Delaware Soybean Board FY16-17 Research

Assessing the Impacts of Seed Treatments and Rotation on SCN Populations and Soybean Yield Over Time; Nathan Kleczewski. (University of Delaware) ($3,986) nkleczew@udel.edu
Soybean Cyst Nematode (SCN) is the most damaging pathogen of soybeans. Damage caused by SCN is driven by colonization of roots by females, which set up permanent feeding sites on roots and continuously draw nutrients from the plant. Management of SCN in many areas relies on rotation from soybean to non-host crops for multiple years and the selection of resistant cultivars. These management methods are not perfect, and consequently Delaware growers are in need of additional management tools for SCN in soybeans.
It is not known if continuous use of nematacide/biological seed treatments have an additive effect on suppressing SCN populations, if SNC seed treatment effects persist pas a single season, or if the impacts of SCN seed treatments, particularly those of biological origin, continue into subjequent years. Assessing the long-term impacts of seed treatments on SCN populations will allow growers to make informed, profitable management decisions as relates to SCN.
Project Objectives:
*Assess four new or commonly used seed treatments in continuous soybean or a soybean corn rotation for their within-season, cumulative and residual effects on SCN egg numbers and soybean yield.

Evaluating the Response of Full Season and Double Cropped Soybean in Narrow and Wide Rows to Various Soil Moisture Levels; Cory Whaley, James Adkins and Phillip Sylvester (University of Delaware); ($16,262). (whaley@udel.edu)
Nationally irrigation research is dominated by the needs of the semi-arid Southwest U.S. The small amount of irrigation research performed in the Mid-Atlantic has focused on corn and vegetables. With over 30% of the tillable land in Delaware under irrigation and the importance of soybeans as a rotational crop, it has become evident that improved irrigation management practices are necessary to maximize soybean yields and profitability.
There has been a very limited amount of irrigation management research conducted on soybean in the Mid-Atlantic region. Research conducted in other areas of the U.S. has limited adaptability to Delaware due to climate and soil differences. In addition, there is little information available on the effect of row width on irrigated soybean. New research on irrigation strategies and row width is necessary to maximize the yield of full season and double cropped soybeans in Delaware.
Project Objectives:
Evaluate the effects of various soil moisture levels and row widths on growth and yield of full season and double cropped soybeans;
Determine the optimal irrigation management strategy for full season and double cropped soybeans to maximize yield and profitability.

Effect of Fertigation on Irrigated Full Season and Double Cropped Soybeans; Cory Whaley, James Adkins and Phillip Sylvester (University of Delaware); ($8,979). (whaley@udel.edu)
Soybean yields have been gradually increasing over the last 30 years due to genetic and management improvements. Traditionally, soybeans have been grown without nitrogen fertilization because of the inherent ability to fix N in nodules and obtain sufficient residuel and mineralized N from the soil. However, in a high yield scenario, particularly under irrigation where water is not a limiting factor, soybeans may not have the ability to fix N or obtain enough from the soil to maximize yields. In addition,

some of the sandy and low-organic-matter soils found in Delaway may not be able to supply sufficient sulfur (S) in a high yield scenario. Recently, growers on Delmarva have reported positive yield responses to N+S fertigation through center pivot irrigation when applied at flowering (R1/R2) or beginning pod (R3) or beginning seed fill (R5) growth stages. In a preliminary replicated study conducted at the UD Warrington Irrigation Research Farm in 2014, N+S (30 lbs N/A + 8 lbs S/A) was fertigated on full season soybeans at R5. Soybeans in plots that received the fertigation yielded 5 bu/a greater than plots that received no fertigation.

Project Objectives:

Evaluate the effects of nitrogen and sulfur applied through a center pivot irrigation on full season and double cropped soybean yield.

Determine the optimal soybean reproductive growth stages for nitrogen and sulfur applications

Determine the economics of applying nitrogen and sulfur on irrigated soybeans during reproductive growth stages.

Area Wide Evaluation of Multiple Insecticide Applications to Control Dectes Stem Borer in Soybeans; Philip Sylvester, Bill Cissel, Joanne Whalen. (University of Delaware) ($3,870) (psylvester@udel.edu)

Recent losses from Dectes Stem Borer (DSB) lodging have increased in both Delaware and in some neighboring counties on the Eastern Shore of Maryland. Research and demonstration plotsestablished on UD research farms and on cooperating farms found insecticide applications can reduce adult DSB populations and percent of infested stems. However, there were no differences between lodging loss and yield in the research plots or on cooperating farms. Although a minimum of two insecticide applications appear to be necessary to reduce yield loss due to lodging, we have not been able to document that two applications will result in increased yields due to reduced lodging.

Project Objectives:

Evaluate the effectiveness of multiple foliar insecticide applications to control Dectes Stem Borer

Determine if the timing for making foliar application-based on DSB adult beetle emergence can apply on an area-wide basis.

Evaluate Soybean Lines with Feed Value Traits Combines with Oil Value (High Oleic/Low Linoleic) in non-GMO Varieties Adapted to Delmarva; John Schillinger and Bill Rhodes (Schillinger Genetics, Inc.); ($15,000). (Co-funded with the Maryland Soybean Board). (brhodes@@schillgen.com)

The USB has indicated that high oleic acid soybeans are needed to avoid further erosion of vegetable oil for food market. Schillinger Genetics has developed outstanding non-GMO high oleic soybean varieties for Delaware. This grant will support testing of new, novel soybean varieties for Delmarva that have added the SG patented feed value genetics to the oil quality genetics.

Project Objectives:

•Test new non-GMO varieties and experimental lines with combined feed value and oil traits.

Weed Management for No-Till and Double Cropped Soybeans for Problem Species and Herbicide-Resistant Biotypes; *Mark VanGessel (University of Delaware); ($17,897). (mjv@udel.edu)*

Some weed species have been challenging to control in soybean production. As production practices change, new weed specie can emerge and become problematic for management, such as Palmer Amaranth. The widespread use of only glyphosate has selected weed biotypes resistant to this

herbicide. The challenge for a successful weed management program is the diversity of species, timing of weed management, and production system-related issues. More work is necessary to determine the best way to manage cover crops to control herbicide-resistant weeds.

Project Objectives:

Evaluate residual herbicide combinations for morningglory and Palmer amaranth control
Evaluate the management of cereal rye cover crop for Palmer amaranth control
Examine timing for burndown applications for full-season soybeans;
Evaluate various herbicide options for control of Palmer amaranth in double-cropped soybeans.

Analyses of Phosphorus Origin in the Chesapeake Bay; Deb Jaisi (University of Delaware); ($21,274). (Co-funded with the Maryland Soybean Board). (jaisi@udel.edu)

Three major phosphorus sources have contributed to the degradation of water quality in the Chesapeake Bay: land driven phosphorus, mobilized phosphorus from bay sediments, and imported phosphorus from ocean. One of the challenges faced is to interpret some of our present results is that we do not have sufficient information on the differences and variations of different land driven phosphorus sources. Previous results show that the bulk of agriculturally driven phosphorus retained in the particulate matter remains as unreactive phosphorus in the sediment in the Chesapeake Bay. Phosphorus derived from dead phytoplankton is the most predominant phosphorus source that sustains dead zone and potentially refuels eutrophication. Because unreactive phosphorus does not play any role in water quality problems, this result indicates that comparing all phosphorus sources into a single group and presuming them equally responsible for water quality issue is not rational. This result will have significant impact once our results are published.

Project Objective:

i) Identify isotopic signatures of particulate P pools in terrestrial P sources in the East Creek waters;
(ii) Track P sources in the East Creek watershed using isotope fingerprint and multi-element fingerprint methods
(iii) Differentiate bioavailable and unavailable PP pools during transport along the environmental gradient from land-derived sources to ultimate export to the Chesapeake Bay.

Examining the capacity of Phytophthora capcisi to spread through soybean; *Nathan Kleczewski (University of Delaware); ($5,000).* (nkleczew@udel.edu)

Issues with P. capcisi have spread throughout the Mid-Atlantic. An aggressive, soil-born pathogen of several crops – including cucurbits and lima beans – P. capcisi causes crop losses due to yield loss and quality loss.

Current recommendations for growers include rotation away from vegetables to agronomic crops for at least two seasons. However, there is concern and some evidence that soybeans may host the pathogen. Due to the extended acreage of soybeans planed in the United States, it is unlikely the pathogen causes yield loss in soybean. However, if soybeans serve as a latent host of the pathogen it may allow the organism to increase in abundance and potentially result in greater losses if vegetables are planted in subsequent seasons.

Project Objectives:

- Assess efficacy and movement of P.capcisis in asymptomatic tissues
- Assess efficacy of infested soybean residue to result in infection of important vegetable crops.