RUTGERS COOPERATIVE EXTENSION

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

Water Quality and Agriculture Projects

November, 2003

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

Every day in New Jersey, growers, dairymen, pasture managers, horse owners, and others in agriculture demonstrate farm management skills to minimally impact water quality and the environment.

They are assisted in their voluntary efforts by a diverse and powerful range of research, demonstration, and outreach projects conducted by the New Jersey Agricultural Experiment Station (NJAES) and Rutgers Cooperative Extension (RCE). Fact Sheet publications emerging from the research through RCE give managers sound information to make good management practice decisions.

The purpose of compiling the work of our faculty and staff is to demonstrate NJAES's ability to support good research-based agricultural practice decisions as pending Federal and State non-point source water quality regulations move toward implementation in New Jersey. We are proud to contribute the impressive broad range of projects in this report toward more viable New Jersey farming operations - conducting their activities in harmony with our State's surface and groundwater resources.

These regulations are primarily directed toward animal agriculture. While New Jersey has almost none of the large controversial AFOs and CAFOs found in other regions, we do have many smaller to medium sized livestock, dairy, and equine operations. The pending regulations may potentially impact their production practices and facilities as well as handling and beneficial reuse of manures or other animal wastes. The regulations may also impact crop farming operations near surface waters or watersheds.

Our results and outreach help make better agricultural practice decisions possible and provide validated data, not "junk science" on which to base regulatory standards.

This report does not claim to be an exhaustive summary of research, extension outreach, or publications. It is snapshot of agriculture related water projects during Fall, 2003. There is so much useful exciting work at Cook College, NJAES and Rutgers Cooperative Extension related to water resources and quality that we are amazed and proud to present this review.

Jack Rabin, Associate Director – Farm Services
Cindy Rovins, Crop Communications Editor

Cover photo: Natural habitat of upper Cohansey River watershed agricultural area James Johnson, 2003

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Nonpoint Education for Municipal Officials – Barnegat Bay NEMO

Principle Investigators: Christopher Obropta, Ph.D., Specialist in Water Quality; George E. Flimlin, Marine Extension Agent; Janet N. Larson, Program Associate in Resource Management
Type of Project: Workshops
Project Time Frame/ Completion Status: Project Started 1/22/03 and expected to be completed Fall 2003.

Project Description: The Barnegat Bay Project implements Non-point Education for Municipal Officials (NEMO) in all 39 municipalities of the Barnegat Bay Watershed, as recommended in the EPA National Estuary Program's Comprehensive Conservation and Management Plan. NEMO is an educational program addressing water quality through land use. The project builds on work completed by the Rutgers Center for Remote Sensing and Spatial Analysis including: GIS mapping and a "build-out" analysis of the entire Barnegat Bay Watershed. An additional objective addresses public education requirements of EPA's Phase II Stormwater permitting regulations. Every municipality in New Jersey must comply with these new regulations and obtain Phase II permits. This project assists these municipalities' compliance with the regulations.

Salem County GreenKeepers Plan – Salem River/Delaware Estuary Watershed Project

Principle Investigator: David Lee, Agricultural Agent, RCE Salem County
Type of Project: Outreach and education
Project Time Frame: January 1, 2000 through December 31, 2004

Project Description: This project is Salem County's first watershed protection initiative to reduce and prevent non-point source pollution (NPS) in the 115-square mile Salem River Watershed. The Salem River, the spine of the watershed, is cited by the Nationwide Rivers Inventory for "outstandingly remarkable values" – yet it also has critical water quality threats and impairments.
This project implements a broad-based educational campaign on protecting water resources, complemented with outreach to critical audiences. Salem County is: 1) educating and training growers to use an analytical nutrient management software program and visually scout to reduce environmental impacts from field runoff, 2) educating landowners and businesses to reduce coliform leaching from septic systems, 3) taking inventory of stream banks on participating farms/adjoining cluster homes for man-made sources of erosion and recommending vegetative buffer, reforestation, or other techniques to reduce pollution, 4) educating boaters, fishermen, and recreationers to watershed friendly practices that reduce NPS and protect habitat and species, and 5) conducting a public awareness campaign educating the general public and critical audiences about watershed protection.

Project Description: Four impaired areas of the the Salem River are undergoing tests for nutrient levels and pathogen populations. Nutrient analyses (for feed and manure) are being conducted on four participating bovine and equine farms in the watershed. The aggregate results from nutrient analyses of the farms will be compared to nutrient levels in the watershed. The basis for additional research will be determined on the analyses of results. Two educational meetings (one bovine and one equine) will be scheduled for agricultural landowners reporting results. Speakers will present information related on: 1) Nutrient Management, 2) Macro Invertebrate population/Watershed Health and, 3) Water collection and sampling techniques.

Animal Waste Management and Water Quality

Principle Investigators: David Lee, Salem County Agricultural Agent, Michael Westendorf, Ph.D., Extension Specialist in Livestock and Dairy; Marie Banasiak, Salem County Extension Program Assistant
Type of Project: Research, outreach, and education
Project Time Frame: December 2002 – March 2004

Project Description: With the EPA's concern about NPS pollution from Animal Feeding Operations and Concentrated Animal Feeding Operations (AFO-CAFO), NJDEP and participants of most of the 20 watershed planning groups are turning their attention to how NJ livestock producers can effectively reduce NPS pollution. The NJ agricultural community is facing three major challenges to help producers prepare for more intense scrutiny of their farm management while maintaining profitable and viable operations:
1) Educating livestock producers, members of the 48 livestock commodity groups, other organizations, and 4-H animal club leaders, about NPS pollution management, especially manure management, before they are confronted with possible NJPEDES permit requirements and enforcement actions.
2) Demonstrating where potential NPS pollution might be occurring on the farm and how to manage their manure and other materials to prevent discharges with minimal expense.
3) Engaging these landowners in the process of Comprehensive Nutrient Management Plan development, and clarifying the need for planning services either from the Natural Resource Conservation Service, other agencies, or the private sector.

The New Jersey AFO Outreach and Checkup Program

Principle Investigator(s): David Lee, Salem County Agricultural Extension Agent; Helen Heinrich, NJ Farm Bureau
Type of Project: Education
Project Time Frame: July 2003 through July 2004

Utilization of Community Leaves for Improving Orchard Soil Quality

Principle Investigators: Robert D. Belding, Ph.D., Extension Specialist in Pomology; Joseph Heckman, Ph.D., Extension Specialist in Soil Fertility
Type of Project: Research/Education
Project Time Frame: 3 years:1999-2002

Project Description: In the spring of 2000, two peach blocks were set up as a trial for mulch of community collected leaf organic matter (OM) to improve orchard soils. Specifically, we compared the use of leaves to no leaves applied, and the use of supplementary nitrogen to offset the nitrogen needs of decomposing OM. Finally, we compared incorporating leaves into soils where new trees were being planted or applying leaves only to the soil surface. Tree growth, nutrient status, and fruit quality were determined. Information about composting and the benefits of soil OM were relayed to growers whom readily adopted the practice as a measure to improve soil fertility, increase tree growth, and improve yields.
The effects of using leaf mulch on water quality include: reduction in use of chemical fertilization; increased soil OM helps bind nutrients, reducing leaching; microbial activity increases the breakdown of chemicals to reduce groundwater contamination; and mulch reduces surface water runoff.

Factors Affecting Disease Development in Nursery Crops Irrigated by Recycled Water

Principle Investigators: Gladis Zinati, Ph.D., Specialist in Nursery Management; Peter Oudemans, Ph.D. Specialist in Plant Pathology; Ann B. Gould, Ph.D., Specialist in Plant Pathology; Rich Obal, Monmouth County Agricultural Agent; Jim Johnson, Cumberland County Agricultural Agent; Jerry Frecon, Gloucester County Agricultural Agent
Type of Project: Research
Project Time Frame/ Completion Status: Data collection was completed in early September, 2003. Results are currently being analyzed.

Project Description: The objectives of the study were to: 1) identify nurseries that utilize a water capture and recycle system, 2) identify plant pathogens in recycled water, 3) determine predisposing factors that increase disease by measuring nutrients, EC and pH of recycled and runoff water and 4) study the effect of various fertilization and irrigation techniques on disease incidence. Five nurseries in Southern and Central NJ participated in the study. Retention ponds were bioassayed for the presence of the watermold fungi Phytophthora and Pythium on a weekly basis in July and August. The irrigation water (sanitized and unsanitized) was also sampled for pathogen detection. Irrigation water and leachate from test block plants at each site were sampled weekly to measure nutrient, EC and pH levels. Diseased plants were collected and specific pathogens involved were identified.

Project Description: The Upper Cohansey River was monitored primarily for nitrogen and phosphorus levels that were correlated with particulate matter in the water. Siltation was found to be a leading cause of impairment. The project also involved the installation of vegetative cover on erodable agricultural land near surface water, to reduce the impact of agricultural operations on water quality. We've determined the following conservation practices can impact the effects of agriculture on water quality: filter strips, water ways and diversions, drop structures, crop reserve program, minimum tillage, no till and turf strips.

Upper Cohansey Watershed Project

Principle Investigators: Jim Johnson, Cumberland County Agricultural Agent; Chris Obropta, Ph.D., Specialist in Water Quality; Cumberland Soil Conservation District
Type of Project: Research
Completion Status: Completed August 30, 2003

Project Description: The goal of this project is enabling improvement of manure-handling practices for small-scale horse farms of less than 6 horses through a multi-disciplinary approach. While developing technological approaches (such as manure composting) to deal with manure problems on small-scale horse farms is important, it is not sufficient. To develop better approaches for handling manure, scientists and engineers need to better understand the practices and perceptions of owners of small-scale horse farms. In addition, effective communication about manure-handling practices will also depend, in part, on understanding the constraints owners face. Factors that facilitate and impede appropriate manure handling are explored through interviews with owners of small-scale horse farms.

Motivating Changes in Manure Handling Practices of Small-Scale Horse Farmers: A Multi-Disciplinary Approach

Principle Investigators: Uta Krogmann, Ph.D., Specialist in Solid Waste Management; Caron Chess, Ph.D., Associate Professor, Human Ecology; Michael Westendorf, Ph.D., Specialist in Livestock and Dairy
Type of Project: Research
Project Time Frame: 2001-2004

Beneficial Uses of Excess Cranberries in New Jersey

Principle Investigators: Uta Krogmann, Ph.D., Specialist in Solid Waste Management; Barbara Rogers, Ph.D., Program Associate, Soil Ecologist in Office of Waste Management; Saratha Kumudini, Ph.D., Associate Professor, University of Kentucky
Type of Project: Workshop and Research
Project Time Frame: 2001-2003

Description: Identifying beneficial uses of organic wastes provides farmers and municipalities with organic waste management options. A dramatic drop in cranberry prices (46%) resulted in a federal regulation to limit production in 2001 (32%). Cranberry growers needed to find immediate ways to manage and dispose of their excess harvest in a cost effective and environmentally sensitive manner. The overall objective of this study was to utilize the excess cranberries as a soil amendment by assisting New Jersey growers in composting and/or using the cranberries as a mulch. The three tasks completed to accomplish this overall objective included: a) a composting workshop for the growers, b) a composting demonstration site, and c) the continuation of a pilot experiment using cranberries as a mulch.

Best Management Practices for Horse Manure on Small Farms

Principle Investigators: Uta Krogmann, Ph.D., Specialist in Solid Waste Management; Michael Westendorf, Ph.D., Specialist in Livestock and Dairy
Type of Project: Research, Factsheets and Workshop
Project Time Frame: 1999-2003

Description: Construction activities, urban runoff, and horse farms are the predominant sources of non-point source pollution in the coastal Monmouth County drainage basin. Best Management Practices (BMPs) for horse manure management and especially horse manure composting on small-scale horse farms in Monmouth County are being refined and implemented. Personnel from Rutgers animal farms designed, constructed and monitored a simple shed composter for field application. In this research portion of the project, pathogen reduction in small simple shed composters and the release of *Aspergillus fumigatus* emissions under normal farm operational conditions were evaluated. Two similar composting units were constructed in Monmouth County on two small horse farms. A third facility is designed and will be constructed shortly. The compost is used off-farm as soil amendment. Central to the project is an outreach program for information dissemination and BMP adoption. 4-H groups are part of the outreach program.

Description: The practise of applying organic wastes to land to improve soil quality has little documentation of the effects on the soil ecosystem. This study evaluated the impact of a traditional organic waste amendment (dairy manure) and a non-traditional amendment (cranberry skins) on selected chemical, physical, and biological soil properties. The surface soil of two sites was sampled:
1) a manure-amended silt loam and an unamended control, and 2) a sandy loam amended with cranberry skins at high and low rates. Chemical properties evaluated included pH, cation exchange capacity, soil organic matter content, total and inorganic nitrogen levels, and available plant nutrients (P, K, Mg, Ca, Cu, Mn, Z, and B). Physical properties included bulk density and water retention. Biological parameters included potential dehydrogenase activity and metabolic diversity.

Organic Wastes: Effect on Soil Quality

Principle Investigators: Uta Krogmann, Ph.D., Specialist in Solid Waste Management; Daniel Giménez, Ph.D., Assistant Professor, Environmental Science
Type of Project: Research
Project Time Frame: 1999-2001

Description: Non-traditional organic wastes (food-processing by-products and yard wastes) applied appropriately to agricultural fields can provide plant nutrients for crops, return organic matter to the soil, and improve the water and nutrient holding capability of the soil. However, non-traditional wastes, like traditional organic wastes, need to be handled carefully to avoid non-point source pollution. Physical and chemical characteristics were determined for selected food processing by-products and yard wastes in New Jersey. In addition, laboratory nitrogen mineralization rates (NMR) were determined for selected wastes. The effect of waste characteristics and soil type on NMRs needs to be accounted for if organic wastes are to be used as a source of N. In addition to this laboratory study, a 3-year field study of grass clippings applied to fall cabbage determined the effectiveness of using this common yard waste as a nutrient supplement for crops. Guidelines for land application of non-traditional wastes applied to agricultural fields were developed from the research completed during this project and additional data from the literature.

Best Management Practices for the Use of Non-Traditional Organic Wastes in Agriculture

Principle Investigators: Uta Krogmann, Ph.D., Specialist in Solid Waste Management
Type of Project: Research and Bulletin
Project Time Frame: 1998-2001

Implementation of Riparian Forest Buffer Systems for the Rancocas Creek Watershed

Principle Investigator: Mark C. Vodak, Ph.D., Specialist in Forestry
Project Type: Applied, Field/Demonstration/ education
Project Time Frame: Complete. 1998-2000.

Project Description: Planted two riparian forest buffers on two different sites in the Rancocas Watershed. Each were based on the US Forest Service's three-zone buffer model, utilized native plants and were approximately one-half an acre in size. Function and design flexibility were demonstrated through the use of a municipal park site and a typical farm/pasture site.

Mill Dam/Ironworks Park Riparian Buffer & Streambank Stabilization Project

Principle Investigator: Mark C. Vodak, Ph.D., Specialist in Forestry
Project Type: Applied, field/demonstration/ education
Project Time Frame: December, 2001 – June, 2003

Project Description: Extension and expansion of the Rancocas Project above. This effort encompassed approximately an additional one-half acre and both sides of the stream in this Mount Holly park. The project further demonstrated a functional riparian forest buffer restoration design which included aesthetic and recreational aspects.

A Watershed Approach to Riparian Restoration

Principle Investigator: Mark C. Vodak, Ph.D., Specialist in Forestry
Project Type: Applied, field/demonstration/ education
Project Time Frame: October, 1999 – September, 2004

Project Description: The overall purpose of this project is to build support for watershed protection through the installation or preservation of riparian buffer areas. A GIS methodology for evaluating riparian forest buffer health was developed, and four buffers planted, two each in the Pohatcong and Musconetcong River watersheds. Based on the US Forest Service's three-zone buffer model, the riparian forest buffer designs were customized to reflect the differences in site and ownership. While buffer size varied, all used native plants occurring naturally within the buffer area.

Project Description: When New Jersey began preparing TMDLs (Total Maximum Daily Loads) for the State's impaired waterways, the State decided to assemble a TMDL Advisory Panel to provide the New Jersey Department of Environmental Protection (NJDEP) technical support for its approaches to watershed restoration. The State reached out to the NJ-EcoComplex, a unit within Rutgers University's Cook College for assistance. The NJ-EcoComplex provides technical assistance to the NJDEP through a multidisciplinary panel, and administers subcontracts for related technical support. The panel has included scientists and engineers from Rutgers University, Stevens Institute of Technology, New Jersey Institute of Technology, Rowan University and Richard Stockton College of New Jersey. The members were selected based on their background and experience in dealing with the TMDL related processes including lake, stream, and estuary modeling, water quality monitoring, and ecological systems studies. The panel reviews both technical approaches submitted by NJDEP and proposals solicited for related research, and offers formal recommendations to NJDEP. The end result is TMDL development that is based on sound science. While addressing pertinent issues relating to the success of the project, the Panel continues efforts to promote a statewide dialog on the NJ-EcoComplex - NJDEP model of an academic science advisory panel to state TMDL development officials.

Watershed Restoration Plan Development through Development/ Establishment of TMDLs

Principle Investigators: Christopher Obropta, Ph.D., Specialist in Water Quality; James Cavazzoni, Research Associate, EcoComplex
Type of Project: Research
Project Time Frame/ Completion Status: Still in development phase — The project was started 8/24/01 with funding through 2/28/05.

Project Description: This research program is exploring the economic and environmental advantages to combining aquaculture and hydroponics. Water is continuously recirculated through the aquaponic section and the hydroponic section of the greenhouse. It duplicates naturally occurring water and nutrient cycles in a highly productive, controlled environment atmosphere. The goal is to achieve near zero discharge water levels, while enhancing the revenue per unit area to the grower. This is currently being done in the Burlington County Greenhouse at the EcoComplex.

Aquaponics – The combination of recirculation aquaculture and hydroponic plant production

Principle Investigators: David Specca, Director of Developmental Programs, EcoComplex; Joe Willis, Greenhouse Manager, EcoComplex; Harry Janes, Professor, Dept. Plant Biology and Pathology
Type of Project: Research
Project Time Frame/ Completion Status: Ongoing, December 2003 completion

Demonstration of a year round, automated greenhouse tomato production system

Principle Investigators: Harry Janes, Professor, Dept. Plant Biology and Pathology; David Specca, Director of Developmental Programs, EcoComplex; Joe Willis, Greenhouse Manager, EcoComplex; Logen Logendra, Field Researcher, Dept. Plant Biology and Pathology
Type of Project: Research/Demonstration
Project Time Frame/ Completion Status: Ongoing, no target completion date

Project Description: Cook College, Rutgers University is demonstrating its patented production system that can produce high quality, high yielding greenhouse tomatoes year round. This system uses water very efficiently by collecting and reusing the nutrient solution being fed to the tomatoes on watertight, movable benches. Other vegetable crops can also be produced using this production system.

Desalinization utilizing waste heat from small distributed co-generation systems to produce potable water

Principle Investigators: David Specca, Director of Developmental Programs, EcoComplex; Joe Willis, Greenhouse Manager, EcoComplex; Tom Manning, P.E., Bioresource Engineering; Harry Janes, Professor, Dept. Plant Biology and Pathology
Type of Project: Research
Project Time Frame/ Completion Status: Ongoing, end date December 2003

Project Description: This work is part of a demonstration project funded by EPA Region II at the Burlington County Research and Demonstration Greenhouse. Utilizing vacuum distillation technology, we will quantify the amount of potable water that can be produced from seawater using waste heat from a microturbine system.

Project Description: TerraCycle, Inc. has developed a vermiculture-based composting system that is highly automated and enclosed. It is designed to compost waste food products and manure into high value vermicompost and compost "tea". The tea is being evaluated for its organic fertilizer qualities and as an organic fungicide when applied to crops. There is very little risk of water discharge from the production process due to the enclosed design of the composting equipment.

Use of Vermiculture Compost and Tea

Principle Investigator(s)/ Author(s): Priscilla Hayes, Environmental Coordinator, Cook College; Peter Oudemans, Ph.D., Specialist in Plant Pathology; Joe Willis, Greenhouse Manager, EcoComplex; David Specca, Director of Developmental Programs, EcoComplex; Mike Dimino, P.E., Acting Executive Director, EcoComplex; TerraCycle Staff
Type of Project: Outreach
Project Time Frame/ Completion Status: Ongoing, no completion date sent

Project Description: Our intent is to collect the rainwater runoff from the one-acre research greenhouse into low cost retention ponds and reuse the water for greenhouse irrigation needs. This system would be a demonstration of technology already in use in Holland. This capability is important to NJ greenhouse growers who are facing tighter impervious coverage restrictions and nonpoint source pollution regulations.

Reuse of rainwater run-off collected from greenhouse roofs

Principle Investigators: A.J. Both, Specialist in Controlled-Environment Engineering; Tom Manning, P.E., Bioresource Engineering; David Specca, Director of Developmental Programs, EcoComplex; Joe Willis, Greenhouse Manager, EcoComplex; Mike Dimino, P.E., Acting Executive Director, EcoComplex
Type of Project: Research
Project Time Frame/ Completion Status: Proposed

Study of chemicals and disease organisms in recirculating nutrient solutions used in greenhouse production

PI's: A.J. Both, Ph.D., Specialist in Controlled Environment Engineering; Donna E. Fennell, Dept. of Environmental Science; George J. Wulster, Ph.D., Specialist in Floriculture
Type of Project: Research
Status: The study is expected to be part of a thesis research project and is scheduled to commence when appropriate funding is available.

Project Description: The open-roof greenhouse on Hort Farm 3 contains a closed nutrient solution recirculation system that virtually eliminates any ground water contamination due to run-off. The nutrient solution is stored in underground concrete tanks and periodically pumped onto the floor to irrigate and fertilize the crops. Commercial growers have implemented similar systems with good success. However, the concern is once introduced, a disease organism can spread from plant to plant very rapidly. In addition, precisely dosed chemicals such as growth regulators can linger in recirculating irrigation systems. Therefore, we plan to study the faith of chemicals and spread of plant diseases in such systems.

2003 Small Farm Expo Manure Composting Workshop

Instructor: Kevin Milz, Hunterdon County Soil Conservation District
Type of Project: Workshop
Status: completed

Project Description: This workshop, offered at the 2003 Small Farm Expo, provided information on how to properly store, compost and spread livestock manure. Rutgers Cooperative Extension is a co-sponsor of the Expo.

Equine Agricultural Management Practices (AMP)

Principle Investigators: Donna Foulk, Program Associate IPM, Bob Mickel, Agricultural Agent; Michael Westendorf, Ph.D., Specialist in Livestock and Dairy; Margie Margentino, Equine Program Associate; Everett Chamberlain, Agricultural Agent
Status: work in progress

Project Description: The purpose of the equine AMP is to establish generally accepted procedures for conducting specific activities, particularly those that may be perceived as a health hazard or nuisance by the neighboring residential non-farm community. The agricultural management practices serve as guidelines for farm owners and managers to follow while operating a commercial equine enterprise. Major components of the AMP include: Pasture stocking rates, rotational grazing, soil testing, pasture nutrients, mowing, species selection, weed management, renovation, fencing, shelter, farming stock rates, dust control, stall waste production and characteristics, manure storage, spreading manure, composting, stream-bank fencing and regulatory compliance.

To reach the goals of improving and preserving water quality in New Jersey, nutrient trading will have to play a significant role in obtaining cost-effective reductions. As the NJDEP moves toward assigning the point source dischargers total phosphorus effluent limitations of 0.1 mg/l for discharges to waterways that are impaired for phosphorus, a potential for "point-nonpoint" source trading becomes an alternative to treatment plant upgrades. A trading policy provides profitable opportunities for sources with low treatment costs to reduce their loading beyond legal requirements, generate a credit, and sell these credits to dischargers with high treatment costs. This flexibility produces a less expensive outcome overall while achieving the desired environmental target. In addition to the economic benefits, a "point-nonpoint" source trading program also provides ancillary effects such as wetland restoration or the implementation of BMPs that improve wildlife habitat in addition to improving water quality.

A methodology was developed to identify potential water quality trading opportunities within the Raritan River Basin that are both scientifically and economically feasible for total phosphorus. The focus of the trading opportunities is in areas where TMDLs have already been prepared or are pending. Since "point-nonpoint" trading opportunities can potentially yield the largest economic and wildlife habitat benefits, especially in areas where agricultural land use is significant, this project focuses on these opportunities. Using available databases and Geographic Information System (GIS) data, thirteen sub-watershed basins were initially identified as potential candidates for point-nonpoint source trading. Each of these sub-watershed basins were evaluated based upon point source loadings, nonpoint source loadings, land use/land cover characteristics, riparian buffer conditions, and soil properties. Based upon this evaluation and an examination of the economic parameters for each sub-watershed basin, four of the thirteen basins were identified as having the highest potential for successfully implementing a point-nonpoint source trading program that could restore water quality in its waterways.

Evaluating Point-Nonpoint Source Pollutant Trading Opportunities in EPA Region 2

Principle Investigators: Christopher Obropta, Ph.D., Specialist in Water Quality; Jeff Potent, USDA Regional Water Quality Coordinator/EPA Region 2
Type of Project: Research
Completion Status: Due to be completed June 30, 2004.

Project Description: Research is under way to determine nutrient removal values for several vegetable crops. Nutrient removal values are needed in order to write nutrient management plans.

Nutrient removal by vegetable crop harvest

Principle Investigator: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Project: Research
Time frame: 2002 - 2006

Project Description: A 12 state regional project is underway to update P fertilizer recommendations for field corn.

Soil Test Calibration for predicting corn response to phosphorus in the Northeast US

Principle Investigator: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Project: Research & Journal article
Time Frame: 1998 – 2004, journal article 2004

Project Description: Some Cook College students are getting trained in Nutrient Management through a new course developed in the Spring 2003 semester with 9 students registered. During the Fall 2003 semester a course in Soil Fertility is being taught with 20 students registered. Soil Fertility will also be offered Fall 2004 semester.

Nutrient Management in Agriculture and Environment; and Soil Fertility

Course Instructor: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Project: Undergraduate Courses
Time frame: Spring 2003, Fall, 2003 and 2004

Project Description: Rutgers will host the Northeast Branch American Society of Agronomy and Soil Science Society of America meeting. This meeting will highlight many aspects of nutrient management and will include tours. We are planning a special one day secession for nutrient management training. Certified Crop Advisors from New Jersey and surrounding states will be encouraged to attend and will be given CCA credits.

Northeast Branch American Society of Agronomy and Soil Science Society of America meeting

Contact: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Time Frame: July 12 - 14 2004

Publications

Title: Nutrient Management Factsheet series
Author: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Publication: Factsheets series
Publication dates: 2003

Overview: Recent factsheets published by RCE highlight certain aspects of Nutrient Management. Recent titles include:
Soil Nitrate Testing as a Guide to Nitrogen Management for Vegetable Crops; Nutrient Removal Values by Field and Forage Crops; Nutrient Management of Land Applied Grass Clippings; Sweet Corn Crop Nitrogen Status Evaluation by Stalk Harvest

Title: Soil Fertility Factsheet series
Author: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Publication: Factsheets
Publication date: 2005

Overview: A new set of fact sheets is being written for Soil Fertility Recommendations for Field and Forage Crops. This will in part replace the old 1994 Rutgers Field and Forage Crop Guide.

Title: Soil Fertility Management Targeted for Plant Health
Author: Joseph Heckman, Ph.D., Specialist in Soil Fertility
Type of Publication: Review Article
Publication date: 2004

Overview: This article will explain ways to improve soil fertility for specific crops where there is the potential to use targeted plant nutrition as an alternative to pesticides.

Title: Conservation Water Management by New Jersey's Cranberry Industry
Authors: Peter Oudemans, Ph.D., Extension Specialist in Plant Pathology; Jack Rabin, Associate Director – Farm Services
Type of Publication: Technical Report
Publication date: 2002

Overview: Cranberry growers are certified to divert a specified amount of water that is determined by the acreage under cultivation. Growers are required to report water usage to the NJDEP Bureau of Water Allocation (BWA). The BWA provides a standard form for reporting pond, stream, and well diversions on a monthly basis. Current reporting tends to significantly overestimate water use in cranberry production. Water should only be reported once, at its first original site of diversion. This report provides an overview of the three ways overestimates occur:
1. Reported stream diversions sometimes represent water reported again later as pond reservoir diversions.
2. Water pumped from reservoirs or ponds may have been re-used by pumping bog-to-bog as many as 10 times on a single farm.
3. Water diverted and reported by one farm is often re-used and reported by other farms down-stream.