed the responsibilities of the Distance Education Coordinator. For additional information, contact Dr. Grunwald at: SGrunwald@mail.ifas.ufl.edu or browse through our web site: http://DistEduc_SWS.ifas.ufl.edu.

FACULTY, STAFF and STUDENTS

Christine Bliss won first place poster at the campus-wide Graduate Student Forum on April 4th in the Environmental, Agriculture and Life Sciences Division.

Kevin Grace won second place in the Oral Presentation in the Environmental, Agriculture and Life Sciences Division.

Travis Hanselman was awarded first place (Soil and Environmental Quality) in the 2002 Graduate Student Paper Contest of the Soil and Crop Science Society of Florida.

Don Graetz was awarded UF Research Foundation Professor for 2002-2005 in recognition of his outstanding research accomplishments and scholarship.

Lena Ma was awarded the Gamma Sigma Delta Junior Faculty Award in March 2002.

Ramesh Reddy was awarded the Senior Faculty Research Award from the University of Florida Chapter of the Sigma Xi Scientific Research Society.

David Sylvia accepted the position of Head, Department of Crops and Soil Sciences at the Pennsylvania State University. We wish David all the best in his new assignment.

John White was nominated President-elect of the University of Florida Chapter of the Sigma Xi Scientific Research Society.

The Third Annual Soil and Water Science Departmental Research Forum September 5, 2002 J. Wayne Reitz Union - UF-Campus

The Third Annual Soil and Water Science Research Forum is scheduled for September 5, 2002, in Gainesville, Florida. The forum is designed to bring together representatives from state and federal agencies, and private industry, faculty and graduate students, and prospective students interested in soil and water science. The forum will provide an opportunity for all interested in soil and water science to interact with our students, faculty and administrators on campus.

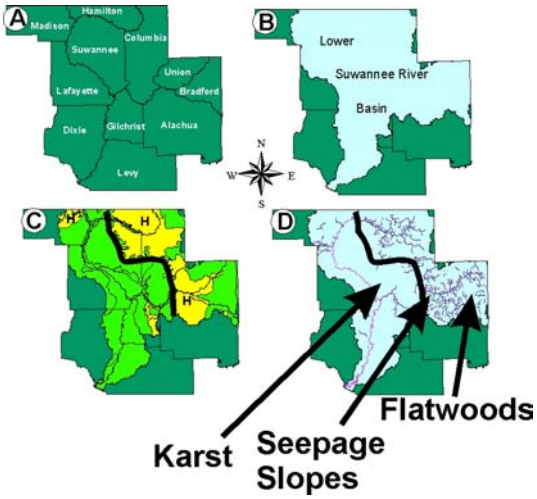
Several of graduate students and post-doctoral research associates, and faculty are planning to make either oral or poster presentations at the forum. Our faculty will be available to discuss collaborative projects. Register at our web site: http://soils.ifas.ufl.edu/forum.

Research

Nutrient Management in the Suwannee River Basin: Geographic Considerations

Several SWS faculty are involved in research projects addressing nutrient management issues in the Suwannee River Basin. These projects assess risks associated with nitrate and phosphate applications. The risks relate to geographic factors.

The Lower Suwannee River Basin spans several Florida counties (Figures A and B) where agricultural activities have potential to affect the groundwater, river, and estuary. The path of water movement strikingly differs between the eastern and western part of the Basin, along a line (black line, Figure C) tracing the approximate western extent of the contiguous Hawthorn (H; yellow area) Geologic Group. Superimposing that same line on a map of the streams (Figure D) shows that stream density is much greater to the east of the line, over the Hawthorn and beyond. The high stream density is due to low permeability of some strata within the Hawthorn, which divert water laterally.



To the west of this line lies “karst”, a landscape underlain by limestone where water is not laterally diverted near enough to the surface to develop extensive surface drainage. The black line drawn in Figures C and D roughly parallels the Cody Scarp, which separates the dissected terrace to the east from the lower, less sloping area to the west.

Here is what this geologic-hydrologic-landscape relation means for soils and nutrients: (i) Soils to the west, on karst landscapes, are characterized by good drainage and vertical water movement. These conditions minimize denitrification, and hence nitrate leaching is a risk. Also, phosphate environmental risks are related to leaching rather than surface runoff. (ii) Soils along sideslopes just to the west of the line tend to be imperfectly drained due to seepage. They also commonly contain high natural levels of phosphate due to the influence of the phosphatic parent materials (Hawthorn Group formations). A valid question: what is the ecological influence of these naturally-phosphatic soils? (iii) Soils on the flatwoods further to the east, on the less-dissected part of the terrace, tend to be poorly drained (promoting denitrification), and constitute less risk of nitrate leaching. However, they are highly vulnerable to phosphate movement via runoff or shallow subsurface flow in unreactive soil horizons.

For additional information contact W.G. Harris (wghs@mail.ifas.ufl.edu).

Nutrient Management Practices for Animal Waste and Fertilizer Applications in the Suwannee River Basin

Sampling ground water monitoring wells at a dairy farm

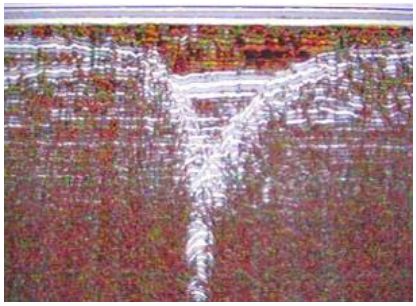
The Soil and Water Science Department, along with other UF departments and centers (Agricultural and Biological Engineering, North Florida Research and Education Center), state agencies (Department of Agricultural and Consumer Services, Department of Environmental Protection) and federal agencies (Natural Resource Conservation Service) are cooperating in a 319-funded project entitled “Effectiveness of Best Management Practices (BMPs) for Animal Waste and Fertilizer Management to Reduce Nutrient Inputs into Ground Water in the Suwannee River Basin.” Recent data have indicated increasing levels of nutrients, especially nitrate, in ground water, spring water, and private drinking water wells. This has brought about a need for agency efforts to find nutrient management solutions to the problem. As a result, public agencies and the agricultural community are taking the lead in implementing a watershed-based process for BMP development, demonstration, refinement, and implementation to reduce nutrient loadings to ground water and surface water, involving stakeholders throughout the basin. These cooperators have formed the Suwannee River Basin Nutrient Management Working Group (SRBNMWG) also known as the Suwannee River Partnership. Information on the partnership is available at http://www.srwmd.state.fl.us/waterquality/srbnmwg.html

As one component of partnership activity, the 319-funded project addresses BMPs on a dairy, a poultry, and a vegetable farm in Lafayette and Suwannee Counties in the Middle Suwannee River Basin. Each farm has been instrumented with a ground water monitoring well network. Wells and soil profiles are being intensively monitored to determine pre- and post-BMP nitrate concentrations on each of the farms. A one-year pre-BMP monitoring phase has been completed on all the farms and BMPs are now being implemented to address the elevated nitrate concentrations observed in some of the monitoring wells. The overall goal of this project is to demonstrate that effective BMPs can be implemented to reverse the increasing trend of nitrate concentrations in the ground water and springs of the Middle Suwannee River Basin.

For additional information contact D.A. Graetz (dag@mail.ifas.ufl.edu).

UF/IFAS Role in the Development of the Florida Phosphorus Index

Soil profile showing redoximorphic features at the Bt horizon



GPR image showing presence of a sink hole

The Phosphorus Index (P-Index) is a site specific, qualitative vulnerability assessment tool that allows selection of sites that are potentially the least vulnerable to off-site movement of P. The P-Index also allows the selection of conservation practices to reduce the risk of P loss from a given site. Major participants in developing the Florida P-Index include the Soil and Water Science Department, Agriculture and Biological Engineering Department, NRCS, Florida Department of Agriculture and Community Services, the USDA-Agricultural Research Service, as well as other agencies, organizations and private individuals.

The Florida P-Index was concurred on November 13, 2000, by the USDA State Technical Committee and adopted by T. Niles Glasgow, NRCS State Conservationist. With the aid of a 4-year USDA-IFAFS grant awarded in September 2000, Soil and Water Science investigators, in collaboration with the USDA-ARS Research Laboratory in Tifton, Georgia, are testing the Florida and Georgia P- indexing schemes on highly leachable soils and karst landscapes. Preliminary information suggests that karst landscapes may require further refinement of the "leaching criterion" in the P-Index, based on water moving preferentially through breaches in Bt horizons or through redox-depleted zones within the Bt horizon.

Systematic profiling using ground penetrating radar (GPR) is expected to provide the necessary information related not only to the leaching criterion, but also to establish the presence of sink holes that may constitute elevated risk for the "potential to reach water body" criterion as defined in the P-Index. Details of the Florida P-Index are available at http://www.fl.nrcs.usda.gov/flgeneral/pifinal.pdf.

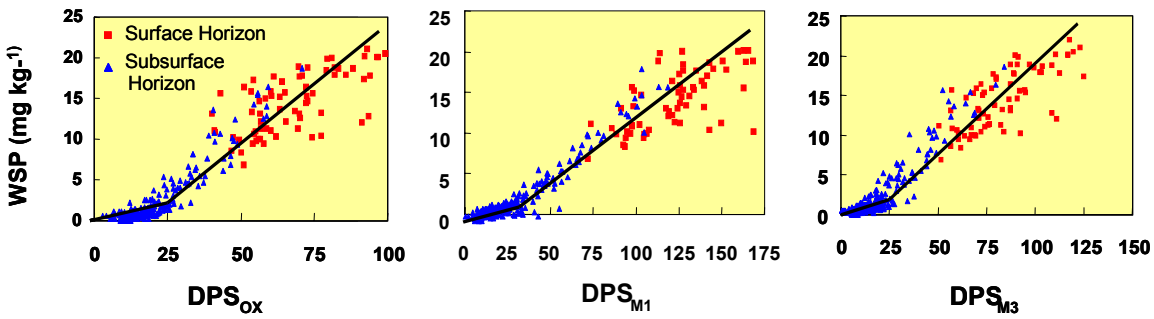
For additional information contact V.D. Nair (vdna@mail.ifas.ufl.edu)

A Soil Phosphorus Saturation Index for Phosphorus Management in Florida

Soil tests were originally designed and calibrated to evaluate soil fertility for crop production. However, in Florida and most of the US, soil fertility tests for phosphorus (STP) are currently used for environmental evaluation of P saturation even though calibration for such purposes is minimal. For example, STP is a management factor in the Florida P-Index. The Degree of P Saturation (DPS), a concept first introduced in the Netherlands, relates a soil's extractable P to its P sorbing capacity and is reportedly a predictor of the P likely to be mobilized from a soil system. DPS, expressed as a percent, is calculated by dividing the ammonium oxalate-extractable P value by the sum of oxalate-extractable Fe and Al. Soil profiles with weighted DPS values >25% have been identified as contributing to groundwater pollution with P.

Oxalate extraction is not common in Florida, so use of the DPS approach would require additional analyses. Mehlich 1 is the common soil test extractant for P and Mehlich 3 is becoming increasingly popular as a soil test extractant. We determined DPS for several manure-impacted surface and subsurface soils as originally expressed (DPS_{Ox}) and compared the results with DPS calculated using Mehlich 1 (DPS_{M1}) and Mehlich 3 (DPS_{M3}) as the extractants for P, Fe, and Al. In all three cases of DPS calculations (using oxalate, Mehlich-1, or Mehlich-3), it was noticed that the relationship between water-soluble P (WSP) and DPS has an abrupt slope change at about 25% DPS. If the 25% DPS value is taken as a critical DPS for Florida soils, a large percentage of manure-impacted surface soils will exceed the value, and could potentially be a risk to water quality.

Given that DPS_{M1} can be readily obtained in Florida soil testing programs and there is strong evidence in the literature for the 25% DPS being a critical value for environmental risk, it may be desirable to replace STP with DPS_{M1} as an indicator of P release potential in the management factor in Florida's P-Index. For additional information, contact V.D. Nair (vdna@mail.ifas.ufl.edu).



Precision Agriculture to Identify Limiting Soil Factors in Citrus Production

Nutrient management research conducted by Arnold Schumann, Assistant Professor of Plant Nutrition at the Citrus Research and Education Center (CREC), Lake Alfred, concerns the citrus soil-water-plant system. Together with cooperators at the CREC and Gainesville campus, improvements in citrus nutrition are being developed, especially better nitrogen (N) use efficiency while sustaining profitable yields and maximizing environmental protection (N-BMPs). New precision agriculture projects are focusing on the causes and effective remedies for in-field soil variability which causes unacceptable spatial yield variability and low profitability per acre. This requires developing and implementing rapid in-field soil and tree nutrient / water sensing methods which improve the site-specific diagnosis and management of spatially variable soil and tree nutrients. Aerial photographs, yield maps and in-field observations of many Florida citrus groves have suggested strong links between under-performing areas of groves and soil factors, especially in the flatwoods regions. The objective of this study is to identify soil-limiting factors for citrus production and to devise strategies for remediating these factors. Spatial variability of soil conductivity measured with an EM38 (Geonics, Ltd) electromagnetic induction soil profiler and georeferenced with a DGPS in study sites in south Highlands and north Hardee counties demonstrated the important contribution of soil to spatial variability of citrus growth and production. Ground truthing data collected to date have revealed a link between apparent soil conductivity measured down to 1.5 m by the EM38 and the characteristics (depth, development, thickness) of the Bh or Bt horizons underlying E horizons. Ground water monitoring also showed large spatial variations related to soil conductivity, which may be from water table perching on these poorly drained impervious subsoil horizons. Different soil series within citrus blocks, displaying a range of texture, organic carbon content, CEC and soil water relations are responsible for much of the observed yield variability in north Hardee county. Soil water sensors placed in the rooting zone of trees have shown very different responses of these adjacent soils to irrigation, rainfall and evapotranspiration. Possible solutions for improving overall citrus profitability in highly variable groves include soil amendments of clay or organic matter, and improved scheduling of nutrition and irrigation preferably applied at variable rates. For additional information contact A. Schumann (awschumann@lal.ufl.edu).

Typical installation of an instrument-sensor cluster, measuring rainfall, irrigation water pressure, watertable depth, and volumetric soil water in the citrus root zone

Citrus Nutrient Management in the Southwest Florida Flatwoods

About 20 years ago, freezes in the northern part of Florida's citrus-growing region resulted in a relocation of much of the industry to the warmer southern peninsula. The impact of this move was felt strongly in southwest Florida, where grove area more than tripled from 57,000 acres in 1982 to 180,000 acres in 2000. Southwest Florida now produces almost 25% of the Florida citrus. Growers moving south encountered a change of soil type from deep, well-drained central ridge Entisols to poorly drained flatwoods Spodosols and Alfisols. Citrus nutrient management is somewhat different on these soils due to restricted root zones resulting from shallow water tables and subsurface hardpans.

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Decreasing Nitrogen Leaching During Turfgrass Establishment

Student, Travis Shaddox

Establishment of new golf courses or renovation of existing turfgrass sites, such as public parks and sports fields, is common practice in Florida. During establishment, large amounts of nitrogen fertilizer and water are used to ensure rapid turf coverage. This can lead to increased nitrate leaching to groundwater. Travis Shaddox in Dr. Jerry Sartain's research program recently completed a study in which nitrate leaching as influenced by fertilizer type and application method during turfgrass establishment was investigated. The study consisted of applying a soluble nitrogen fertilizer or that fertilizer mixed with a controlled-release fertilizer, with each being applied according to two methods. The standard method consisted of applying the same amount of nitrogen each week for 12 weeks. The progressive method consisted of applying low amounts of nitrogen during the initial weeks of growth, and then increasing that amount as the turf biomass increased. Results from the study show that the addition of the controlled-release nitrogen source decreased leaching by 40%. Nitrate leaching was further reduced under the progressive application method. Establishment was not affected by either fertilizer type or application method, with full coverage under the standard and progressive method being achieved at 36 and 34 days after planting, respectively. The practical implications of this research are that nitrogen loss via leaching during turfgrass establishment can be reduced without adversely affecting establishment by applying a combination of soluble and controlled-release nitrogen fertilizer in a progressive-type application method.

For additional information, contact J. Sartain (jbs@mail.ifas.ufl.edu).

Citrus Nutrient Management in the Southwest Florida Flatwoods

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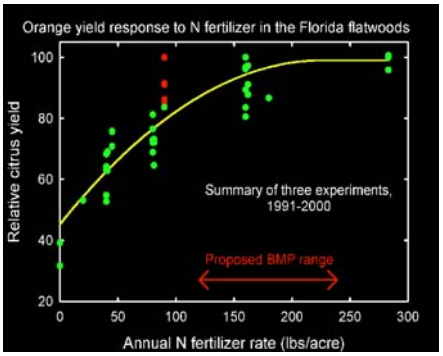

Best management practices (BMPs) for citrus N fertilization are currently being developed in Florida in response to groundwater nitrate concerns. During the 1990s, the research program headed by Thomas Obreza, Professor at the Southwest Florida Research and Education Center in Immokalee evaluated orange yield response to water-soluble and controlled-release N fertilizer (CRF) in three flatwoods field experiments to help define optimum N rates for maximum fruit production and quality in support of BMP development. Experiments each lasted 5 to 7 years; two were initiated on newly-planted trees, and one on established trees. In no case did orange yield respond positively to annual N rates above 240 lbs N/acre, which is the interim BMP maximum N rate. Yield responses were not economic above 200 lbs N/acre, which is the University of Florida's maximum recommended rate. The data suggest that maximum economic yield of oranges grown in the Florida flatwoods can be obtained using N rates at or below the interim BMP rate.

Recently citrus nutrition efforts have shifted towards P and K fertilization. A calibration experiment was initiated using Mehlich 1 and 3 extractants in 1998 in a newly planted citrus grove that was very low in soil-test P and K. A range of P and K fertilizer rates were applied annually and showed increased soil test values for P but not for K. Tree growth and fruit yield have responded positively to K fertilizer but not to P fertilizer despite the fact that soil-test P in control plots is in the "very low" range. This research will enable the Florida citrus industry to more appropriately allocate P and K fertilizer costs, minimize impact on surface water quality, and produce higher quality fruit by understanding the main effects and interactions of P and K.
For additional information contact T.A. Obreza (taob@mail.ifas.ufl.edu).

Nutrient Mitigation in the Indian River Lagoon Area

The Indian River Lagoon (IRL), stretching 155 miles from Volusia County down to Northern Palm Beach County, is a natural resource of regional significance. This drainage basin was historically long and narrow. However, construction of extensive drainage canal systems during the early 1900s more than doubled the size of the IRL drainage basin. These drainage canals collect and transport large volumes of storm water runoff from a variety of different land-use types within the drainage basin. This runoff water is the primary source of nitrogen and phosphorus in the IRL, originating from non-point sources primarily south of Melbourne.

Citrus acreage is one of the largest land-uses in the IRL drainage basin. The majority of this acreage is located in the "expanded watershed" areas created by the drainage canal systems built earlier this century. Citrus production, as well as other land-uses, is receiving heavy local scrutiny regarding its contributions of nutrients to the IRL. In an effort to help improve the quality of water leaving IRL area citrus groves, a manual entitled, "Water Quality/Quantity BMPs for Indian River Citrus Groves" was developed. This manual represents the cumulative effort of several State agencies, local growers, and IFAS researchers. The development of the manual was facilitated by Brian Boman (Agricultural Engineering), Chris Wilson (Indian River REC, Ft. Pierce), and Jack Hebb (St. Lucie County Cooperative Extension Service).

Practices listed in this manual were selected based on Best Professional Judgment since research is lacking in many of the areas. The manual was published by the FDEP and FDACS in 2000. Current research projects are evaluating the effectiveness of several of the recommended BMPs for reducing nutrient losses from citrus production areas. These practices cover a wide range, including: the use of top-discharging water control structures, sediment traps, and maintaining vegetative filter strips on citrus beds and within water furrows.

Orange Grove

Studies are also being conducted to evaluate sampling frequency necessary to accurately characterize phosphorus loadings at a watershed sub-basin scale within a typical, flashy water control district. Additional research is focusing on the use of natural and innovative biofiltration technologies for reducing concentrations of nitrogen and phosphorus in surface water.

For additional information contact C. Wilson (pcwilson@mail.ifas.ufl.edu).

Best Management Practices to Improve Water Quality in the Everglades Agricultural Area (EAA)

The Everglades Agricultural Area (EAA) comprises 700,000 acres of highly productive land south and downstream of Lake Okeechobee. The soils in the EAA are organic and artificially drained for crop production. The majority of the land is in sugarcane production, with other crops including rice, sod, sweet corn, lettuce and other vegetables. The University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) Best Management Practices (BMP) research and education projects to reduce phosphorus (P) concentrations and load reduction from the EAA started in 1986.

Current research and extension efforts at the EAA are multi-faceted. Research includes development of management strategies to address particulate P source and transport mechanisms. Farm-level studies showed that particulate P in drainage water samples accounts for up to 60% of total P leaving the farm. An extensive array of monitoring instruments were installed at seven farms to track changes in P concentrations, and drainage water discharge. Appropriate BMPs were adopted at each site, and the effects of implemented practices assessed at each farm.

Controlled fertilizer application by AIRMAX

The farm level reductions appear to be reflected in basin-level monitoring data collected by the South Florida Water Management District (SFWMD). Hydrologically adjusted farm-level load reductions, expressed as the SFWMD adjusted unit area load (AUAL), averaged 54.9 % for the project sites (7-year average referenced to WY93-94). The EAA basin-level AUALs decreased by approximately 41.4% and total P concentrations by 7.9%.

Extension efforts involve BMP training workshops for growers, extension publications, on-farm demonstration plots, and individualized consulting with growers to improve their BMP implementation to further reduce P leaving their farms.

For additional information contact S.H. Daroub (sdaroub@mail.ifas.ufl.edu).

Production Bed Model Improvement

Agricultural production of vegetable and horticultural crops in Florida's sandy soils and humid subtropical climates typically involves a number of intensive management practices for purposes of maintaining optimum soil water, aeration, nutrient, thermal, and pest-free soil environments for crop root systems. A system of parallel, plastic-covered soil beds separated by bare furrows is commonly utilized for intensive production of high-value crops such as strawberry. The raised beds provide drainage of excess water during rain storms, as well as elevated soil temperature. During cooler winter Months, plastic films over the beds alter the hydrothermal environment of soil in the beds by providing a warming effect and minimizing evaporative water loss from the soil. Starter fertilizer is typically applied in concentrated bands to the soil bed and pesticides are applied to minimize adverse effects of pests to plant root systems. Drip irrigation and subsurface drainage practices are utilized to minimize periods of inadequate and excessive soil water environments, respectively. During periods of rain storm events, plastic covers minimize excess water infiltration and thus inhibit excess leaching of agrichemicals from the soil beds.

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Nutrient Management for Improved Lychee Yields

Lychee (*Litchi chinensis* Sonn.) is gaining popularity in American markets and is becoming a high value crop in south Florida. However, unreliable flowering and yield seriously impact lychee production. Flowering normally follows cold or drought stress. Warm weather, high rainfall and excessive nutrients cause unreliable flowering and fruit set. When excessively watered and fertilized, lychee trees grow vigorously and produce vegetative flushes every two or three months. The lack of maturity of late vegetative flushes in the late fall or early winter prevents flowering in January and February. Yuncong Li and his colleagues at the Tropical Research and Education Center in Homestead demonstrated that the timing and rate of nitrogen fertilizer significantly affected soil and leaf nitrogen status. High nitrogen concentrations in the leaves were associated with vegetative flushing and reduced flowering and yield. Vegetative flushes in late fall can be prevented by restricting nitrogen in summer. Thus, through proper nitrogen fertilization, growers can achieve abundant flowering and ultimately increase yields.

For additional information contact Y. Li (yunli@mail.ifas.ufl.edu).

Extension

Nutrient Management for Sustainable Productivity and Water Quality

The need for solutions as we strive to balance nutrient management for economical as well as environmental sustainability has never been greater. The SWSD Nutrient Management extension program takes a preventive and proactive posture by offering soil testing services, developing educational material and offering training to IFAS county faculty, consultants, and stakeholders. The role of nitrogen, phosphorus and several trace metals as plant nutrients on the one hand and as major soil and water contaminants with potential health and quality risks on the other, poses a challenge to scientists and regulators alike. The extension program packages state-wide SWSD research for the benefit of the clientele, starting with sustainable crop production to minimize nutrient-impacts on the environment and fragile ecosystems of Florida.

The Extension Soil Testing Laboratory is the flagship of the SWSD nutrient management extension program, a critical diagnostic service, analyzing over 12,000 soil, water and tissue samples yearly for commercial producers and homeowners of Florida, including IFAS extension faculty. The SWSD extension faculty plays a pivotal role in taking up field demonstration projects such as the Suwannee 319 project at the crop production, dairy and poultry sites, P-studies on potatoes in calcareous marl soils of Homestead and vegetables in southwest Florida, P- leaching studies in south Georgia and north central Florida, nitrate studies on potatoes in the St. Johns River Basin, P-retention studies in the Lake Okeechobee Basin, etc. The SWSD faculty provided significant technical support to the development of the Florida P-Index, a multi-agency effort led by the NRCS.

Our extension faculty is also taking a major lead in the development of commodity and region specific 'Best Management Practices' (BMPs) for Florida agriculture. Such efforts include BMPs for Indian River Citrus Production, Forage Production, Row Crop and Vegetable Crop Production, Landscape and Turfgrass Production, Ridge Citrus Production, Nursery Production, and Beef Cattle Production. A major grant contract was secured from FDACS by the SWSD and the Agricultural and Biological Engineering extension faculty in collaboration with the NRCS to provide the required training for nutrient management certification to third party vendors and others in Florida. The first training session is scheduled for June 4-6, 2002 in Okeechobee. The SWSD faculty have been taking a lead role in the Certified Crop Adviser training programs. For additional information contact R.S. Mylavarapu (raom@mail.ifas.ufl.edu).

Announcing the Arthur G. Hornsby Extension Professorship

Arthur G. Hornsby, professor of Soil and Water Science, Institute of Food and Agricultural Sciences (IFAS), University of Florida, with wife, Kathy.

After a distinguished career of 30 years (11 years with U. S. Environmental Protection Agency and 19 years at the University of Florida), Dr. Hornsby retired from professional service. In recognition of his professional contributions, UF-IFAS is establishing an endowment from private donor funds to support the **Arthur G. Hornsby Extension Professorship.**

The Art Hornsby Extension Professorship program is a faculty recognition program named in honor of Dr. Art Hornsby. The program bestows an honorary title for an outstanding extension faculty member contribution to protection of our soil, water and other natural resources in Florida.

Contributions to the fund would be fully tax deductible. Your contributions can be mailed to Office of Development-SHARE, P.O.Box 110170, Gainesville, Fl. 32611-0170.

Production Bed Model Improvement

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Environmental impact of agrichemicals applied during intensive management of high-value crops growing in systems of mulched soil beds is incompletely known. Many factors including the hydrothermal status of the soil affect the fate and transport of these agrichemicals in soil bed systems. With current and future environmental issues concerning TMDL's and protection of water quality, the ability to predict what the fate of applied agrichemicals would be under different management scenarios would very beneficial for planning and avoiding those practices which contribute to groundwater contamination.

A mechanistic 2-dimensional model for coupled water-heat and chemical transport for non-isothermal conditions has been used to numerically simulate the diurnal dynamics of the hydro-thermal environment within raised soil beds covered with plastic mulch. This model has also been used to investigate fumigant (methyl bromide) fate and transport in soil beds during fumigation. The development of this model was supported by resources from the Lake Manatee Watershed Demonstration Project (USDA Water Quality Initiative). Faculty members Craig Stanley and Bob Mansell with graduate students Arne Olsen and Ha Wonsook are collecting experimental field data at the Gulf Coast Research and Education Center in Bradenton to be used to validate the present model and to add a plant water uptake component and user-friendly interface. It is expected that this improved model will be useful in simulating different management scenarios that will provide information for improving management decisions concerning nutrient and other agrichemical applications made by the vegetable producer. For additional information contact C. Stanley at cds@gnv.ifas.ufl.edu