Research Trials and Demonstrations at the Haskell Ag Lab:

Alfalfa Planting Density Trial (ongoing)

*Lead Investigator(s): Ben Beckman, Extension Educator, ben.beckman@unl.edu*

1) Study looking at different seeding rates of a typical pre inoculated alfalfa variety ranging from 5 to 20 lb./acre from an economic and production perspective.
2) Study comparing seeding rate increase to inoculation of a traditional vernal alfalfa variety to determine what method is most cost effective at producing a full/productive stand.

Packing/Chop Length/Covering of Silage Trial (ongoing)

*Lead Investigator(s): Ben Beckman, Extension Educator, ben.beckman@unl.edu; Sara Bauder, SDSU*

Study being conducted in cooperation with SDSU Extension comparing ¼, ½, and ¾ inch chop lengths of corn silage as well as 12, 15, and 17 lb. packing densities. Silage was harvested and packing into 8 inch diameter by 36 inch length mini-silos and will be evaluated for dry matter loss and quality.

Soybean Gall Midge IPM (ongoing)

*Lead Investigator(s): Justin McMechan, Asst. Professor of Entomology, justin.mcmechan@unl.edu
Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu*

Our largest research effort is directed at the new soybean pest, the soybean gall midge. We are collaborating with Justin McMechan (project lead) and several surrounding state universities on a suite of soybean gall midge biological, behavioral, and ecological studies with the goal of developing IPM strategies and tools to manage this pest. These studies are funded by the Nebraska Soybean Board, North Central Soybean Research Program, USDA NIFA, North Central IPM Center, and various Industry partners.

Stink Bug IPM (ongoing)

*Lead Investigator(s): Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu
Robert Wright, Professor of Entomology, rwright2@unl.edu*

Stink bugs have been a growing pest issue in Nebraska crops and the north central states. Blessing Ademokoya (PHD Grad student) is working on one of our current stink bug IPM projects. She has sampled fields (soybean, corn, and adjacent crops/areas) here at HAL and other UNL research stations to determine stink bug species number, abundance, parasitism, and economic injury. This information will help us understand the local stink bug ecology and be used to better manage this complex of corn and soybean pests. These studies have been in part supported by the Nebraska Soybean Board and the North Central Soybean Research Program.
Cover Crops in Nebraska (ongoing)

Lead Investigator(s): Justin McMechan, Asst. Professor of Entomology, justin.mcmechan@unl.edu

Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu

How do cover crops impact insect pests and natural enemies? Another collaborative project led by Dr. Justin McMechan. These studies are in part funded by the Nebraska Soybean Board and North Central Soybean Research Program.

Insect Monitoring Network (ongoing)

Lead Investigator(s): Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu

We have two types of insect traps at HAL that are part of multi-station or multi-state networks. Our suction trap is part of a network coordinated by the USDA (also in part funded by a NCSRP project). This will help signal when to start scouting for small flying insect pests like the soybean aphid, and in some cases, help predict probability of significant infestation. The other trap is a light trap that we examine and report on daily. Ag consultants, managers, and farmers use this information to initiate scouting for various crop pests. We post the insects we capture on the web along with other sites in Nebraska. This can be accessed at https://entomology.unl.edu/fldcrops/lightrap

Corn and soybean caterpillar movement and behavior (ongoing)

Lead Investigator(s): Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu

Edson L.L. Baldin, Professor, Universidade Estadual Paulista, Brazil, and UNL Adjunct Professor, edson.baldin@unesp.br

We have been conducting a variety of larval movement and behavior studies to learn how different species of caterpillars on plants, from plant to plant, and how they interact. We will use this information to better manage caterpillars in crops and reduce the development of resistance. Studies addressing western bean cutworm are typically done in collaboration with Dr. Julie Peterson, UNL entomologist at North Platte, the USDA, and other Universities. Many of these studies are conducted in collaboration with our Brazilian colleagues led by Dr. Edson Baldin, who is currently visiting us from UNESP Botucatu, Brazil. These studies are supported by various funding agencies such as the Nebraska Corn Board and USDA NIFA.

Insecticide Efficacy Trials (ongoing)

Lead Investigator(s): Thomas E. Hunt, Professor of Entomology, thunt2@unl.edu

Resistance to BT rootworm corn has renewed interest in soil insecticides. We just finished this year’s root digging and rating with the help of Keith Jarvi, retired Extension educator and longtime IPM expert – he has been rating roots at HAL since about 1980. We also do a variety of insecticide trials for soybean aphid, bean leaf beetle, stink bugs, several caterpillar species, and grasshoppers each year. These trials are often supported by various Industry partners.

https://entomology.unl.edu/fldcrops/lightrap
Haskell Ag Lab Beekeeping (ongoing)

Lead Investigator(s): Nicole Luhr, Entomology Technologist, nicole.luhr@unl.edu

One of our newest demonstrations is the establishment of an apiary at the Haskell Ag Lab. The apiary is located near our small orchard and new pollinator garden. The demonstration is used for child through adult beekeeping and pollinator education.

Hybrid hazelnut planting at HAL, Oct. 2020 – 2030)

Lead Investigator(s): Aaron Clare, Forestry Properties Manager, aaron.clare@unl.edu

- The goal of the project is to document survival, growth rate, and most importantly nut yield. In addition, hazelnuts require much less inputs, only need to be planted once, can stabilize and improve soil, sequester carbon, and provide habitat for beneficial birds and insects. New markets hazelnuts are constantly being created. This could be an alternative crop for Nebraska farmers.
- The planting location at the UNL Haskell Agriculture Lab in southern Dixon county. Terrain is on top of a slight hill with a 5% south slope with Nora – Crofton silty clay loam soils.
- In October 2020, a trial was initiated of two hybrid hazelnuts cultivars – ‘Grand Traverse’, a hybrid of European hazelnut and Turkish tree hazel; and ‘OSU 541.147’ The Beast™, a hybrid of European hazelnut and American hazelnut. The plants are clones that were propagated via tissue culture micropropagation. They were one year one gallon container holdovers from a previous project.
- In April 2021 bare-root seedlings of the native American hazelnut (Corylus americana) were planted in outer rows and at the beginnings and ends of each row to encircle the hybrids.
- The cultivars are spaced initially at 10’ apart in rows that are 20’ apart, with at least 20’ and the ends for maintenance equipment to turn around. The American hazels are planted 5’ apart because they are only being used for a pollen source.
- The cultivars will be pruned to grow as a single-trunk tree with an open, vase-like form to maximize light penetration.
- The 10’ spacing is considered ‘double density’ in the industry in Oregon. After about 10 years, the crowns of the trees will start to compete with each other, so every other tree will need to be removed for a final 20’ spacing apart in the rows. (20’x20’ design). The American hazelnuts will be left as planted.
- Hazelnuts are not self-pollinating, and they need to have a different pollen source than their own to produce nuts. These two cultivars are pollen-compatible, so they should produce nuts if planted together. However, more than one source of pollen is recommended, so the American hazelnut seedlings are included to add more diverse pollen to the mix.
- There is perennial rye planted in the space between the tree rows to act as a ground cover. It will be mowed periodically. Weed control next to the tree rows will be with glyphosate herbicide. A person could plant any other food or cover crop they want in between the rows for an ‘Alley Crop’ technique.
- If needed, a fence to protect the trees from deer browse and rubbing will be installed. A person could decide to protect each tree individually if the cost of a fence is too great.
- Plans are also to install drip irrigation with ½ gallon / hour emitters for summer watering. Until that is installed, the plants are watered with equivalent of 1 – 2 inches of water per week.
- Hazelnuts will start to produce nuts after 4-5 years and increase their yield each year after that. They can live for over 50 years.
Accelerating Riparian Buffer Adoption to Enhance Water Quality and Farm Income (Terminated)

*Lead Investigator(s): David Shelton, Retired Professor. Contributed by Mitiku Mamo, Extension Educator, mmamo2@unl.edu*

The overall project goal was to facilitate the installation of at least 3800 acres or 1000 miles of buffers in Nebraska. Three-component approach consisting of: 1) major demonstration sites; 2) peer-based outreach; and 3) a multi-faceted educational program, were used.

The riparian buffer at Haskell Ag Lab was established in 2000 as a demonstration site to showcase and evaluate a wide variety of buffer maturities and types. The buffer area was established along both sides of a mile long stretch of a stream passing through the farm.

Although farmers and landowners generally recognize the benefits of riparian buffers, often, they are reluctant to install them because they don’t want to take land out of production. Moreover, buffer maintenance is also required. To address these concerns, the project was designed to provide education on the benefits of buffers as well as include decorative florals, specialty woods, and fruit plants that have income-generating potential.

Even though the project was terminated about seventeen or so years ago and some of the plants have exhausted their useful life, it still is a function buffer protecting the stream from pollutants with a few of the decorative specialty woods and berry bushes as productive as ever.

Managing Cover Crops to Enhance Soil Ecosystem Services in Soil Vulnerable to Environmental Pressures (October 2020-October 2024)

*Lead Investigator(s): Humberto Blanco, Professor, 402-472-1510, hblanco2@unl.edu; Mitiku Mamo, Sabrina Ruis, Chris Proctor, Laura Thompson, Jay Parsons, Haishun Yang*

Enchancing soil ecosystem services of environmentally sensitive soils, such as erodible and sandy soils, is key under increasingly variable climatic conditions. Adding cover crops (CCs) could be one strategy to accomplish this. This 4-yr project is assessing impacts of CC planting and termination dates on soil ecosystem services including improvement in soil properties, water quality parameters, C sequestration, and crop yields using field data, modeling, and economics. We are using two sloping and two sandy soils across Nebraska with cereal rye CCs planted pre- or post-crop harvest and terminated one month pre- or at crop planting. The project was initiated in Fall 2020 with one of the sandy sites located at Haskell Agricultural Lab (HAL). The cereal rye CC is planted pre-harvest of corn or soybean in September by broadcast seeding. The post-harvest planted cereal rye is planted through drilling in October. The cereal rye cover crop is terminated pre-plant in late April or post-plant in mid-May. Soil samples are collected each spring to determine soil physical, chemical, and biological properties, nitrate leaching, and C sequestration. We are also collecting data on CC biomass and cash crop grain yields. In spring 2021, the first spring after project initiation, pre-harvest planted and early terminated rye produced 66 lb/ac of biomass, pre-harvest planted and late terminated 43 lb/ac, post-harvest planted and early terminated 27 lb/ac and post-harvest planted and late terminated 126 lb/ac of biomass. Soil samples collected in spring 2021 are currently under analysis. In future years we will perform economic analysis based on production inputs, outputs, and CC value-added
benefits. We will also model CC management effects on N-leaching using leaching (DNDC) models. This project is designed to provide timely data to growers, extension specialists, policymakers, and others to manage the abundant environmentally sensitive soils in the Great Plains and Midwest.

Developing an approach to guide nitrogen fertilizer application in soybean (2021-2023)

Lead Investigator(s):

Nicolas Cafaro La Menza PhD (Co-PI), Postdoctoral Research Associate, Department of Agronomy and Horticulture University of Nebraska-Lincoln. E-mail: ncafarolamenza2@unl.edu

Luzviminda Ann Sazón MSc, Research Scholar, Department of Agronomy and Horticulture University of Nebraska-Lincoln. E-mail: lsazon2@unl.edu

Juan Pablo Monzon PhD, Research Assistant Professor, Department of Agronomy and Horticulture University of Nebraska-Lincoln. E-mail: jmonzon2@unl.edu

James E. Specht PhD, Emeritus Professor, Department of Agronomy and Horticulture University of Nebraska-Lincoln. E-mail: jspecht1@unl.edu

Patricio Grassini PhD (PI), Associate Professor, Department of Agronomy and Horticulture University of Nebraska-Lincoln. E-mail: pgrassini2@unl.edu

Project Summary:

Soybean yield and protein concentration are limited by nitrogen (N) supply, especially in high-yield environments. However, yield response to N fertilizer is inconsistent and usually not cost-effective. This project aims to develop a method that allows in-season diagnosis of plant nitrogen status that can be used to better inform soybean producers with respect to when and how much N fertilization can be applied on soybean to achieve a profitable yield response more consistently. To develop and validate this method, we conducted 23 replicated trials in Nebraska producer fields in Nebraska. Each experiment included three treatments: (i) a ‘zero-N’ treatment that received no N fertilizer; (ii) a ‘full N’ treatment in which the crop grew under ample N supply, and (iii) an ‘optimal N’ treatment in which we applied 70 lb ac-1 of N fertilizer during flowering with the goal of delivering an economically profitable yield response. In-season soil, plant, and irrigation water samples were collected, and seed yield and protein concentration were measured at maturity. Ultimately, this project expects to generate a decision tool that can guide producers on their decisions about N fertilizer application in soybean.