

A Knowledge Center for
Water and Nutrient Management
for the Nursery and Greenhouse Industries

John D. Lea-Cox and David S. Ross

*College of Agriculture and Natural Resources
University of Maryland
College Park, MD*

Presentation Outline:

- Project Collaborators, Vision and Strategy
- Overview of the Industry - Statistics and Sectors
- Knowledge Center Structure and Components
- Website and Learning Module Content
- Assessing Success

Collaborators:

University of Maryland (Lead Institution)	John Lea-Cox, David Ross (PI's) Andrew Ristvey
Virginia Tech	Greg Eaton, Roger Harris Chuan Hong
North Carolina State University	Ted Bilderback
Clemson University	Bill Bauerle
University of Georgia	John Ruter
University of Florida	Tom Yeager, Richard Beeson

Vision:

- To create a web-based Knowledge Center for the nursery and greenhouse industries in the United States, based on sound scientific and engineering principles.
- To provide best management practice information on water, nutrient and pathogen management.
- To provide learning modules for continuing education of professionals, growers and students.
- To provide audit and other resource management tools for increasing the efficiency of current production practices.

Strategy:

- Provide the information and materials necessary to *implement* those programs, to our stakeholders (growers and professionals).
- Provide educational opportunities for certification, through appropriate partnerships.
- Provide information to policy makers and the public on the industry and on the various programs and processes in this area.
- Partner with industry associations and government agencies, to provide synergy to these efforts.

2002 USDA Ag Census – Crop Production Data

Crop	Oilseed and Grain	Vegetables and Melon	Fruit and Tree Nuts	Other (Sugar, Tobacco, Hay)	Nursery and Greenhouse
Land Area (Million acres)	242.22	11.22	11.53	118.33	4.82
Market Value of Goods (Billion US\$)	40.47	13.25	13.56	16.11	15.09
Gross Return (\$/acre)	167	1181	1176	136	3128
Net Return (\$/acre)	32.57	362.23	260.56	13.54	946.59





















Water, Nutrient and Pathogen Management for Intensive Plant Production Systems

Irrigation Management

Planning and Design:

- ✓ Site Constraints, Growth
- ✓ Water Supply, Recycling
- ✓ Components, Redundancy
- ✓ Calculating Delivery, Flow

Installation:

- ✓ Materials
- ✓ Labor
- ✓ Cost

Irrigation Management:

- ✓ Scheduling, Efficiency
- ✓ Monitoring, Maintenance
- ✓ Labor, Time
- ✓ Technology, Education

Irrigation System Audit:

- ✓ Component Age
- ✓ Efficiency Measurements
- ✓ System Upgrades, Technology
- ✓ Replacement Cost
- ✓ Site-specific BMP options

Nutrient Management

Fertilization Strategy:

- ✓ Nutrient delivery options
- ✓ Nutrient rates, Uptake Efficiency
- ✓ Plant groupings
- ✓ Nursery layout

Substrate Management:

- ✓ Substrate physical properties
- ✓ Substrate chemical properties
- ✓ Component analysis
- ✓ Reformulation options

Water Management:

- ✓ Irrigation scheduling
- ✓ Interception efficiency
- ✓ Leaching fraction
- ✓ Recycling efficiency

Risk Management:

- ✓ Site Risk Assessment
- ✓ Water Management
- ✓ Fertilization Management
- ✓ System Risk Assessment
- ✓ Site-specific BMP options

Runoff Water Management

Planning and Design:

- ✓ Site constraints, Growth issues
- ✓ Land availability
- ✓ Stormwater diversion
- ✓ Calculating Flow, Capacity

Surface, Subsurface Options:

- ✓ Containment basins
- ✓ Ditches, Riparian buffers, Wetlands
- ✓ Subsurface storage options
- ✓ Infrastructure, cost issues

Management:

- ✓ Monitoring Runoff, Liability issues
- ✓ Flow Management, Erosion
- ✓ Efficiency, cost factors

Water Management Audit:

- ✓ Site Assessment
- ✓ Low-cost management alternatives
- ✓ Re-engineering considerations
- ✓ Cost issues
- ✓ Site-specific BMP's

Recycling Issues

Design issues:

- ✓ Capacity requirements
- ✓ Infrastructure BMP's
- ✓ Pre-treatment options

Plant Root Pathogens:

- ✓ Major water-borne pathogens
- ✓ Pathogen life cycles
- ✓ Susceptible plant species
- ✓ IPM considerations

Disease Management:

- ✓ Chemical treatment options
- ✓ Non-chemical treatments
- ✓ Containment pond design
- ✓ Isolating growing areas, layout

Recycling Audit:

- ✓ Site Assessment
- ✓ Low-cost BMP alternatives
- ✓ Re-engineering considerations
- ✓ Cost issues
- ✓ Site-specific BMP options

Login



First-time TechReg Users, click [here](#).

Quick Access for Service

- > Find a Technical Service Provider
- > TSP Not-To-Exceed Rates
- > USDA Office Information Locator
- > State TSP Coordinators

Quick Access for Providers

- > Get a USDA User ID and Password
- > Apply Online
- > Online Resources

Business Opportunities for Providers

- > FedBizOpps
- > FedGrants

TechReg is

NRCS's online tool for **Technical Service Providers** to register, become certified, and manage their TSP profiles.

TechReg also helps landowners locate and choose certified registered technical service providers who can help them meet their conservation goals. [More >>](#)



Need Help?

You can get technical support for TechReg a number of ways:



- ▶ **Contact** TechReg Support by [email](#).
- ▶ **For problems** with your USDA login and password, contact the USDA help desk at 1-888-311-1444 or visit the [USDA Centralized Help Desk](#) Information page.
- ▶ **Find Answers** in the TechReg [Frequently Asked Questions\(FAQ\)](#) page.
- ▶ **Contact** a [NRCS TechReg State Coordinator](#) for more information on the Technical Service Provider process.

In the Spotlight

TSP Brochure

[Expanding Conservation Technical Assistance Capacity on Private Lands](#) is available online. Printed copies of this brochure can be ordered by calling 1-888-LANDCARE.



NRCS News Lists

Sign up for [NRCS News List](#) to receive timely information from NRCS via email.

TSP Not-To-Exceed Rates

Find the **Not-To-Exceed (NTE) Rates** for cost reimbursements for Technical Service Providers



USDA Customers

Find [Technical Service Providers](#) working in your state and county.

View the [Technical Service Provider Certification](#)

Technical Service Providers



Interested in becoming a Technical Service Provider?

- ▶ **It's easy**, just check out the [TechReg-Step by Step Guide](#)

Certification Criteria

- ▶ **For details** on technical service categories, find them [here](#).

Need help becoming qualified?

- ▶ Working with [Recommending Organizations](#) and our partners is an easy way to get qualified and certified as a Technical Service Provider.



Apply Online

- ▶ Using your USDA User ID you can now [Apply Online](#) to become a certified TSP. This includes individuals, businesses, as well as Public Sector Entities.

Upcoming Training Opportunities

- ▶ [CNMP Development Course](#) 2/13/06-2/15/06—Kansas City, MO



American Nursery & Landscape Association

- About ANLA
- Member Benefits
- About the Industry
- Events
- Publications
- Research
- Awards
- Legislative Center
- Links
- HOME
- MEMBERS ONLY
- ANLA STAFF
- SITE SEARCH



- ### Members Only
- ▶ [Member Benefits](#)
 - ▶ [Member Search](#)
 - ▶ [Staff Contacts](#)
 - ▶ [ANLA Consultants](#)
 - ▶ [Legislative Center](#)
 - ▶ [Newsletter Archives](#)
 - ▶ [ANLAConnect](#)
 - ▶ [ANLAPulse Poll](#)
 - ▶ [Compliance Center](#)
 - ▶ [Resources](#)
 - ▶ [Free Beer!](#)

Welcome to ANLA

Now in its 128th year, the American Nursery & Landscape Association is the ***national voice of the nursery and landscape industry***. Members grow, distribute, and retail plants of all types, and design and install landscapes for residential and commercial customers. ANLA provides education, research, public relations, and representation services to members.



Consumers: Find a local garden center or landscape firm

Ask ANLA

Join ANLA



What's New?

🌸 SPEAK OUT ON SENSIBLE IMMIGRATION REFORM!

(posted February 03, 2006)

Immigration reform is THE issue that has the green industry buzzing. Will the Senate pass reforms that combine security and enforcement with efficient temporary worker programs and a sensible and rational approach for addressing the status of trained and trusted workers who lack proper immigration status? Or will Congress play to the wedge politics of fear and division, and do irreparable damage to the American economy and to people's lives? For background, suggested talking points, sample editorials, and other materials, visit the Immigration Reform Resource Room by clicking [here](#). To send a letter to your U.S. Senators, click [here](#).

🌸 Happy Graduation!

(posted January 19, 2006)

Congratulations to all of the Garden Center University Class of '06 graduates! We wish you the best of luck in your future endeavors!

Knowledge Center for Water & Nutrient Management & Conservation

for the nursery and greenhouse industries

- [Home](#)
- [Project Description](#)
- [Developers](#)
- [Working Groups](#)
- [Stakeholders](#)
- [Literature Search](#)
- [Course Area](#)
- [Contact Us](#)

Waternut.org is being developed as an on-line Knowledge Center for Water and Nutrient management and Conservation, for the Nursery and Greenhouse industries.

This educational site is primarily intended to serve a variety of professionals who are involved in the management of intensive plant production systems throughout the Eastern United States.

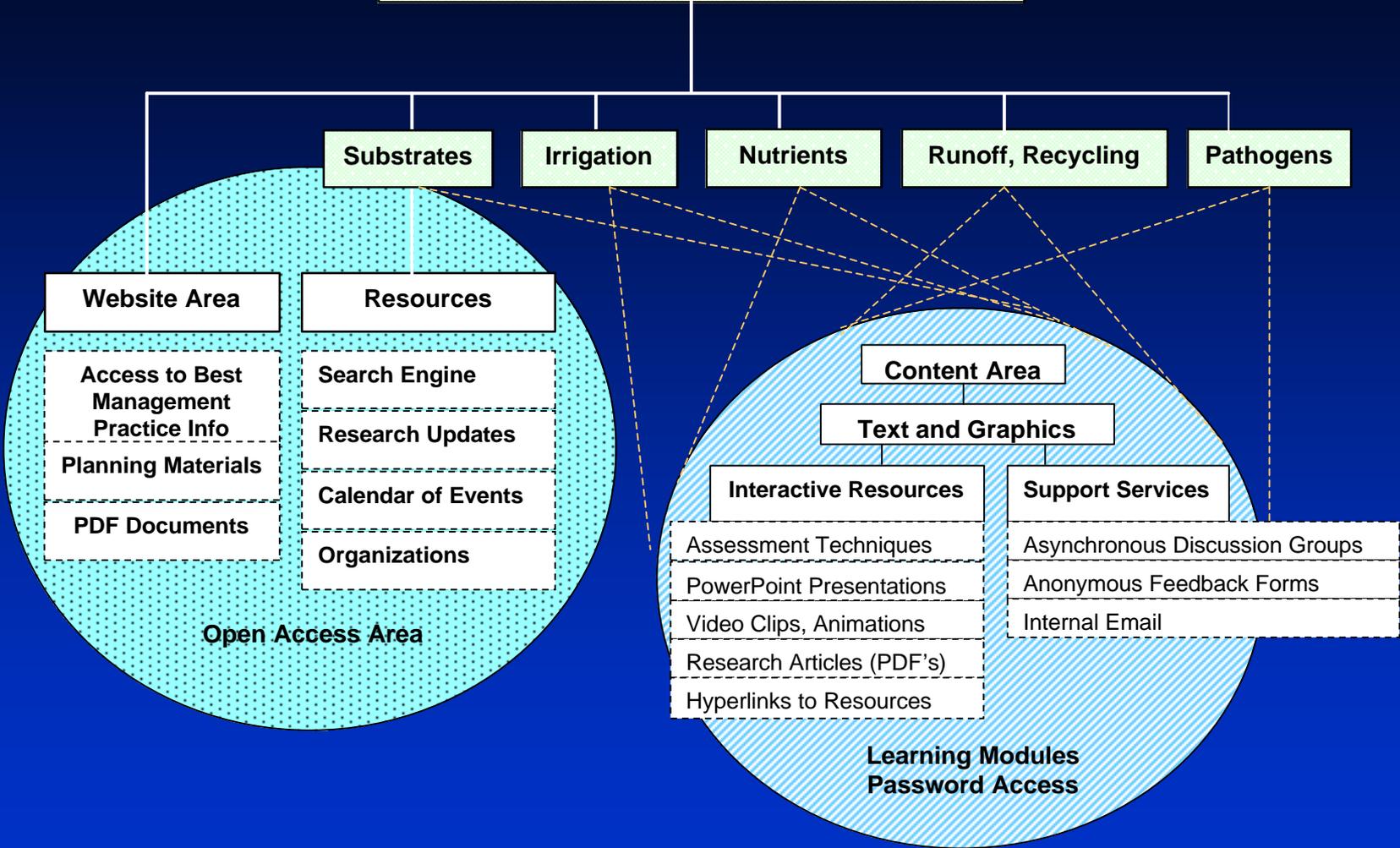
This project is funded through an Extension grant from the USDA-CREES - National Integrated Water Quality Program, to help achieve the larger goals of the [National Water Program](#) and integrating with the goals of the [Mid-Atlantic](#) and [Southern Region](#) water quality programs. In addition, this Knowledge Center intends to integrate with the [National Extension Water Outreach Education](#) project and observe [Best Education Practice](#) goals.

The Knowledge Center will eventually comprise a three-tier system of:

1. Public access webpages providing general resources and best management practice recommendations for water and nutrient management, to promote the efficient use of resources, with the expressed intent of reducing environmental impacts from these agricultural industries.
2. A courseware (WebCT, Blackboard or Moodle) environment to provide high-quality educational resources to individual professionals within the industry, with the expressed aim of integrating with the [NRCS technical service provider \(TSP\)](#) program.
3. Self-learning modules on irrigation, nutrient and pathogen management, stormwater management and recycling issues, including engineering management recommendations, together with audit tools to assess and improve the efficiency of existing systems.

Additional project objectives also involve developing regional criteria for effective water and nutrient management so that training and certification programs can achieve accreditation for trainees, and educating other groups as to the current best management practices that have been implemented by these industries.

Knowledge Center
--- Graphical Representation of Resources



National Extension Water Outreach Education

Facilitating Access to Resources and Best Education Practices

[Home](#)
[About Us](#)
[Contact Us](#)
[Search](#)
[Sitemap](#)

WATER EDUCATION TOPICS

[+ Best Education Practices, BEPs](#)
[+ Use BEPs](#)
[+ Educational Resources](#)
[+ Professional Development](#)
[+ Other Resources](#)

WATER MANAGEMENT TOPICS & ISSUES

[Animal Waste Management](#)
[Drinking Water and Human Health](#)
[Environmental Restoration](#)
[Nutrient and Pesticide Management](#)
[Pollution Assessment and Prevention](#)
[Water Conservation and Agricultural Water Management](#)
[Home](#) » [Best Education Practices](#)

Essential BEPs

Here you'll find primary recommendations grouped according to typical educator challenges. If you want to use BEPs but aren't sure where to begin, try the [BEP Decision Tree](#). [BEP Research](#) provides more information, including key recommendations from each discipline, available by [Knowledge Areas](#).

[View the Essential BEPs as PDF](#) 54 KB

For every education or learning situation

The learning experience:

- Is specifically designed to maximize the type of outreach or education effort selected:
 - [Information \(one-way communication\)](#)
 - [Communication \(two-way communication\)](#)
 - [Education \(formalized learning process\)](#)
 - [Capacity Building \(enhance group or community skills\)](#)
- Contributes to meeting learning goals
 - Knowledge - the development of intellectual skills, such as recall of data, comprehension, application, analysis, synthesis and evaluation
 - Attitudes - the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and ways of thinking
 - Skills - physical movement, coordination, and use of motor-skill areas

For the individual

The learning experience:

- Has a clear purpose with tightly focused outcomes and objectives.
- Is learner centered, and consequently:
 - Assesses the learner in order to set appropriately high and challenging standards.
 - Relates to the individual's level of physical, intellectual, emotional, and social development.

ESSENTIAL BEPs navigation

[For every education or learning situation](#)

[For the individual](#)

[For the class or group](#)

[For Web-based learning](#)

[For the community](#)

[Beyond the community](#)

[References](#)

You are logged in as John Lea-Cox (Logout)

Turn editing on

Using Moodle (for Faculty)

Watnut » Using Moodle

People

Participants

Activities

- Assignments
- Chats
- Choices
- Forums
- Glossaries
- Lessons
- Quizzes
- Resources
- Surveys

Search Forums

Advanced search ?

Administration

Course categories

- Soil and Substrates
- Irrigation Management
- Surface Water Management
- Water Management Tools
- Nutrient Management
- Pathogen Management
- Developer Resources

Topic outline

Welcome to **Using Moodle!**

- News forum
- General discussion area
- Moodle likes and dislikes
- Activity module wish list
- General discussion area
- Resource Files

1 Introduction

- What is moodle?
- About this course
- Having problems?
- Navigation - To complete
- How to use the Lesson Module
- Course structure

2 Creating your moodle course

This module section how to create your moodle course.

- Requesting a new moodle course
- Logging in to moodle
- Your course homepage
- Course format
- Adding activity modules
- Managing activity modules
- Managing topics and weeks
- Creating links within and between activities - TO DO

Latest News

Add a new topic...
 (No news has been posted yet)

Upcoming Events

There are no upcoming events
 Go to calendar...
 New Event...

Recent Activity

Activity since Sunday, 5 February 2006, 03:06 PM
 Full report of recent activity...
 Nothing new since your last login

Calendar

<< February 2006 >>

Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

- Global events
- Course events
- Group events
- User events

Status	Substrates	Irrigation Management	Water Management Tools	Surface Water Management	Fertilization and Nutrient Management	Pathogen Management
Simple 	* Basic Overview of Substrates – ‘Ideal Substrates’	* Your Water Source: Understanding Water Quality	* Irrigation System Audits	* Basics of Surface Water Management	* Basics of Fertilization	* Water-borne Pathogens – Identification & Prevention
	Physical Properties of Substrates	Understanding Water Supply: Basic Hydraulics	Plant Water Use Modeling (GUIC)	Site Assessment – Layout and Infrastructure	Fertilization Strategies	Fundamental Biology of <i>Phytophthora</i>
	Chemical Properties of Substrates	Irrigation System Design and Selection	Irrigation Scheduling Tools and Technology	Minimizing Water and Nutrient Runoff	Plant Nutrient Use: Calculating Specific Fertilizer Applications	Applied Biology of <i>Phytophthora</i>
	Biological Properties of Substrates	Irrigation Best Management Practices: Overhead Systems	Containment Pond Design Criteria	Capture and Recycling of Runoff Water	Simple Nutrient Management Planning	Water Decontamination and <i>Phytophthora</i> Management
Advanced 	Substrate Ecology, Nutrient Cycling, Composting & Waste Management,	Irrigation Best Management Practices: Low Volume Systems		Storm Water Runoff and Control	Advanced Water and Nutrient Management Planning	

Water and Nutrient Management for the Nursery and Greenhouse Industries

You are not logged in. (Login)
English (en)

Latest News

21 Nov, 16:53
John Lea-Cox
Check out the new Policy Document Area [more...](#)

7 Oct, 08:42
John Lea-Cox
Moodle is Up and Running!! [more...](#)
[Older topics ...](#)

Useful Links

[National Academy Water Information Centre](#)

Upcoming Events

There are no upcoming events
[Go to calendar...](#)
[New Event...](#)

Course categories

- [Soil and Substrates](#)
 - [Irrigation Management](#)
 - [Surface Water Management](#)
 - [Water Management Tools](#)
 - [Nutrient Management](#)
 - [Pathogen Management](#)
 - [Developer Resources](#)
- [Search courses...](#)
[All courses...](#)

Available Courses

- Soil and Substrates**
 - [Basic Functions of Soils and Substrates](#)
 - [Physical Properties](#)
 - [Chemical Properties](#)
 - [Biological Properties](#)
 - [Composting and Waste Management](#)
- Irrigation Management**
 - [Introduction: Understanding Water Quality](#)
 - [Understanding Water Supply: Hydraulics](#)
 - [Irrigation System Design and Selection](#)
 - [Best Management Practices - High Volume Systems](#)
 - [Best Management Practices - Low Volume Systems](#)
- Surface Water Management**
 - [Basics of Surface Water Management](#)
 - [Site Assessment - Layout and Infrastructure](#)
 - [Stormwater Runoff and Control](#)
 - [Surface Water Capture and Recycling](#)
- Water Management Tools**
 - [Irrigation System Audits](#)
 - [Plant Water Use Modeling](#)
 - [Irrigation Scheduling Tools](#)
 - [Containment Pond Design](#)
- Nutrient Management**
 - [Basics of Fertilization](#)



This is where all the action will be for the Watnut Project! Here, you will find links to all the educational modules being developed by faculty in Maryland, Virginia, North and South Carolina and Florida over the coming months!

Main Menu

- [Site news](#)
- [Questions and Comments?](#)

Online Users

(last 5 minutes)
[John Lea-Cox](#)

Calendar

<< February 2006 >>

Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28					

Impacts – How will we measure our success?

- Numbers of visitors and people signing up for learning modules
- Pre- and post-assessment of grower implementation of best management practices.
- Reductions in nutrient contributions to watersheds (over time).
- Numbers of professionals trained (irrigation consultants etc.)
- Engagement of policy-makers and grower association support

Questions ?

