Innovative Cropping Systems Environmental Credit Program
USDA/NRCS Conservation Innovation Grant
Final Report – September 29, 2008
NRCS Grant Agreement 68-3A75-4-193

Final Project Summary:

Over the course of Innovative Cropping Systems Environmental Credit Program Substantial strides were gained towards the advancement of innovative technologies in crop production and market based initiatives.

The USDA/NRCS Conservation Innovation Grant funding support allowed project participants to measure pollutant reduction performance for Innovative Cropping System (ICS) components. Nutrient leaching and carbon sequestration relative to conventional management systems have been documented. Sensor based "on the go" nitrogen application has become a reality with the development of corn and wheat algorithms for Virginia. Research which provides performance separation with various cover crop options and management alternatives were tested. Numerous field comparisons were conducted to evaluate tillage effects on nitrogen management, yield and pest controls. A feasibility study was conducted with a locality to evaluate non point to non point trades between ICS producers and land developers using project funded research. The Virginia Nutrient Exchange Regulations has incorporated factors from this project in to the rule making for point to non point for nutrient credits. The EPA Chesapeake Bay Program now recognizes the tracking of progress from Continuous No-Till acres, in part, from the efforts funded through this grant. It is estimated that over 12 thousand individuals have been reached via formal presentations to facilitate technology transfer and implementation of ICS and market based initiatives. Due the funding opportunities provided by the USDA/NRCS Conservation Innovation Grant project participants have received national attention and now enjoy a significantly higher percent of ICS implementation in many areas.

Report by
Colonial Soil & Water Conservation District
Table of Contents

CONDUCT A SERIES OF FIELD TEST PLOTS TO COMPARE THE ENVIRONMENTAL BENEFITS OF ICS VERSES CONVENTIONALLY MANAGED SYSTEMS. QUANTIFY RUNOFF AND INFILTRATION OF NITROGEN, PHOSPHORUS AND SEDIMENT ASSOCIATED WITH ICS.

- *SIX FIELD STUDIES WERE CONDUCTED IN THE SPRING OF 2005 TO EVALUATE THE GREENSEEKER® RT200 FOR MAKING SENSOR-BASED, VARIABLE-RATE N APPLICATIONS TO WINTER WHEAT IN VIRGINIA. PLOT SIZE WAS 18 M WIDE BY 90 TO 150 M LONG. TOP-DRESS N WAS APPLIED TO WINTER WHEAT USING A SPRA-COUPE® APPLICATOR WITH AN 18-M BOOM, WHICH WAS EQUIPPED WITH A GREENSEEKER® RT200 VARIABLE-RATE SPRAY SYSTEM. THE EXPERIMENTAL DESIGN WAS A RCB THAT INCLUDED NINE TREATMENTS REPLICATED FOUR TIMES. SPECIFIC TREATMENTS INCLUDED TWO VARIABLE N RATE APPLICATIONS DETERMINED USING THE GREENSEEKER®, TWO SINGLE N RATES BASED ON TISSUE TESTS OR GREENSEEKER®-BASED YIELD ESTIMATES, AND A RANGE OF FIVE PREDETERMINED FIXED RATES. NITROGEN USE EFFICIENCY (NUE) WAS INCREASED AT THREE LOCATIONS USING VARIABLE-RATE N APPLICATION COMPARED TO THE STANDARD FIXED-RATE PRACTICE, WHILE NUE WAS NOT AFFECTED AT TWO LOCATIONS AND WAS REDUCED AT A SINGLE LOCATION.*

- *NUMEROUS FIELD PLOTS WERE INSTALLED TO EVALUATE AND DEMONSTRATE COVER CROP (SIDE BY SIDE TRIALS) TO COMPARE SPECIES, TIME OF PLANTING AND NITROGEN UTILIZATION AND ADAPTATION TO ICS MANAGEMENT. NITRATE MOVEMENT AND BIOMASS GENERATION DATA HAS BEEN PROVIDED FOR 3 CROPPING SEASONS.*

- *NITROGEN FERTILIZER TREATMENT PLOTS WERE INSTALLED TO EVALUATE UREA'S INHIBITORS AND UREA BASED POLYMERS VS. STANDARD NITROGEN MANAGEMENT.*

- *LONG-TERM "NEVER TILL" NITROGEN RATE STUDIES IN WHEAT WERE INSTALLED AND NITRATE SAMPLES HAVE BEEN ANALYZED FOR 3 CROPPING SEASONS.*

- *TILLAGE VS. VARIETY TRIALS WERE INSTALLED TO INCLUDE NEW WHEAT VARIETIES 3 CROPPING SEASONS.*

- *"ON THE GO" VARIABLE NITROGEN RATE TECHNOLOGY USING INFRARED SENSING GREENSEEKER EQUIPMENT ON A FIELD SCALE SPRAY UNIT SPRA-COUPE . DATA HAS BEEN COLLECTED FROM WHEAT PLOTS SHOWING INCREASED PLANT USE EFFICIENCIES AND INCREASED YIELDS 3 CROPPING SEASONS. ADDITIONAL FIELD PLOTS FOR CORN HAVE BEEN EVALUATED OVER 2 YEARS.*

- *EVALUATION SITES WERE SELECTED AND BACKGROUND MANAGEMENT SURVEYS WERE COMPILED.*

- *MATERIALS AND EQUIPMENT WERE COORDINATED FOR THE INSTALLATION OF GROUND WATER LYSIMETERS.*
- *SOIL SAMPLES FROM CONVENTIONAL AND ICS FIELDS WERE COLLECTED AND SENT TO ARS / FORT COLLINS COLORADO. SAMPLE ANALYSIS WILL PROVIDE NITRATE AND SOIL CARBON DATA TO USE AS BASE LINE INFORMATION FOR THE N-LEAP AND CEQUESTER MODELS 3 CROPPING SEASONS.*
- *LONG-TERM "NEVER TILL" NITROGEN RATE STUDIES IN WHEAT WERE INSTALLED AND NITRATE SAMPLES HAVE BEEN ANALYZED FOR 3 CROPPING SEASONS..*
- *TILLAGE VS. VARIETY TRIALS WERE INSTALLED TO INCLUDE NEW WHEAT VARIETIES.*

CONDUCT A SERIES OF OUTREACH EVENTS TO ASSIST IN THE TECHNOLOGY TRANSFER AND IMPLEMENTATION OF ICS AND OTHER NEW TECHNOLOGIES.

- *ABSTRACTS (3) WERE SELECTED FOR PRESENTATION AT THE ANNUAL AMERICAN SOCIETY OF AGRONOMY MEETING AT INDIANAPOLIS.*
- *PRESENTATIONS GIVEN BY COLONIAL SOIL & WATER CONSERVATION DISTRICT (CSWCD) STAFF, VA COOPERATIVE EXTENSION AND VA TECH ON CIG EFFORTS AND TECHNOLOGIES TO 70 PRODUCERS AT 4 RIVERS AG. CONFERENCE.*
- *HOST VA/CHESAPEAKE BAY – "IN SERVICE TRAINING" AND FIELD TOUR. SPEAKERS INCLUDED VA TECH & UNIVERSITY OF MD RESEARCH SCIENTIST AND USDA/ARS RESEARCH SCIENTIST FROM FT. COLLINS, CO AND PROJECT PARTNERS. FIELD COMPONENT INCLUDED TOUR OF CIG FUNDED RESEARCH AND GREENSEEKER DEMONSTRATION. ATTENDANCE INCLUDED APPROX. 150 AGENCY, POLICY LEVEL OFFICIALS AND ENVIRONMENTAL ADVOCATE REPRESENTATIVES.*
- *HOST USDA/NRCS EASTERN REGION FIELD TOUR OF CIG FUNDED FIELD RESEARCH AND GREENSEEKER TECHNOLOGY.*
- *DEMONSTRATION/PRESENTATIONS – REGIONAL WATERSHED TOUR – APPROX. 70 INDIVIDUALS' LOCAL ELECTED OFFICIALS, ADVOCATE GROUPS, AGENCY AND STAKEHOLDERS.*
- *DEMONSTRATION/PRESENTATION - WASTE MANAGEMENT COMMISSION - APPROX. 35 INDIVIDUAL STAKEHOLDERS, APPOINTED OFFICIALS AND AGENCY REPS.*
- *4 RIVERS CORN & SOYBEAN FIELD DAY OVER 50 PRODUCERS, TECH. AGENCY AND AG. BUSINESS REPRESENTATIVE VIEWED RESEARCH AND DEMONSTRATION PLOTS, GREENSEEKER EQUIPMENT DEMO., AND PRESENTATIONS ON RESEARCH DATA, ICS, CIG AND NUTRIENT TRADING.*
- *PRESENTATION – HAMPTON ROADS PLANNING DISTRICT COMMISSION – APPROX. 40 INDIVIDUALS FROM 16 LOCALITIES & ENV. AGENCY REPS. & STORMWATER DIVISIONS, WASTE WATER AUTHORITIES, STATE & FED. AGENCIES.*
- *PRESENTATION – VIRGINIA STATE ASSOC. OF SOIL & WATER CONSERVATION DISTRICTS ANNUAL MEETING – APPROX. 50 INDIVIDUALS FROM SWCD'S & NRCS.*
- *PRESENTATION – ANNUAL 4 RIVERS AG. CONF. – APPROX. 60 CROP PRODUCERS*

- *2 PRESENTATIONS – VIRGINIA ANNUAL CROP PRODUCTION ASSOC. – APPROX. 50 AG. INDUSTRY REPRESENTATIVES.*
- *DEMONSTRATION/PRESENTATION – AREA III VIRGINIA ASSOC. OF SOIL & WATER CONS. DISTRICT ANNUAL MEETING. – APPROX. 80 INDIVIDUALS FROM SWCD'S & NRCS.*
- *PRESENTATION – VIRGINIA CROP IMPROVEMENT ASSOCIATION ANNUAL MEETING – APPROX. 90 PRODUCERS, AGENCY AND AGRI. BUSINESS REPRESENTATIVES.*

THE ABOVE OUTREACH EVENTS HAVE PROVIDED TECHNOLOGY TRANSFER OF INNOVATIONS/ADAPTATIONS IN CROP PRODUCTION TO IMPROVE WATER QUALITY AND SUSTAIN PROFITABILITY. AWARENESS OF THE INTENT OF THE USDA CIG GRANT AND THE CONCEPTS OF A MARKET – BASED APPROACH HAVE REACHED OVER 500 KEY INDIVIDUALS OVER THE PAST 6 MONTHS.

- *PRESENTATIONS GIVEN BY COLONIAL SOIL & WATER CONSERVATION DISTRICT (CSWCD) STAFF, VA COOPERATIVE EXTENSION AND VA TECH ON CIG EFFORTS AND TECHNOLOGIES TO 70 PRODUCERS AT 4 RIVERS AG. FIELD DAY.*
- *RECEIVED NOMINATION SPONSORED BY VA. NRCS STATE OFFICE FOR NATIONAL NO-TILL INNOVATOR AWARD.*
- *WON NATIONAL NO-TILL INNOVATOR AWARD (ORGANIZATIONAL CATEGORY) SPONSORED BY NO-TILL FARMER MAGAZINE & SYNGENTA. RECOGNITION TO INCLUDE PRESS RELEASE IN SEVERAL LOCAL NEWSPAPERS, NATIONAL & REGIONAL AGRICULTURAL PUBLICATIONS. AWARD TO BE PRESENTED AT THE 2007 NATIONAL NO-TILL CONFERENCE ON JAN. 12TH IN DES MOINES, IOWA.*
- *CSWCD AG. WATER QUALITY SPECIALIST PROVIDED A PRESENTATION ON ICS AT THE VA. CHESAPEAKE BAY COASTAL REGION COST SHARE TRAINING (32 SWCD REPRESENTATIVES IN ATTENDANCE).*
- *4 RIVERS SMALL GRAIN FIELD DAY OVER 60 PRODUCERS, TECH. AGENCY AND AG. BUSINESS REPRESENTATIVE VIEWED RESEARCH AND DEMONSTRATION PLOTS, GREENSEEKER EQUIPMENT DEMO., AND PRESENTATIONS ON RESEARCH DATA, ICS, CIG AND NUTRIENT TRADING.*
- *SOUTHERN STATES ADVANCED CROPS AND SOILS TRAINING, BLACKSBURG, VA (30 PARTICIPANTS).*

- *AG EXPO IN MONTROSS, VA. EXHIBITED AND DISCUSSED GREENSEEKER® TO 160 PARTICIPANTS.*
- *POTOMAC WATERSHED FORUM IN MANASSAS, VA. PRESENTATION ON GREENSEEKER® & SOIL QUALITY TO 160 PARTICIPANTS.*
- *4 RIVERS CORN/SOYBEAN FIELD DAY IN CHARLES CITY, VA. EXHIBITED AND DISCUSSED THE FUTURE OF NUTRIENT MANAGEMENT WITH VARIABLE RATE N APPLICATIONS (60 PARTICIPANTS).*
- *DINWIDDIE & PRINCE GEORGE SOYBEAN FIELD DAY IN DINWIDDIE, VA. TALKED ABOUT SENSOR-BASED/GREENSEEKER® TECHNOLOGY IN N MANAGEMENT (30 PARTICIPANTS).*
- *CHARLES CITY COUNTY FAIR IN CHARLES CITY, VA. EXHIBITED GREENSEEKER® AND ANSWERED QUESTIONS (40 PARTICIPANTS).*
- *EASTERN JOINT EMPLOYEE DEVELOPMENT MEETING USDA/NRCS STATE OFFICE DISCUSSED GREENSEEKER® CAPABILITIES ALONG WITH SOIL QUALITY AND NEVER-TILL CROPPING SYSTEM (30 PARTICIPANTS).*
- *SOIL & WATER CONSERVATION SOCIETY TECHNICAL WORKSHOP IN STAUNTON, VA. GREENSEEKER'S® FUTURE IN NUTRIENT MANAGEMENT (55 PARTICIPANTS).*
- *EASTERN SHORE AGRICULTURAL FIELD DAY, PAINTER, VA. (APPROXIMATELY 60 ATTENDEES).*
- *VIRGINIA AGRICULTURAL COUNCIL FIELD TOUR, PAINTER, VA. (APPROXIMATELY 30 ATTENDEES).*
- *USDA-ARS NITROGEN USE EFFICIENCY WORKSHOP, COLUMBIA, MO (APPROXIMATELY 80 ATTENDEES).*
- *FOUR RIVERS FIELD DAY, CHARLES CITY, VA (APPROXIMATELY 50 ATTENDEES).*
- *WESTMORELAND COUNTY AGRICULTURAL FIELD DAY, MONTROSS, VA (APPROXIMATELY 50 ATTENDEES).*
- *S. E. DISTRICT VIRGINIA COOPERATIVE EXTENSION AGENT IN-SERVICE TOUR, PAINTER, VA (APPROXIMATELY 35 ATTENDEES).*
- *YORK RIVER WATERSHED ROUNDTABLE – APPROX. 40 INDIVIDUAL AGENCY, NON GOV. ADVOCATES, LOCALITIES, INDUSTRY, MUNICIPAL SERVICE AUTHORITIES & STAKEHOLDER.*
- *DEMONSTRATION/PRESENTATIONS – REGIONAL WATERSHED TOUR – APPROX. 70 INDIVIDUALS' LOCAL ELECTED OFFICIALS, ADVOCATE GROUPS, AGENCY AND STAKEHOLDERS.*

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- *PRESENTATION – ANNUAL 4 RIVERS AG. CONF. – APPROX. 60 CROP PRODUCERS*
- *PRESENTATION – PRODUCER & CHESAPEAKE BAY COMMISSION MEETING – 12 PRODUCERS AND 6 AGENCY REPS. WITH CHES. BAY COMMISSION EXECUTIVE DIRECTOR*
- *2 PRESENTATIONS – VIRGINIA ANNUAL CROP PRODUCTION ASSOC. – APPROX. 50 AG. INDUSTRY REPRESENTATIVES.*
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DEVELOP AND DISSEMINATE INFORMATION, DATA, AND DOCUMENTS FOR A MARKET – BASED TRADING FRAMEWORK FOR WATER QUALITY.

- *POTOMAC WATERSHED FORUM IN MANASSAS, VA. PRESENTATION ON GREENSEEKER® & SOIL QUALITY TO 160 PARTICIPANTS.*
- *SOUTHERN STATES ADVANCED CROPS AND SOILS TRAINING, BLACKSBURG, VA (30 ATTENDED).*
- *CHARLES CITY COUNTY FAIR IN CHARLES CITY, VA. EXHIBITED GREENSEEKER® AND ANSWERED QUESTIONS (40 PARTICIPANTS).*
- *EASTERN JED MEETING IN RICHMOND, VA. DISCUSSED GREENSEEKER® CAPABILITIES ALONG WITH SOIL QUALITY AND NEVER-TILL CROPPING SYSTEM (30 PARTICIPANTS).*
- *SOIL & WATER CONSERVATION SOCIETY TECHNICAL WORKSHOP IN STAUNTON, VA. GREENSEEKER'S® FUTURE IN NUTRIENT MANAGEMENT (55 PARTICIPANTS).*

TITLE: EVALUATION OF VARIABLE-RATE N FERTILIZATION STRATEGIES FOR THE MID-ATLANTIC COASTAL PLAIN.

PRINCIPAL INVESTIGATOR: S. B. PHILLIPS, EASTERN SHORE AREC, VIRGINIA TECH.

PRESENTATIONS:

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- *VIRGINIA AGRICULTURAL COUNCIL FIELD TOUR, PAINTER, VA. (APPROXIMATELY 30 ATTENDEES).*
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- *PRESENTATION GIVEN BY CSWCD AT NORTH SOUTH BASIN SUMMIT II – MARKET BASED INCENTIVES TO IMPROVE CONSERVATION DELIVERY: REDUCED NUTRIENT DISCHARGE IN THE MISSISSIPPI BASIN – NEW ORLEANS, LA. SPONSORED BY THE SAND COUNTY FOUNDATION, SHELL OIL & THE MCKNIGHT FOUNDATION. ATTENDANCE – 60.*
- *HOST ENVIRONMENTAL CREDITS WORKSHOP – YARMOUTH CREEK WATERSHED FEASIBILITY STUDY. SPEAKERS FROM EPA HQ – OFFICE OF WATER, VA. DEQ, VA DCR AND VA NRCS. ATTENDANCE – 20.*
- *PRESENTATION GIVEN TO ENVIRONMENTAL ECONOMICS MS LEVEL CLASS AT THE COLLEGE OF WILLIAM & MARY. ATTENDANCE – 15.*

- *PARTICIPATE IN PHONE CONFERENCE WITH IOWA FARM BUREAU & VA FARM BUREAU CONCERNING THE SALE OF CARBON SEQUESTRATION CREDITS IN VA.*

- *PRESENTATION GIVEN BY CSWCD AT THE 9TH NATIONAL MITIGATION BANKING CONF. – ENVIRONMENTAL BANKING: CULTIVATING THIS GREEN FRONTIER – PORTLAND, OREGON*

- *THE CSWCD WAS REQUESTED TO PROVIDE SERVICES TO THE VIRGINIA ATTORNEY GENERAL'S OFFICE (OAG) AND US EPA. THE ATTORNEY GENERAL JERRY KILGORE ORDERED A LEGAL AND ENVIRONMENTAL ANALYSIS OF VIRGINIA'S MANDATES AND AGREEMENTS ASSOCIATED WITH THE RESTORATION OF THE CHESAPEAKE BAY , TO INCLUDE ANALYSIS OF THE LEGAL LIABILITIES ON VIRGINIA, ITS OFFICERS AND AGENCIES, IF THE COMMONWEALTH FAILED TO MEET THE ONGOING AND CALENDAR YEAR 2010 AGREEMENTS IT MADE WITH THE US EPA OR IF EPA FAILED TO MEET ITS MANDATES UNDER THE CONSENT ORDER IN THE MATTER OF AMERICAN CANOE, ET AL. V. EPA. THE LEGAL ANALYSIS INCLUDED IDENTIFICATION OF EXISTING VIRGINIA LAW THAT COULD BE APPLIED FOR THE CONTROL OF NUTRIENTS INTO THE BAY, AS WELL AS EVALUATION OF LEGISLATIVE PROPOSALS, INCLUDING NUTRIENT TRADING MARKETS. THE ENVIRONMENTAL ANALYSIS EXAMINED THE DEGREE TO WHICH VIRGINIA COULD MEET ITS NUTRIENT REDUCTION TARGETS EXCLUSIVELY THROUGH POINT SOURCES ALONE AND EVALUATED THE IMPORTANCE OF NONPOINT SOURCE CONTROLS. THE OAG, US EPA AND THE CSWCD HAVE WORKED TOGETHER AND BY SHARING INFORMATION AND DISCUSSION REGARDING NONPOINT SOURCE AGRICULTURAL PRACTICES, INCLUDING ICS. BASED ON THESE DISCUSSIONS THE CONSIDERATIONS QUICKLY NARROWED TO THE CONCEPTS OF A MARKET-BASED TRADING SYSTEM. A MEETING IS SCHEDULED FOR APRIL 6TH. WITH APPROXIMATELY 30 INDIVIDUALS. IT IS EXPECTED THAT THE VIRGINIA ATTORNEY GENERAL, THE VIRGINIA SECRETARY OF AGRICULTURE & FORESTRY, THE VIRGINIA SECRETARY OF NATURAL RESOURCES, SEVERAL REPRESENTATIVES FROM EPA HEADQUARTERS AND REGION III, USDA NRCS HEADQUARTERS AND STATE REPRESENTATIVES, VIRGINIA DIRECTORS OF THE DEPTS. OF ENVIRONMENTAL QUALITY AND CONSERVATION AND RECREATION, THE CHESAPEAKE BAY PROGRAM, FARM BUREAU, VA. SMALL GRAINS & CORN GROWERS ASSOCIATION, VA. COOPERATIVE*

- *EXTENSION, VA. COMMISSIONER OF AGRICULTURE, SMITHFIELD FOODS, INC., PHILLIP MORRIS, INC., DOMINION RESOURCES, SEVERAL ENVIRONMENTAL LAW FIRMS AND SEVERAL CROP PRODUCERS WILL BE IN ATTENDANCE. THE CSWCD WILL PROVIDE THE ONLY FORMAL PRESENTATION TO HIGHLIGHT ICS AND THE CIG DELIVERABLES. THE REMAINING AGENDA WILL BE DEDICATED TO DISCUSSIONS CONCERNING OPTIONS TO ENGAGE AGRICULTURE WHICH HAS BEEN ALLOCATED THE LION'S SHARE OF NUTRIENT REDUCTIONS THROUGH THE TRIBUTARY STRATEGY IMITATIVE.*

- *THE CSWCD MET WITH THE VIRGINIA SECRETARY OF AGRICULTURE & FORESTRY (VSAF), THE HONORABLE ROBERT BLOXOM TO PROVIDE INFORMATION AND DISCUSSION IN SUPPORT OF ICS, CIG AND A TRADING MARKET. THE VSAF IS A NEWLY FORMED CABINET OFFICE IN VIRGINIA. THE VSAF ACKNOWLEDGED THE NEED OF ICS AS WELL AS OTHER TECHNOLOGIES TO MEET THE WATER QUALITY CHALLENGES THAT VIRGINIA FACES. THE VSAF ALSO AGREED THAT MARKET BASED PRINCIPLES SHOWED MERIT AND FURTHER EVALUATION.*

- *CSWCD REPRESENTATIVES ATTENDED, VIA INVITATION, THE VA. NONPOINT SOURCE NUTRIENT MARKET MEETING. THE EVENT WAS HELD BY THE VA. ATTORNEY GENERAL'S OFFICE AND EPA HQ. AND HOSTED BY THE THOMAS JEFFERSON INSTITUTE FOR PUBLIC POLICY. A PRESENTATION WAS GIVEN BY THE CSWCD MANAGER ON ICS AND CIG AS A FEATURE AGENDA ITEM. THE VA. ATTORNEY GENERAL, VA. SECRETARY OF NATURAL RESOURCES, VA. SECRETARY OF AGRICULTURE AND FORESTRY, EPA HQ & REGION III, EPA CHESAPEAKE BAY PROGRAM, VA. DEPT. OF CONSERVATION & RECREATION, VA. DEPT. OF ENVIRONMENTAL QUALITY AND NUMEROUS ENVIRONMENTAL AND AGRICULTURAL INSTITUTION REPRESENTATIVES ATTENDED. APPROX. 40 IN ATTENDANCE. NOTE* THIS MEETING WAS PART OF A LARGER INITIATIVE ORDERED BY THE VA. ATTORNEY GENERAL'S OFFICE IN COOPERATION WITH EPA HQ TO EXECUTE A LEGAL AND ENVIRONMENTAL ANALYSIS OF VA. MANDATES AND AGREEMENTS ASSOCIATED WITH THE RESTORATION OF THE CHESAPEAKE BAY. THIS, IN PART ALLOWED FOR THE INCLUSION OF NONPOINT TRADING LEGISLATION, KNOWN AS THE VA. NUTRIENT CREDIT EXCHANGE LEGISLATION SIGNED INTO LAW BY THE GOVERNOR AFTER THE LAST SESSION OF THE VA. GENERAL ASSEMBLY. IN ADDITION, THE VA. ATTORNEY GENERAL RESIGNED TO ACCEPT THE REPUBLICAN NOMINATION FOR GOVERNOR AND HAS INCLUDED NONPOINT NUTRIENT TRADING IN HIS ENVIRONMENTAL AND AGRICULTURAL PROGRAM OUTLINES DURING HIS CAMPAIGN.*

- *MEMBER VIRGINIA NUTRIENT EXCHANGE PROGRAM NON POINT SOURCE ADVISORY COMMITTEE – 6 MEETINGS AS ADVISORY MEMBERS IN THE DEVELOPMENT OF RULES FOR MUNICIPAL WASTE UTILITY NUTRIENT TRADING WITH CROP PRODUCERS/LANDOWNERS IN SUPPORT OF THE VIRGINIA NUTRIENT EXCHANGE LEGISLATION.*

- *PROVIDE WRITTEN COMMENTS CONCERNING THE VIRGINIA NUTRIENT EXCHANGE LEGISLATION.*

- *RECEIVED THE NATIONAL NO-TILL INNOVATOR AWARD SPONSORED BY SYNGENTA & NO-TILL MAGAZINE. NOMINATED BY USDA/NRCS VA. STATE OFFICE. PRESENTED AT THE ANNUAL NO-TILL CONFERENCE (700 IN ATTENDANCE).*

- *PRESENTATION AT 4 RIVERS AGRICULTURE CONFERENCE (70 PRODUCERS IN ATTENDANCE).*

- *COORDINATION OF SPEAKERS FROM IOWA FARM BUREAU AND EPA HEADQUARTERS, TOPIC ENVIRONMENTAL CREDITS AT THE ANNUAL VIRGINIA CROP PRODUCTION MEETING (100 ARGIL. BUSINESS REPS).*

- *PRESENTATION – VA CHAPTER OF SOIL & WATER CONSERVATION SOCIETY ANNUAL MEETING – MARKET BASED STRATEGIES – ARE THEY THE ANSWER FOR WATER QUALITY (50 EXECUTIVE ADVOCATE, FEDERAL & STATE AGENCY REPS.)*

- *CIG PROJECT STATUS REPORT PRESENTATION – VA CORN GROWERS ASSOC. BOARD OF DIRECTORS MEETING (25 EXECUTIVE BOARD MEMBERS)*

- *YARMOUTH CREEK ENVIRONMENTAL CREDIT TRADING FEASIBILITY STUDY – JAMES CITY COUNTY NUTRIENT & LAND ATTRIBUTE VALUATION STUDY FOR POTENTIAL STORM WATER TO CROP PRODUCTION TRADING MARKET.*

- *THE CSWCD MANAGER PARTICIPATED, VIA INVITATION, IN THE NATIONAL FORUM ON SYNERGIES BETWEEN WATER QUALITY TRADING AND WETLAND BANKING IN WASHINGTON DC. THIS EVENT WAS HELD BY EPA HQ AND FACILITATED BY THE ENVIRONMENTAL LAW INSTITUTE AND WAS ATTENDED BY APPROXIMATELY 65 INDIVIDUALS REPRESENTING KEY INSTITUTIONS IN SUPPORT OF ADVANCING MARKET – BASED APPROACHES TO WATER QUALITY.*

- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO HANK HABICHT, CHIEF EXECUTIVE OFFICER OF THE GLOBAL ENVIRONMENT & TECHNOLOGY FOUNDATION AND HIS STAFF ON ICS AND CIG. MR. HABICHT SERVES ON THE CHESAPEAKE BAY BLUE RIBBON FINANCIAL TASK FORCE, US SECRETARY OF ENERGY ADVISORY COUNCIL, PRESIDENT'S ADVISORY COMMITTEE ON TRADE POLICY AND NEGOTIATION AND THE STEERING COMMITTEE OF THE ENERGY FUTURE COALITION.*

- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO TRACY MEHAN, PRINCIPLE IN THE ARLINGTON, VA. OFFICE OF THE CADMUS GROUP INC. ON ICS AND CIG. MR. TRACY IS THE FORMER ASSISTANT ADMINISTRATOR FOR THE EPA OFFICE OF WATER AND DIRECTED BOTH THE CLEAN WATER & SAFE DRINKING WATER ACTS PROGRAMS. DURING MR. MEEHAN'S TENOR THE EPA WATER QUALITY TRADING POLICY WAS ADOPTED.*

- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO CARL LUCERO, USDA/NRCS NATIONAL LEADER FOR CLEAN WATER AND HIS STAFF ON THE PROGRESS OF ICS AND THE CSWCD CIG PROJECT. THE CSWCD MANAGER WAS ENCOURAGED BY MR. LUCERO TO SUBMIT AN ABSTRACT FOR THE 2ND NATIONAL WATER QUALITY TRADING CONFERENCE AND THE 9TH NATIONAL MITIGATION & CONSERVATION BANKING CONFERENCE.*

- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO THE HAMPTON ROADS PLANNING DISTRICT COMMISSION (HRPDC) ON ICS AND CIG PROGRESS AT THE JAMES RIVER WATERSHED ROUNDTABLE MEETING. THE HRPDC HAS ENDORSED THE CSWCD EFFORTS IN SUPPORT OF AN*

ENVIRONMENTAL CREDIT TRADING PILOT. THE HRPDC IS A 45 MEMBER COMMISSION AND REPRESENTS 16 LOCALITIES AND MORE THAN 1.6 MILLION CONSTITUENTS. SEVERAL STATE, FEDERAL AND MUNICIPAL UTILITY REPRESENTATIVES WERE ALSO IN ATTENDANCE. (52 INDIVIDUALS)

- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO DENNIS TRACEY, VP. OF ENVIRONMENTAL & PUBLIC RELATIONS PROGRAMS FOR SMITHFIELD FOODS ON ICS AND CIG. SMITHFIELD FOODS IS THE LARGEST PORK PROCESSING COMPANY IN THE WORLD. MR. TRACEY IS THE FORMER DIRECTOR OF THE VA. DEPT. OF ENVIRONMENTAL QUALITY AND WAS RECENTLY RECOGNIZED ALONG WITH THE PRESIDENT OF SMITHFIELD FOODS FOR ENVIRONMENTAL EXCELLENCE BY THE GOVERNOR OF VA.*
- *THE CSWCD MANAGER HAS SERVED TO PROVIDE TECHNICAL ASSISTANCE TO A CORE WATER QUALITY TRADING GROUP HOSTED BY THE LAW FIRM OF MCGUIRE WOODS. (EIGHT INDIVIDUALS)*
- *PRESENTATION – YORK RIVER WATERSHED ROUNDTABLE – APPROX. 40 INDIVIDUAL AGENCY, NON GOV. ADVOCATES, LOCALITIES, INDUSTRY, MUNICIPAL SERVICE AUTHORITIES & STAKEHOLDER.*
- *THE CSWCD MANAGER PROVIDED A PRESENTATION TO THE ENVIRONMENTAL STEWARDSHIP CLASS FOR THE WILLIAMSBURG CHAMBER OF COMMERCE (35 INDIVIDUALS).*
- *THE CSWCD MANAGER PROVIDED A PRESENTATION FOR THE SOUTHERN STATES REGIONAL PROFESSIONAL ANNUAL TRAINING ON ICS, CIG AND NUTRIENT TRADING (40 INDIVIDUALS).*
- *THE CSWCD HAS AGREED TO PROVIDE A NUTRIENT TRADING FEASIBILITY STUDY FOR JAMES CITY COUNTY FOR THE YARMOUTH CREEK WATERSHED.*
- *THE CSWCD, ICS & CIG HAVE BEEN PROVIDED AS A RESOURCE CLEARING HOUSE LINK FOR THE EPA CHESAPEAKE BAY TARGETED WATERSHED GRANTS (RFP PRIORITIES INCLUDE INNOVATION, COST EFFECTIVE IMPLEMENTATION, SUSTAINABILITY AND MARKET – BASED APPROACHES).*
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INNOVATION, COST EFFECTIVE IMPLEMENTATION, SUSTAINABILITY AND MARKET – BASED APPROACHES).

- *THE PRACTICE OF CONTINUOUS NO-TILL HAS BEEN ACCEPTED BY THE EPA CHESAPEAKE BAY PROGRAM AS A "TRACK ABLE PRACTICE" WITH A POLLUTION REMOVAL EFFICIENCY ASSIGNMENT. COMMUNICATIONS FROM THE EPA INDICATE THAT EFFICIENCIES WILL BE ADJUSTED ACCORDING TO CONCLUSIONS OF THIS CIG FUNDED RESEARCH.*
- *PRELIMINARY DATA FROM LYSIMETER, DEEP CORE SOIL ANALYSIS, COVER CROP AND GREENSEEKER RESEARCH ALL SUPPORTS PROJECT HYPOTHESIS AND CIG PROPOSED OBJECTIVES.*
- *CSWCD TECHNICAL STAFF AND CIG PARTNERS SERVING ON VA. NUTRIENT EXCHANGE TECHNICAL ADVISORY COMMITTEE.*
- *CSWCD PROVIDED A PRESENTATION AT THE VA SOIL & WATER CONSERVATION SOCIETY ANNUAL MEETING ON NUTRIENT TRADING.*
- *PRELIMINARY DATA FROM LYSIMETER, DEEP CORE SOIL ANALYSIS, COVER CROP AND GREENSEEKER RESEARCH ALL SUPPORTS PROJECT HYPOTHESIS AND CIG PROPOSED OBJECTIVES.*
- *CSWCD TECHNICAL STAFF AND CIG PARTNERS SERVING ON VA. NUTRIENT EXCHANGE TECHNICAL ADVISORY COMMITTEE.*
- *CSWCD PROVIDED A PRESENTATION AT THE VA SOIL & WATER CONSERVATION SOCIETY ANNUAL MEETING ON NUTRIENT TRADING.*
- *THE CSWCD WAS REQUESTED TO PROVIDE SERVICES TO THE VIRGINIA ATTORNEY GENERAL'S OFFICE (OAG) AND US EPA. THE ATTORNEY GENERAL JERRY KILGORE ORDERED A LEGAL AND ENVIRONMENTAL ANALYSIS OF VIRGINIA'S MANDATES AND AGREEMENTS ASSOCIATED WITH THE RESTORATION OF THE CHESAPEAKE BAY , TO INCLUDE ANALYSIS OF THE LEGAL LIABILITIES ON VIRGINIA, ITS OFFICERS AND AGENCIES, IF THE COMMONWEALTH FAILED TO MEET THE ONGOING AND CALENDAR YEAR 2010 AGREEMENTS IT MADE WITH THE US EPA OR IF EPA FAILED TO MEET ITS MANDATES UNDER THE CONSENT ORDER IN THE MATTER OF AMERICAN CANOE, ET AL. V. EPA. THE LEGAL ANALYSIS INCLUDED IDENTIFICATION OF EXISTING VIRGINIA LAW THAT COULD BE APPLIED FOR THE CONTROL OF NUTRIENTS INTO THE BAY, AS WELL AS EVALUATION OF LEGISLATIVE PROPOSALS, INCLUDING NUTRIENT TRADING MARKETS. THE ENVIRONMENTAL ANALYSIS EXAMINED THE DEGREE TO WHICH VIRGINIA COULD MEET ITS NUTRIENT REDUCTION TARGETS EXCLUSIVELY THROUGH POINT SOURCES ALONE AND EVALUATED THE IMPORTANCE OF NONPOINT SOURCE CONTROLS. THE OAG, US EPA AND THE CSWCD HAVE WORKED TOGETHER AND BY SHARING INFORMATION AND DISCUSSION REGARDING NONPOINT SOURCE AGRICULTURAL PRACTICES, INCLUDING ICS. BASED ON THESE DISCUSSIONS THE CONSIDERATIONS QUICKLY NARROWED TO THE CONCEPTS OF A MARKET-*

BASED TRADING SYSTEM. A MEETING IS SCHEDULED FOR APRIL 6TH. WITH APPROXIMATELY 30 INDIVIDUALS. IT IS EXPECTED THAT THE VIRGINIA ATTORNEY GENERAL, THE VIRGINIA SECRETARY OF AGRICULTURE & FORESTRY, THE VIRGINIA SECRETARY OF NATURAL RESOURCES, SEVERAL REPRESENTATIVES FROM EPA HEADQUARTERS AND REGION III, USDA NRCS HEADQUARTERS AND STATE REPRESENTATIVES, VIRGINIA DIRECTORS OF THE DEPTS. OF ENVIRONMENTAL QUALITY AND CONSERVATION AND RECREATION, THE CHESAPEAKE BAY PROGRAM, FARM BUREAU, VA. SMALL GRAINS & CORN GROWERS ASSOCIATION, VA. COOPERATIVE EXTENSION, VA. COMMISSIONER OF AGRICULTURE, SMITHFIELD FOODS, INC., PHILLIP MORRIS, INC., DOMINION RESOURCES, SEVERAL ENVIRONMENTAL LAW FIRMS AND SEVERAL CROP PRODUCERS WILL BE IN ATTENDANCE. THE CSWCD WILL PROVIDE THE ONLY FORMAL PRESENTATION TO HIGHLIGHT ICS AND THE CIG DELIVERABLES. THE REMAINING AGENDA WILL BE DEDICATED TO DISCUSSIONS CONCERNING OPTIONS TO ENGAGE AGRICULTURE WHICH HAS BEEN ALLOCATED THE LION'S SHARE OF NUTRIENT REDUCTIONS THROUGH THE TRIBUTARY STRATEGY INITIATIVE.

- *THE CSWCD MET WITH THE VIRGINIA SECRETARY OF AGRICULTURE & FORESTRY (VSAF), THE HONORABLE ROBERT BLOXOM TO PROVIDE INFORMATION AND DISCUSSION IN SUPPORT OF ICS, CIG AND A TRADING MARKET. THE VSAF IS A NEWLY FORMED CABINET OFFICE IN VIRGINIA. THE VSAF ACKNOWLEDGED THE NEED OF ICS AS WELL AS OTHER TECHNOLOGIES TO MEET THE WATER QUALITY CHALLENGES THAT VIRGINIA FACES. THE VSAF ALSO AGREED THAT MARKET BASED PRINCIPLES SHOWED MERIT AND FURTHER EVALUATION.*

DISSEMINATION AND OUTREACH CONT. – DR. MARK ALLEY, VIRGINIA TECH:

MEETING: PROFESSIONAL CROP ADVISORS UPDATE; VERONA, VA; JANUARY 9, 2007.

TITLE: SOIL QUALITY AND N USE EFFICIENCY.

AUDIENCE: 50 CERTIFIED CROP ADVISORS.

MEETING: SOUTHERN STATES GROW MASTER CONFERENCE, BLACKSBURG, VA, AUGUST 7, 2005
TITLE: CARBON AND NITROGEN IN LONG-TERM NO-TILL SOILS
AUDIENCE: 35 CERTIFIED CROP ADVISORS

MEETING: AMERICAN SOCIETY OF AGRONOMY, SOIL SCIENCE SOCIETY OF AMERICA ANNUAL MEETINGS, SALT LAKE CITY, UT, NOVEMBER 7, 2005
TITLE: SOIL ORGANIC MATTER CONTENTS AFTER LONG-TERM NO-TILLAGE MANAGEMENT FOR GRAIN CROP PRODUCTION IN THE VIRGINIA COASTAL PLAIN
AUDIENCE: 2,500 AGRONOMY SOCIETY MEMBERS

MEETING: AREA III SOIL AND WATER CONSERVATION DISTRICT. MARCH 14, 2007. TAPPAHANNOCK, VA
TITLE: NITROGEN MANAGEMENT, WATER QUALITY, AND CROPPING SYSTEMS.
AUDIENCE: SOIL AND WATER CONSERVATION PROFESSIONALS FROM THE DISTRICT WITH ADDITIONAL STATE NRCS PERSONNEL AND VIRGINIA COOPERATIVE EXTENSION PERSONNEL. 135 ATTENDEES.

MEETING: TIDEWATER SOIL AND WATER CONSERVATION DISTRICT, MARCH 27, 2007. HARCUM, VA.
TITLE: COVER CROPS, NO-TILL AND NUTRIENT TRADING.
AUDIENCE: FARMERS, SOIL AND WATER CONSERVATION PROFESSIONALS AND VIRGINIA COOPERATIVE EXTENSION PERSONNEL; 49 ATTENDEES.

MEETING: SEMINAR FOR DEANS AND DIRECTORS OF UNIVERSITIES IN THE PHILLIPPINES, INDONESIA, THAILAND, AND VIET NAM. MARCH 30, 2007. BLACKSBURG, VA
TITLE: CROPPING SYSTEMS, LONG-TERM NO-TILL AND SOIL QUALITY RESEARCH.
AUDIENCE: UNIVERSITY RESEARCH DIRECTORS, 6 ATTENDEES.

MEETING: UNDERGRADUATE RESEARCH SYMPOSIUM, APRIL 3, 2007. VIRGINIA TECH, BLACKSBURG, VA.
TITLE: MODIFICATION OF THE ILLINOIS SOIL N TEST: ADAPTATION FOR ROUTINE ANALYSIS
AUDIENCE: UNIVERSITY STUDENTS AND FACULTY, ~300 ATTENDEES.

MEETING: USDA-NRCS IN-SERVICE TRAINING WORKSHOP, NEW KENT, VA, APRIL 13, 2006.
TITLE: SOIL C AND N STATUS AFTER LONG-TERM NO-TILLAGE MANAGEMENT FOR GRAIN CROP PRODUCTION IN THE VIRGINIA COASTAL PLAIN.
AUDIENCE: 100 USDA-NRCS NUTRIENT MANAGEMENT SPECIALISTS.

MEETING: AMERICAN SOCIETY OF AGRONOMY, SOIL SCIENCE SOCIETY OF AMERICA ANNUAL MEETINGS, INDIANAPOLIS, IN, NOVEMBER 12, 2006
TITLE: NITROGEN STATUS IN CONTINUOUS NO-TILL SOILS OF THE VIRGINIA COASTAL PLAIN.
AUDIENCE: 2,500 AGRONOMY SOCIETY MEMBERS

MEETING: SOUTHERN STATES GROW MASTER CONFERENCE, BLACKSBURG, VA, AUGUST 7, 2005
TITLE: CARBON AND NITROGEN IN LONG-TERM NO-TILL SOILS
AUDIENCE: 35 CERTIFIED CROP ADVISORS

MEETING: CHICAGO CLIMATE EXCHANGE TECHNICAL ADVISORY GROUP, CHICAGO ILL.PROVIDE SUPPORT DATA FOR ADOPTION OF CARBON CREDITS IN VIRGINIA AS ACCEPTABLE FOR CCX TRADING MARKET.

DESCRIBE SIGNIFICANT RESULTS, ACCOMPLISHMENTS, AND LESSONS LEARNED. COMPARE ACTUAL ACCOMPLISHMENTS TO THE PROJECT GOALS IN YOUR PROPOSAL:

- *THE PRACTICE OF CONTINUOUS NO-TILL HAS BEEN ACCEPTED BY THE EPA CHESAPEAKE BAY PROGRAM AS A "TRACK ABLE PRACTICE" WITH A POLLUTION REMOVAL EFFICIENCY ASSIGNMENT. COMMUNICATIONS FROM THE EPA INDICATE THAT EFFICIENCIES WILL BE ADJUSTED ACCORDING TO CONCLUSIONS OF THIS CIG FUNDED RESEARCH.*
- *THE VA. DCR HAS ADOPTED POLICY THAT STEERS A MAJORITY OF STATE COST SHARE FUNDS TOWARDS CONTINUOUS NO- TILL BASED ON COST EFFECTIVENESS.*
- *CENTURY & NLEAP MODELS USING (CIG FUNDED) SOIL ANALYSIS WILL BE DEMONSTRATED AS A POTENTIAL TOOL FOR NUTRIENT TRADING AT THE SWCS INTERNATIONAL MEETING THIS SUMMER IN KEYSTONE, CO.*
- *THERE HAS BEEN DISCUSSION CONCERNING THE OFFER OF INCENTIVE FUNDS FOR GREENSEEKER TECHNOLOGY FROM EQUIP AND STATE COST SHARE.*
- *PROJECT PARTNERS WILL CONTINUE TO PURSUE A CARBON TRADE VIA THE CHICAGO CLIMATE EXCHANGE AND ENVIRONMENTAL CREDIT TRADE VIA YARMOUTH CREEK AND VA NUTRIENT EXCHANGE LEGISLATION.*
- *ICS ENVIRONMENTAL EFFICIENCY/CREDITS WERE APPLIED AS PART OF THE YARMOUTH CREEK ENVIRONMENTAL TRADING PROGRAM FEASIBILITY STUDY.*
- *THE PRACTICE OF CONTINUOUS NO-TILL HAS BEEN ACCEPTED BY THE EPA CHESAPEAKE BAY PROGRAM AS A "TRACK ABLE PRACTICE" WITH A POLLUTION REMOVAL EFFICIENCY ASSIGNMENT. COMMUNICATIONS FROM THE EPA INDICATE THAT EFFICIENCIES WILL BE ADJUSTED ACCORDING TO CONCLUSIONS OF THIS CIG FUNDED RESEARCH.*
- *VA. ALGORITHMS HAVE BEEN DEVELOPED FOR GREENSEEKER ADAPTATION TO CORN AND WHEAT PRODUCTION.*
- *VA. PRODUCERS ARE ABLE TO PURSUE A CARBON TRADE VIA THE CHICAGO CLIMATE EXCHANGE DUE TO SOIL CARBON RESEARCH FUNDED THROUGH THIS PROJECT.*
- *PRODUCERS ARE BETTER ENABLED TO MEASURE ENVIRONMENTAL (NUTIRENT) CREDIT TRADES VIA YARMOUTH CREEK AND VA NUTRIENT EXCHANGE LEGISLATION PROTOCALS.*
- *WATERSHED DATA AND ENVIRONMENTAL EFFICIENCY/CREDITS HAVE BE APPLIED AS PART OF THE YARMOUTH CREEK ENVIRONMENTAL TRADING PROGRAM FEASIBILITY STUDY.*
- *CENTURY & NLEAP MODELS USING (CIG FUNDED) SOIL ANALYSIS HAVE BEEN DEMONSTRATED AS A PREDICTION/TRACKING TOOL FOR ENVIRONMENTAL CREDITS.*
- *PARTIAL FUNDING HAS BEEN SECURED TO CONTINUE ICS N LEACHING RESEARCH.*

- *PROJECT RESEARCH WILL BE UTILIZED TO PREDICT AND TRACK WATERSHED WIDE PROGRESS BY THE EPA CHESAPEAKE BAT PROGRAM AND ASSOCIATED STATE MARKET BASED INITIATIVES.*
- *NUMEROUS PRIVATE, STATE AND FEDERAL AGENCY PERSONNEL ARE BETTER TRAINED AND EQUIPPED TO DISSEMINATE SOIL QUALITY, ICS MANAGEMENT AND MARKET BASED CONCEPTS.*
- *IN 2007 A COALITION OF AGRICULTURAL AND WATER QUALITY ADVOCATE GROUPS HAVE FORMALLY REQUESTED THAT THE GOVERNOR OF VA. PROVIDE UNPARALLEL FUNDING ($100 MILLION A YEAR FOR THE NEXT 10 YEARS) TO IMPLEMENT THE 5 MOST COST EFFECTIVE BMPS. THREE OF THE 5 PRACTICES ARE PRINCIPLE ICS COMPONENTS (CNT, COVER CROPS & NUTRIENT MANAGEMENT).*
- *VA. STATE COST SHARE & EQUIP FUNDING NOW OFFER FUNDING AND POLICY THAT PROMOTE ICS CONCEPTS. MD. & PA. ARE FOLLOWING THIS TREND.*
- *THE AG. INDUSTRY HAS FOCUSED ON R&D AND OFFER NEW PRODUCTS THAT ADVANCE ICS CONCEPTS IN VA.*
- *VA LEGISLATORS (FED. STATE & LOCAL)HAVE GAINED A BETTER APPRECIATION FOR THE COST EFFECIVNESS OF ICS PRINCIPLES AND THE OPPORTUNITY TO OBTAIN GOALS THROUGH A MARKET BASED APPROACH.*
- *ICS HAS GAINED SIGNIFICANT ADVANCEMENTS IN SYSTEM COMPONENT PERFORMANCE.*
- *THE MANUSCRIPT ENTITLED "MODIFICATION OF THE ILLINOIS SOIL N TEST TO IMPROVE MEASUREMENT PRECISION AND INCREASE SAMPLE THROUGHPUT" WAS ACCEPTED FOR PUBLICATION IN THE SOIL SCIENCE SOCIETY OF AMERICA JOURNAL.*

29 OCTOBER 2007

ACTIVITIES DURING THE QUARTER INCLUDED HARVESTING 15 CORN RESEARCH PLOTS FOR THE SECOND YEAR CALIBRATION OF THE ILLINOIS SOIL N TEST, COMPLETING SOIL CARBON AND NITROGEN ANALYSES, AND PREPARING MANUSCRIPTS FOR PUBLICATION. THE MANUSCRIPT ENTITLED "MODIFICATION OF THE ILLINOIS SOIL N TEST TO IMPROVE MEASUREMENT PRECISION AND INCREASE SAMPLE THROUGHPUT" WAS ACCEPTED FOR PUBLICATION IN THE SOIL SCIENCE SOCIETY OF AMERICA JOURNAL. THE MANUSCRIPT PROVIDES A REFERENCE SOURCE FOR MODIFYING THE ILLINOIS SOIL NITROGEN TEST FOR USE IN ANALYZING LARGE NUMBERS OF SAMPLES SUCH AS WOULD BE NECESSARY IN A ROUTINE SOIL TESTING LABORATORY. SOIL CARBON AND NITROGEN ANALYSES WERE COMPLETED FOR THE ADDITIONAL FIELD SITES AND THE DATA IS CURRENTLY BEING SUMMARIZED FOR PRESENTATION AT THE AMERICAN SOCIETY OF AGRONOMY MEETINGS. THESE DATA WERE INCLUDED IN AN EXTENSION PUBLICATION AND WILL BE PRESENTED TO THE GOVERNMENT AGENCIES WORKING ON DEVELOPING NUTRIENT TRADING PROGRAMS IN VIRGINIA. AN EXTENSION PUBLICATION FOR THE USE OF SENSOR BASED NITROGEN FERTILIZER APPLICATIONS IN WHEAT AND CORN. THE PUBLICATION WILL BE FOR USE BY GROWERS, NRCS PERSONNEL, EXTENSION AGENTS, SOIL AND WATER CONSERVATION DISTRICT EMPLOYEES, AND AGRIBUSINESS REPRESENTATIVES.

STATUS OF RESEARCH:

SIX FIELD STUDIES WERE CONDUCTED IN THE SPRING OF 2005 TO EVALUATE THE GREENSEEKER® RT200 FOR MAKING SENSOR-BASED, VARIABLE-RATE N APPLICATIONS TO WINTER WHEAT IN VIRGINIA. PLOT SIZE WAS 18 M WIDE BY 90 TO 150 M LONG. TOP-DRESS N WAS APPLIED TO WINTER WHEAT USING A SPRA-COUPE® APPLICATOR WITH AN 18-M BOOM, WHICH WAS EQUIPPED WITH A GREENSEEKER® RT200 VARIABLE-RATE SPRAY SYSTEM. THE EXPERIMENTAL DESIGN WAS A RCB THAT INCLUDED NINE TREATMENTS REPLICATED FOUR TIMES. SPECIFIC TREATMENTS INCLUDED TWO VARIABLE N RATE APPLICATIONS DETERMINED USING THE GREENSEEKER®, TWO SINGLE N RATES BASED ON TISSUE TESTS OR GREENSEEKER®-BASED YIELD ESTIMATES, AND A RANGE OF FIVE PREDETERMINED FIXED RATES. NITROGEN USE EFFICIENCY (NUE) WAS INCREASED AT THREE LOCATIONS USING VARIABLE-RATE N APPLICATION COMPARED TO THE STANDARD FIXED-RATE PRACTICE, WHILE NUE WAS NOT AFFECTED AT TWO LOCATIONS AND WAS REDUCED AT A SINGLE LOCATION.

TITLE: NITROGEN CYCLING IN LONG-TERM CONTINUOUS NO-TILL COASTAL PLAIN SOILS OF THE MID-ATLANTIC

DURATION: THREE YEARS

PRINCIPAL INVESTIGATOR: MARK ALLEY, DEPT. OF CROP AND SOIL ENVIRONMENTAL SCIENCES, VIRGINIA TECH, BLACKSBURG, VA 24061; PH: 540-231-9777; EMAIL: MALLEY@VT.EDU

GRADUATE RESEARCH ASSISTANT: JOHN T. SPARGO, DEPT. OF CROP AND SOIL ENVIRONMENTAL SCIENCES, VIRGINIA TECH, BLACKSBURG, VA 24061; PH: 540-231-4145; EMAIL: JSPARGO@VT.EDU

LOCATION: KING WILLIAM, NEW KENT, AND CHARLES CITY COUNTIES, VIRGINIA

OBJECTIVES:

I. *COMPARE N LEACHING POTENTIAL BETWEEN CONVENTIONAL AND LONG-TERM NO-TILL CULTIVATED SOILS.*
II. *DETERMINE N SEQUESTRATION IN SOILS USING CONTINUOUS NO-TILL MANAGEMENT.*
III. *PREDICT ORGANIC N TURNOVER IN CONTINUOUS NO-TILL SOILS.*
IV. *DISSEMINATE KNOWLEDGE GAINED FROM THIS RESEARCH TO VIRGINIA EXTENSION PERSONNEL AND AGRICULTURAL LAND MANAGERS.*

EXECUTIVE SUMMARY:

FIELD RESEARCH WAS INITIATED IN THE SPRING OF 2005 TO ADDRESS CONCERNS REGARDING N LEACHING LOSSES, SEQUESTRATION AND "TURN-OVER" IN LONG-TERM NO-TILL SOILS. THIS RESEARCH HAS IMPLICATIONS FOR BOTH ENVIRONMENTAL QUALITY (E.G., N-LEACHING, C-SEQUESTRATION) AND AGRONOMIC EFFICIENCY (E.G., SOIL QUALITY, N-USE-EFFICIENCY). WHAT FOLLOWS IS A BRIEF SUMMARY OF OUR CURRENT RESEARCH PROJECTS ADDRESSING THESE ISSUES.

TILLAGE EFFECTS ON NITRATE LEACHING LOSSES.

IN ORDER TO COMPARE N LEACHING LOSSES BETWEEN TILLAGE TREATMENTS, FOUR LONG-TERM NO-TILL SITES PAIRED WITH FOUR ROTATIONAL TILLAGE SITES ACROSS FOUR SOIL SERIES WAS SELECTED FOR N LEACHATE MONITORING. ALL SITES ARE ON COMMERCIAL FARMS. TWO OF THE PAIRED SITES ARE IN NEW KENT COUNTY AND TWO ARE IN KING WILLIAM COUNTY. THE SOIL SERIES AT THE TWO PAIRED SITES ON THE FARM IN NEW KENT COUNTY ARE BOJAC LOAMY SAND BOJAC LOAMY SAND (COARSE-LOAMY, MIXED, SEMI ACTIVE, THERMIC TYPIC HAPLUDULTS), AND ALTAVISTA SANDY LOAM (FINE-LOAMY, MIXED SEMI ACTIVE, THERMIC AQUIC HAPLUDULTS), AND ON THE FARM IN KING WILLIAM COUNTY ARE KEMPSVILLE SANDY LOAM (FINE-LOAMY, SILICEOUS, SUBACTIVE, THERMIC TYPIC HAPLUDULTS), AND SLAGLE SANDY LOAM (FINE-LOAMY, SILICEOUS, SUBACTIVE, THERMIC AQUIC HAPLUDULTS). TILLAGE TREATMENTS WITHIN THE SAME SOIL SERIES WERE LOCATED WITHIN ~300 M OF EACH OTHER. THREE PASSIVE CAPILLARY SAMPLERS (PCAPS) WERE INSTALLED AT EACH SITE IN SEPTEMBER 2005. LEACHATE SAMPLING BEGAN IN EARLY NOVEMBER 2005 AND WILL CONTINUE THROUGH AT LEAST NOVEMBER 2007. LEACHATE IS ANALYZED FOR NO3-N AND IS REPORTED ON A CONCENTRATION AND MASS BASIS.

LEACHATE DATA COLLECTED TO DATE IS SUMMARIZED IN FIGS. 1 THROUGH 8. OUR PRELIMINARY EVALUATION OF THE DATA COLLECTED THUS FAR REVEALS NO CONSISTENT EFFECTS OF TILLAGE MANAGEMENT ON NO3-N LEACHING. THERE DOES HOWEVER APPEAR TO BE A SEASONAL EFFECT, WITH MOST OF THE NO3-N LOSSES OCCURRING DURING PERIODS OF LOW EVAPOTRANSPIRATION. WATER SAMPLES WILL CONTINUE TO BE COLLECTED THROUGH SEPTEMBER 2007 AT WHICH POINT A COMPLETE DATA SET WILL ALLOW US TO CONDUCT RIGOROUS STATISTICAL ANALYSIS TO DETERMINE THE FACTORS THAT INFLUENCE NO3-N LOSSES FROM THE CROPPING SYSTEMS UNDER EVALUATION.

TILLAGE EFFECTS ON CARBON AND NITROGEN SEQUESTRATION

ELEVATED SOIL ORGANIC MATTER IN LONG-TERM NO-TILLAGE SOILS MAY SIGNIFICANTLY INFLUENCE C AND N CYCLING. THE OBJECTIVE OF THIS RESEARCH WAS TO DETERMINE THE RELATIONSHIP BETWEEN DURATION OF CONTINUOUS NO-TILL MANAGEMENT AND SOIL N STATUS. SIXTY-FIVE SITES WHERE SELECTED ACROSS THREE SOIL SERIES IN THE VIRGINIA MIDDLE COASTAL PLAIN WITH A HISTORY OF CONTINUOUS NO-TILL RANGING FROM 0 TO 14 YEARS. ALL SITES WERE IN A CORN (ZEA MAYS L.) / WHEAT (TRITICUM AESTIVUM L.) OR BARLEY (HORDEUM VULGARE L.) / DOUBLE-CROP SOYBEAN (GLYSINE MAX L.) ROTATION. THE THREE SOILS SERIES, BOJAC LOAMY SAND (COARSE-LOAMY, MIXED, SEMIACTIVE, THERMIC TYPIC HAPLUDULTS), ALTAVISTA SANDY LOAM (FINE-LOAMY, MIXED SEMIACTIVE, THERMIC AQUIC HAPLUDULTS), AND KEMPSVILLE SANDY LOAM (FINE-LOAMY, SILICEOUS, SUBACTIVE, THERMIC TYPIC HAPLUDULTS), REPRESENT A SIGNIFICANT PORTION OF THE LAND AREA USED FOR CROP PRODUCTION IN THE REGION. HALF OF THE SITES RECEIVED BIOSOLIDS 5 YEARS PRIOR TO THE SAMPLING DATE. APPROXIMATELY HALF OF THE SITES WERE SAMPLED IN SEPTEMBER 2005 AND THE OTHER HALF WERE SAMPLED IN SEPTEMBER 2006 TO MAINTAIN CONSISTENCY WITH CROP ROTATIONS. FIVE SURFACE SAMPLES WHERE COLLECTED FROM 0 - 2.5 CM,

2.5 - 7.5 CM AND 7.5 TO 15 CM USING SOIL CORES OF KNOWN VOLUME. SOIL SAMPLES WERE ANALYZED FOR BULK DENSITY, TOTAL C, AND ORGANIC AND INORGANIC N.

CARBON CONCENTRATION VERSUS DURATION OF NO-TILL MANAGEMENT AVERAGED ACROSS SOIL SERIES AND BIOSOLIDS HISTORY IS SUMMARIZED IN FIG. 9. WE FOUND A SIGNIFICANT RELATIONSHIP (R2=0.38) BETWEEN THE CONCENTRATION OF SOIL ORGANIC C IN THE SURFACE 0 – 15 CM AND DURATION OF NO-TILL MANAGEMENT (PARTIAL R2=0.098; P=0.004; 0.202 ± 0.135 G C KG-1 YR-1), BIOSOLIDS APPLICATION (PARTIAL R2=0.14; P=0.0002; 1.81 ± 0.906 G C KG-1 YR-1) AND SOIL SERIES (PARTIAL R2=0.14; P=0.0003; BOJAC LOAMY SAND: -2.00 ± 1.04 G C KG-1 YR-1). THERE WAS NO RELATIONSHIP BETWEEN BULK DENSITY AND DURATION OF NO-TILL. THIS MAY BE DUE TO RANDOM VARIATION IN BULK DENSITY AMONG SITES. WE ESTIMATED CARBON SEQUESTRATION ON AN AREAL BASIS USING AVERAGE BULK DENSITY OF THE SURFACE 15 CM; ABOUT 1.5 G CM-3. USING THIS VALUE AND THE C SEQUESTRATION RATE OF 0.202 ± 0.135 G C KG-1 YR-1 WE ESTIMATE THAT C IS SEQUESTERED AT A RATE OF 0.455 ± 0.304 MG C HA-1 YR-1. THIS IS IN CLOSE AGREEMENT WITH VALUES PUBLISHED BY OTHER RESEARCHERS WORKING IN THE SOUTHEASTERN UNITED STATES.

ORGANIC AND INORGANIC N ANALYSIS OF SAMPLES COLLECTED IN 2006 ARE CURRENTLY UNDERWAY AND WILL BE COMPLETE IN THE COMING WEEKS. DATA FROM SAMPLES COLLECTED IN 2005 INDICATE THAT TOTAL ORGANIC N AND AMINO-SUGAR N (AND INDICATOR OF MINERALIZABLE N) ARE INCREASING IN THE SURFACE 15 CM WITH DURATION OF NO-TILL MANAGEMENT. THE POSITIVE CORRELATION BETWEEN TOTAL AND AMINO SUGAR N AND DURATION OF NO-TILL MANAGEMENT SUGGESTS IMPROVED CONSERVATION OF FERTILIZER N. THIS HAS SIGNIFICANT AGRONOMIC IMPLICATIONS.

NITROGEN FRACTIONATION IN LONG TERM CONTINUOUS NO-TILL SOILS

A PORTION OF THE ACCUMULATED N IN SOILS MANAGED USING LONG-TERM NO-TILL CULTIVATION IS POTENTIALLY AVAILABLE FOR CROPS. KNOWLEDGE REGARDING BOTH THE AMOUNT AND TIMING OF N-MINERALIZATION IS ESSENTIAL TO EFFICIENT USE OF FERTILIZER N IN NO-TILL SYSTEMS. IF N-MINERALIZATION CAN BE PREDICTED, FERTILIZER N RATES AND APPLICATION TIMING MAY BE ADJUSTED. A SUBSET OF SOIL SAMPLES COLLECTED FOR THE N SEQUESTRATION STUDY WERE USED TO DETERMINE THE AFFECT OF TILLAGE ON THE RELATIVE SIZE AND PROPORTION OF DIFFERENT ORGANIC N FRACTIONS. SOIL SAMPLES USED IN THIS STUDY WERE FROM 10 SITES WITH A HISTORY OF CONTINUOUS NO-TILL RANGING FROM 0 TO 14 YEARS. ALL OF THE SAMPLES WERE COLLECTED FROM SITES MAPPED AS KEMPSVILLE SANDY LOAM (FINE-LOAMY, SILICEOUS, SUBACTIVE, THERMIC TYPIC HAPLUDULTS) AND NONE HAD A HISTORY OF BIOSOLIDS APPLICATION. ORGANIC N WAS FRACTIONATED INTO HYDROLYSABLE AMMONIUM, AMINO-SUGAR N, AMINO-ACID N, TOTAL

HYDROLYSABLE N AND NON-HYDROLYSABLE N. BOTH AMINO-SUGAR N AND AMINO-ACID N CONTENT HAVE BEEN SHOWN TO CORRELATE WITH MINERALIZABLE N.

SOIL TESTING TO PREDICT ORGANIC N MINERALIZATION AND OPTIMIZE FERTILIZER N RATES

A SOIL BASED APPROACH THAT ATTEMPTS TO QUANTIFY ORGANIC N TURNOVER COULD IMPROVE THE PRECISION OF FERTILIZER N RECOMMENDATIONS FOR CORN AND INCREASE N USE EFFICIENCY. IDEALLY, A SOIL N TEST WOULD ESTIMATE A LABILE ORGANIC FRACTION THAT SUPPLIES PLANT AVAILABLE N TO THE CROP DURING THE GROWING SEASON. THE ILLINOIS SOIL N TEST FOR AMINO SUGAR-N (ISNT) HAS SHOWN PROMISE AS A USEFUL TOOL FOR THE ESTIMATION OF POTENTIALLY MINERALIZABLE SOIL N. RESEARCH HAS SHOWN THAT IT MAY BE USED TO ADJUST FERTILIZER N RATES FOR CORN GROWN ON SOILS WITH A HISTORY OF MANURE OR LEGUMES IN THE ROTATION. WE WISH TO DETERMINE IF THE TEST IS ALSO USEFUL TO DETERMINE APPROPRIATE N RATES IN SOILS THAT HAVE BEEN MANAGED USING LONG TERM CONTINUOUS NO-TILLAGE WHERE SOIL ORGANIC N CYCLING HAS BEEN ALTERED. RESEARCH WILL BE CONDUCTED OVER TWO GROWING SEASONS (2006-2007).

PRELIMINARY RESULTS FROM THE 16 N-TRIALS CONDUCTED DURING THE 2006 GROWING SEASON INDICATE THAT THE ASSAY HAS POTENTIAL TO BE A USEFUL TOOL TO ADJUST FERTILIZER N RATES WERE MANAGEMENT PRACTICES (E.G., CONTINUOUS NO-TILLAGE, LEGUMES GROWN IN ROTATION, AND MANURE OR BIOSOLIDS APPLICATION) HAVE ALTERED THE QUANTITY AND CYCLING OF SOIL ORGANIC N. WE FOUND A NEGATIVE CORRELATION BETWEEN ISNT AND YIELD RESPONSE TO SIDEDRESS N, THOUGH THE RELATIONSHIP WAS WEAK (R2=0.29; FIG. 10). WE ALSO FOUND A NEGATIVE RELATIONSHIP BETWEEN ISNT AND THE POUNDS OF N PER BUSHEL OF YIELD AT THE EONR (R2=0.38; FIG. 11). THIS RELATIONSHIP MAY BE ESPECIALLY USEFUL IF USED TO AUGMENT THE CURRENT VIRGINIA RECOMMENDATIONS BASED ON EXPECTED YIELD.

TITLE: NITROGEN CYCLING IN LONG-TERM NO-TILL COASTAL PLAIN SOILS OF THE MID-ATLANTIC

DURATION: THREE YEARS

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LOCATION: KING WILLIAM, NEW KENT, AND CHARLES CITY COUNTIES, VIRGINIA

OBJECTIVES:

I. *COMPARE N LEACHING POTENTIAL BETWEEN CONVENTIONAL AND LONG-TERM NO-TILL CULTIVATED SOILS.*
II. *PREDICT N SEQUESTRATION AND RELEASE FROM ORGANIC MATTER IN LONG-TERM NO-TILL SOILS.*
III. *DISSEMINATE KNOWLEDGE GAINED FROM THIS RESEARCH TO VIRGINIA EXTENSION PERSONNEL AND AGRICULTURAL LAND MANAGERS.*

EXECUTIVE SUMMARY:

FIELD RESEARCH WAS INITIATED IN THE SPRING OF 2005 TO ADDRESS CONCERNS REGARDING N LEACHING LOSSES, SEQUESTRATION AND "TURN-OVER" IN LONG-TERM NO-TILL SOILS. IN ORDER TO COMPARE N LEACHING LOSSES BETWEEN TILLAGE TREATMENTS, FOUR LONG-TERM NO-TILL SITES PAIRED WITH FOUR CONVENTIONAL TILLAGE SITES ACROSS FOUR SOIL SERIES WERE SELECTED FOR N LEACHATE MONITORING. ALL SITES ARE ON COMMERCIAL FARMS. TWO OF THE PAIRED SITES ARE IN NEW KENT COUNTY AND TWO ARE IN KING WILLIAM COUNTY. TILLAGE TREATMENTS WITHIN THE SAME SOIL SERIES WERE LOCATED WITHIN ~300 M OF EACH OTHER. THREE PASSIVE CAPILLARY SAMPLERS (PCAPS) WERE INSTALLED AT EACH SITE. LEACHATE SAMPLING WILL BEGIN IN EARLY NOVEMBER 2005 (AS SOON AS WATER MOVEMENT THROUGH THE SOILS OCCURS) AND CONTINUE THROUGH AT LEAST NOVEMBER 2007. LEACHATE WILL BE ANALYZED FOR NO3-N AND REPORTED ON A CONCENTRATION AND MASS BASIS. TO INVESTIGATE THE RELATIONSHIP BETWEEN TILLAGE AND N SEQUESTRATION/RELEASE APPROXIMATELY 50 SITES ACROSS 3 SOIL SERIES WITH A HISTORY OF NO-TILL RANGING FROM 2 TO 15 YEARS ARE BEING SAMPLED TO A DEPTH OF 15 CM. SOIL SAMPLES ARE BEING ANALYZED FOR BULK DENSITY, TOTAL C, AND ORGANIC AND INORGANIC N. HALF OF THE SITES WERE SAMPLED IN SEPTEMBER 2005 AND THE OTHER HALF WILL BE SAMPLED IN SEPTEMBER 2006 TO MAINTAIN CONSISTENCY WITH CROP ROTATIONS. SOIL CORES WILL BE COLLECTED FROM A SUBSET OF THE ORIGINAL 50 SITES SAMPLED FOR USE IN AN INCUBATION EXPERIMENT TO QUANTIFY POTENTIAL N MINERALIZATION IN LONG-TERM NO-TILL SOILS.