Midwest Cover Crops Council
2025 Annual Meeting- Mankato, MN

Poster Session

Professionals		
1	Cover crops can mitigate no-tillage-induced labile phosphorus stratification	Reid Barker
2	Soil Health Implications of No-Till and Cereal Rye Cover Crop Management in Corn-Soybean Systems	Christopher Baxter
3	Cover crops on sandy soil	Larissa Correia
4	Investigating the effects of cover crops planted before corn on the abundance of lepidopteran pests on Wisconsin farms	Dane Elmquist
5	Influence of rye cover crop seeding rate on corn nitrogen requirement and yield	Monica Schauer
6	Increasing the Impacts of Soil Health Research and Engagement Through Interinstitutional and Interdisciplinary Collaboration	Ashley L. Waggoner
Student- Cover Crop Management		
7	Prior Research on Corn Grown in Perennial Cover Crop Systems: A Review of Management Successes and Failures	Somdatta Achar
8	Can Perennial Cover Crops Suppress Weeds and Boost Corn Yields?	Sovika Bhattarai
9	Planting Green: Potential benefits and disadvantages of planting into a living cover crop	Alexis Correira
10	Assessing Environmental Benefits and Management Guidelines for a Kura Clover Living Mulch System	Mairaed Dunda
11	Environmental Effects of Winter Rye and Oat-Radish Mix Cover Crops in Southern Minnesota Agroecosystems	Robert A Fowler
Student- Cover Crops and Nutrient Management		
12	Corn silage nitrogen response following manure and a winter rye cover crop	Hannah Ruth Francis
Student- Cover Crops and Pest Management		
13	Evaluating the Effect of Cereal Rye Variety on Seedling Disease and Yield of Corn	Luis Esteban Gonzalez
Student- Cover Crops and Soil Health		
14	How does integration of cover crops in an annual prairie crop rotation impact cash crop productivity and infiltration rate?	Ramanpreet Brar
15	Impact of Long-Term Cover-Cropped Organic Farming Practices on the Development of Disease-Suppressive Soils	Nahom Ghile
16	Cereal Rye (Secale Cereale) Root and Shoot Decomposition Under Varying Cover Crop Management	Ally Larson
17	Evaluating the Role of Cover Crops in Mitigating Wind Erosion and Enhancing Soil Health After Sugar Beet Production in Minnesota	Mehmet Ozturk
18	Understanding “Corn Yield Drag” after Cereal Rye Cover Crop in Iowa	Mila Victorio Pessotto
19	Digging Into Clover Living Mulch Effect on Soil	Connor Ruen
20	Enhancing Soil Health Properties through Management: A Comparative Study of Soil Properties from Different Practices On a Conventional to Perennial Spectrum	Sarah Wilson
Student- non-category		
21	Year 2 Results of Early Season Soil Tarping Impacts on Weed Pressure in Eastern South Dakota	Hannah Voye

Poster Abstracts

Poster 1 **Reid Barker**

Cover crops can mitigate no-tillage-induced labile phosphorus stratification

Minimal- and no-tillage systems are effective at reducing soil erosion, increasing soil organic matter, and reducing nutrient losses. However, extended periods of reduced tillage can stratify phosphorus (P) in surface soil layers, which can have negative implications for both water quality and crop nutrition. We measured soil P stratification (SPS) at a long-term (12-year) experiment under maize (Zea mays)-soybean (Glycine max) rotations that combine two tillage practices (chisel-plow, no-tillage) with/without a winter cover crop (Secale cereale or cereal rye). Our objectives were two-fold: 1) quantify SPS in this 2×2 factorial experiment using a common P stratification index (Pstrat) on six soil P measurements – water-extractable (H2O-P), microbial biomass (MBP), anion-exchange resin (AER-P), Mehlich 3 (STP), NaHCO3 (BEP), and total P (TP). We calculated Pstrat as mean P concentrations at 0-5 cm divided by 5-25 cm depths; and 2) correlate Pstrat to crop P uptake and yield to answer the question – does P stratification limit crop growth? The Pstrat ranged from 1.3 to 87.5 across all soil P measurements, but H2O-P was most stratified (mean H2O-P = 22.8). No-tillage increased Pstrat by 45% more than chisel plowing, and cover crops (with tillage) increased Pstrat by 41% compared to winter fallow. In an unexpected antagonistic interaction, however, adding a cover crop to no-tilled soils reduced labile Pstrat by 13% to 32% compared to no-till. Interestingly, soybean P uptake and yield were positively related to a few Pstrat measures (r > 0.48); but maize P uptake was negatively related to the STPstrat (r < -0.46). We confirmed that long-term no-tillage, and even cover crops alone, can stratify soil P. When combined, however, cereal rye as a winter cover crop can alleviate no-till-caused SPS; adding yet another potential benefit to using this winter-hardy crop in Midwest, US cropping systems.

Poster 2 **Christopher Baxter**

Soil Health Implications of No-Till and Cereal Rye Cover Crop Management in Corn-Soybean Systems

Two long-term soil management studies were established in the fall of 2018 at the Arlington and Lancaster, WI Agricultural Research Stations, on plots previously managed under a no-till corn-soybean rotation. Treatments included conventional tillage and no-till without a cover crop, and no-till with cereal rye cover crop managed under four different termination strategies: chemical termination approximately two weeks before planting, chemical termination at planting , forage harvest termination at planting, and chemical termination approximately 2 weeks after planting. In 2023, soil samples were collected from 0-2” and 0-6” for evaluation of soil health parameters at the V5 growth stage. Samples were analyzed for chemical, physical, and biological soil health parameters. Results indicate tillage and/or rye cover crop management had a positive effect on soil health parameters including total carbon, wet aggregate stability, and soil organic matter. These results indicate that measurable effects on soil health parameters can be achieved in as little as five years following implementation of rye cover crops into corn-soybean rotations, and that delayed termination of rye cover crop can have a positive effect on soil organic matter.

Poster 3 **Larissa Correia**

Cover crops on sandy soil

Poster 4 **Dane Elmquist**

Investigating the effects of cover crops planted before corn on the abundance of lepidopteran pests on Wisconsin farms

Cover cropping is a prominent conservation practice that significantly benefits soil and water quality. Incorporating cover crops into dairy and cash grain crop systems also has the potential to alter the insect communities of Wisconsin farms. Producers in Wisconsin are increasingly integrating cereal rye (Secale cereale L.) cover crops into their corn-based rotations. However, several lepidopteran pests, such as true armyworm (Mythimna unipuncta Haworth), whose broad host ranges include cereal rye, have the potential to cause injury to the subsequent corn crop. This study aimed to compare the abundance of M. unipuncta in fields where corn was either planted after a cereal rye cover crop or into a field that had no previous cover crop on commercial farms and

an agricultural research station in Wisconsin. Fields were sampled weekly using a pheromone lure and bucket trap from May to August to quantify adults. A subset of fields were scouted for larvae and potential feeding damage on corn plants. Trap bycatch was evaluated to identify and quantify natural enemies. Results will be discussed in the context of increasing farmer awareness of how pests, and insects in general, respond to cover crops. This knowledge can assist in decision making around chemical control options, the best timing for cover crop termination, and what species or mix of cover crop to utilize.

Poster 5 **Monica Schauer**

Influence of rye cover crop seeding rate on corn nitrogen requirement and yield

Winter rye (Secal cereale L.) is a commonly used cover crop in Wisconsin due to its effectiveness in reducing soil erosion, scavenging nitrogen, and improving soil health. However, the potential trade-offs of using grass cover crops are decreases in corn yield driven by nitrogen uptake and immobilization. The study aims to determine the single year effect of rye seeding rate on rye biomass and optimum nitrogen rate of the subsequent corn (Zea mays L.) crop, while also evaluating the relationship between biomass and decomposition rate. Rye cover crop was planted in fall at five seeding rates (0, 30, 60, 90, 120 lb ac-1) following corn silage harvest and liquid dairy manure application at Arlington Agriculture Research Station in WI. Corn was planted following chemical termination of rye and fertilized with eight nitrogen rates (0, 40, 80, 120, 160, 200, 240, 320 lb-N ac-1). In contrast to previous research at this location, maximum corn yield was not affected by the rye. However, additional nitrogen fertilizer needed to be applied to reach optimum corn yield as rye biomass increased. Knowing how to accurately adjust nitrogen fertilization after a cover crop is critical to ensure optimum corn yield while still gaining the soil health and water quality benefits of winter rye.

Poster 6 **Ashley L. Waggoner**

Increasing the Impacts of Soil Health Research and Engagement Through Interinstitutional and Interdisciplinary Collaboration

The Soil Health Alliance for Research and Engagement (SHARE) project is a cooperative effort between the US Dairy Forage Research Center (USDA ARS), University of Wisconsin-Madison, and the Michael Fields Agricultural Institute to conduct impactful research and outreach efforts focused on the social, economic, and biophysical aspects of soil health. SHARE is supported by a project coordinator, engagement coordinator, and part-time agriculture information specialist. SHARE is interested in bringing all types of people interested in soil health (producers, researchers, government employees, non-profits, etc.) together to better address and move forward work towards building healthier soil systems. During 2024, SHARE engaged in multiple types of outreach, including, but not limited to, providing assistance in the creation and execution of a three-part webinar series on soil health for the Midwest Farmers of Color Soil Health Network, helping spread the word on soil health demonstration sites with the “Demonstrating Soil Health in the Badger State” event, and the creation of www.soilhealthalliance.net which hosts the WI Conservation and Soil Health Events calendar, a calendar of events throughout WI and neighboring states related to agriculture and soil health events, as well as aggregating other relevant resources for producers interested in soil health.

Poster 7 **Somdatta Achar**

Prior Research on Corn Grown in Perennial Cover Crop Systems: A Review of Management Successes and Failures

Corn has highest estimated area harvested in 2024 in comparison to the other grains in the United States and there is continued interest in harvesting stover for less expensive cellulosic ethanol production. Corn grain and stover production with current intensive management is understood to contribute to degradation of soil and water quality. Incorporating perennial groundcover (PGC) into conventional farming can provide a promising solution to the natural

resource degradation associated with traditional corn cultivation. In this review, we will present a summary of prior corn-PGC research that has been focused in the state of Iowa over approximately the last two decades. Newly funded projects by USDA-NIFA, USDA-NRCS and the Department of Energy are expanding this research to other Corn Belt states. Although this research is limited, it does suggest some of the key management practices

that require more research to understand how best to limit PGC competition with corn and improve grain and stover yields. Identifying effective suppression chemical genetic improvement of perennial groundcover (PGC) varieties that respond well to prolonged suppression, further evaluation of PGC and maize hybrid compatibility are key system aspects for PGC system development. Competition between maize and groundcover could potentially be reduced by adjusting the width and placement geometry of tilled zones. Future research should focus on conducting larger-scale evaluations of different perennial cover crop species across multiple locations, various climate conditions, varying management such as tillage, irrigation, herbicide applications, incorporating various corn hybrid or inbred lines, and exploring their compatibility.

Poster 8 **Sovika Bhattarai**

Can Perennial Cover Crops Suppress Weeds and Boost Corn Yields?

Winter annual cover crops (ACCs) have gained attention as a sustainable management practice in the midwestern Corn Belt for their potential to mitigate fallow periods, provide living roots, reduce weed pressure, improve soil health, and water quality. Unlike ACCs grown in a relay cropping system, perennial cover crops (PCCs) can be grown as companion crops with corn without needing to be replanted or terminated annually, thus requires minimal management, and increases continuous living cover year around. However, the impact of PCCs on weed management, plant health and corn productivity remain a critical question. This study examines whether integrating PCCs into wide-row corn production systems can effectively suppress weeds, improve plant health, and boost yields. We hypothesized that 60" or wide-row corn grown with PCCs will not cause a yield reduction but improve plant health and reduce weed pressure compared to conventionally grown 30" row corn without PCCs. To test this, experimental plots were established in a randomized complete block design with four replicates of PCC treatments (control, C; grass cover, GC; legume cover, LC; and grass-legume mix, GLC). Corn growth measurements, including stand counts and aboveground biomass (ear + stalks/leaves), were taken at V2/V3 and R6, respectively, and compared across treatments. At harvest, corn grain yield was measured. Weed density and weed community composition in each experimental plot were assessed monthly from June to October. Our results showed that weed density peaked in August and remained similar in subsequent months. Woolly cupgrass consistently had the highest density across all treatments and months, especially in the C plots. Canada Thistle and Foxtail densities were generally lower but varied between treatments and sampling dates. C had the highest weed density and biomass, showing the importance of PCC integration. GLC was the most effective PCC treatment for suppressing weeds (lowest weed density and biomass) and supports greater cover crop biomass. The PCC integrated system supported our hypothesis with an approximately 72-93% increase in corn stand count at R6 stage relative to conventional system. Additionally, PCCs produced 84-120% more corn ear biomass and achieved 284-348% higher yields compared to C. Among the PCCs, GLC exhibited the highest grain yield and biomass, followed by LC and GC. This study provides valuable insights for farmers seeking to adopt PCCs sustainably while reducing weed pressure and enhancing crop yields. Further research is needed to assess the long-term impacts of PCCs on soil and plant health indicators.

Poster 9 **Alexis Correira**

Planting Green: Potential benefits and disadvantages of planting into a living cover crop

Although cover crops are typically terminated 2-4 weeks prior to cash crop planting, there may be situations where late-burndown or planting into a living cover crop (planting green) may be necessary or even beneficial in regards to yields and ecosystem services. This experiment investigated the effect of cereal rye (Secale cereale) cover crop termination date on corn yield and the presence of beneficial insects in northeast Kansas. Three different termination dates were tested: 4 weeks prior to planting (brown), 3 days prior to planting (green-brown), and at planting (green), as well as a check treatment with no cover crop planted. Sentinel prey assessments indicate no significant difference in the presence of beneficial insects in relation to cover crop presence or termination timing. However, there was a significant yield decrease in treatments where corn was planted into a living cover crop in 2021 and 2022. The site year by termination data interaction was significant. The ideal termination timing in relation to year changed depending on conditions in a given year. In 2021, early termination resulted in higher yields than a no cover check. In 2022, no cover resulted in the highest yields, and the presence of a cover crop resulted in yield decreases, although yields following late termination were not significantly different from check plot yields. In 2023, there was no significant yield difference between termination timing treatments. The observed

crop response is likely due to cover crop biomass and water demand in a given year. Kansas farmers must be dynamic in their approach to cover crops to ensure profitability in their cropping systems, accounting for cover crop biomass accumulation, stored soil water uptake, and anticipated precipitation before the cash crop growing season.

Poster 10 **Mairaed Dunda**

Assessing Environmental Benefits and Management Guidelines for a Kura Clover Living Mulch System
At the University of Minnesota Research and Outreach Center in Rosemount, MN and the Southwest Research and Outreach Center in Lamberton, MN, Kura clover living mulch experiments were established to investigate its utility and benefits in soil and water conservation, as well as improve management recommendations for this system. Factors consisting of maize planting date, row establishment method, and fertilizer N rate were implemented in this experiment. Row establishment (tillage vs. herbicide) and 3 separate planting dates were established over 3 weeks in May. Fertilizer treatments were applied from the last week of June to mid-July. Weekly biomass sampling of the Kura clover occurred throughout the entire growing season. Grain yields were calculated and adjusted to standard moisture content (15.5%). Grain and plant tissue elemental analysis is currently ongoing. Tile drainage export and nitrate loss are also being measured to understand the environmental benefits of a KCLM system.

Poster 11 **Robert A Fowler**

Environmental Effects of Winter Rye and Oat-Radish Mix Cover Crops in Southern Minnesota Agroecosystems
When making a cover crop plan, it is vital to establish a relationship between CC biomass production and potential ecosystem services. The cost of planting at varying densities can be compared to the thresholds at which the CC is effective at delivering measurable benefits. To evaluate the ecosystem services of different biomass production levels in fall and spring, we planted cover crops at different seeding rates in fall 2024. Rye treatments of 10, 20, 40 and 80 lbs/acre are compared to a fallow control and oat/radish treatments of 10, 20, 40 and 60 lbs/acre oat and 1, 2, 4 and 6 lbs/acre of radish. Plots are organized in a randomized block design with 4 replicates at three total sites across Minnesota in St. Paul, Waseca and Lamberton. We will compare water-borne sediment movement, using mesh erosion mats, NO3- leaching and N sequestration by the cover crop across treatments. We also anticipate assessing effects on physical and biological soil health, potentially including a mycorrhizal assay, bulk density, potentially mineralizable C or N, or microbial C and N pools. For this poster, we anticipate sharing preliminary data including sediment from erosion mats and fall cover crop biomass.

Poster 12 **Hannah Ruth Francis**

Corn silage nitrogen response following manure and a winter rye cover crop
Corn silage is an important crop for the Wisconsin dairy industry. However, recommendations for corn silage fertility that maximize yield and nutrient density are assumed to be similar to those for corn grain. This project seeks to update nitrogen fertilizer recommendations for corn silage in Wisconsin. In addition to evaluating N fertilizer recommendations, corn silage yield was evaluated with and without a fall application of liquid dairy manure, and with or without a rye cover crop. The comparison of corn silage yields with and without a rye cover crop will allow for adjustments to current fertilizer recommendations and determination of possible fertilizer equivalence values. A N-rate trail comparing corn silage following fall manure (38t liquid dairy manure, LDM), a winter rye cover crop planted the previous fall, or both will allow for determination of optimum N rate differences under different management conditions currently used by no-till Wisconsin dairy farmers. The experimental design is a randomized complete block, split-plot with four replications. Whole plot factors are with or without rye cover crop and with or without manure. The eight N rates are the split-plot factors (0-313.9 kg ha-1). Corn silage and corn grain were harvested within the same plots and optimum N rates were be compared between treatments. Corn grain and silage systems had similar manure N credits (94 and 88 kg ha-1, respectively). However, while a winter rye cover crop increased optimum N rates in the corn grain treatment, there was no change to optimum N rates in the corn silage treatment within manure and no manure treatments.

Poster 13 **Luis Esteban Gonzalez**

Evaluating the Effect of Cereal Rye Variety on Seedling Disease and Yield of Corn

Cover crops (CC) provide numerous ecological and environmental benefits and consequently they are being encouraged in the United States. Cereal rye (CR) is the most widely CC in corn-soybean production systems in the Midwest because it grows in low temperatures. However, CC adoption across the Midwest is low, 7.2% of acres. Reductions in corn yield have been reported after using CR CC, thus farmers are hesitant to implement this practice. This reduced yield has been attributed to various factors, including CR variety, biomass production, N availability, and seedling disease. The main goal of this study is to evaluate the effect of CR variety on seedling disease, growth and yield of corn. Field trials were established in which corn was planted following CCs of four cultivars of CR (Serafino, Elbon, Aroostook, and Rymin) and a control (without CR CC). Biomass production and C:N of each CR variety, corn root rot severity, number of barren plants, and yield of corn were evaluated. Elbon produced the most biomass of all CR varieties (P<0.001). No differences in biomass occurred among the other varieties. All varieties had a high C:N (>30:1) and no differences among varieties were observed for C:N. (P=0.890). Corn seedlings in CR plots had more severe seminal and radicle root rot than the control (P<0.05). Among varieties, the most severe seminal and radicle root rot occurred following Serafino. The most number of barren plants (P=0.0482) occurred following Rymin. Yield of corn was greatest in the control plots (P=0.0027) and no differences in yield were observed among the CR plots. These results suggest that CR variety may affect seedling disease and growth of corn. Data from these studies will inform the best management strategies and the choice of CR variety.

Poster 14 **Ramanpreet Brar**

How does integration of cover crops in an annual prairie crop rotation impact cash crop productivity and infiltration rate?

Cover crops (CCs) are an integral part of regenerative agriculture and offer a variety of soil health benefits. However, CC adoption across Canadian prairies is limited by short growing season and moisture deficit. More research is needed to examine different strategies for integrating CCs and understand their effect on prairie crop production. This research project assessed the agronomic potential of incorporating CCs in an annual prairie crop rotation and their impact on the water infiltration rate (Kfs) of soil in Carman, Manitoba. The two main treatments of this project were a 4-yr annual crop rotation with CCs and a 4-yr annual crop rotation without CCs which were compared to two control treatments- a 2-yr wheat-canola rotation and an alfalfa perennial crop. Wheat, canola, oats, and soybean were included as cash crops in the 4-year annual crop rotation. Subterranean clover, italian ryegrass, and fall rye were planted as cover crops with wheat, soybean, and oat, respectively. A mixture of italian ryegrass, red clover, and white clover was integrated as a cover crop in the canola crop. Cash crop biomass and grain yield were evaluated to examine the impact of CCs on cash crop productivity. Additionally, mid-season and fall-season assessments of the effects of CCs on Kfs were conducted.

Poster 15 **Nahom Ghile**

Impact of Long-Term Cover-Cropped Organic Farming Practices on the Development of Disease-Suppressive Soils

This research focuses on assessing the impact of long-term organic farming practices under-covered cropped systems on soil health and the alteration of rhizosphere chemical composition that is associated with disease resistance. The hypothesis puts forward that the interactions between plant exudates and beneficial microorganisms within these systems create conditions unsuitable for pathogenic organisms, leading to disease-suppressive soils. The study outlines a comprehensive approach involving a metabolomics-based investigation to elucidate the complete soil chemical profiles. It aims to assess the disease suppression capabilities across a chrono sequence of organic farming practices under-covered cropped systems and further seeks to understand the biological functions of identified molecules in suppressing disease development. The approach involves the extraction of rhizosphere chemicals followed by the analysis with ultra-high-pressure liquid chromatography coupled with high-resolution mass spectrometry (UPLC-HRMS). The ion chromatograms will be processed via the XCMS metabolic platform, operated by the Center for Metabolomics at the Scripps Research Institute. Peak detection, grouping, spectra extraction, and retention alignment will be facilitated by XCMS. Subsequently, the

spectra will be annotated, and the compounds will be identified and categorized through integration with METLIN, the world's largest metabolite database. Multivariate analysis and principal component analysis (PCA) using XCMS will enable the comparison of chemical profiles among treatments. Each identified compound will be assigned and correlated with its biological pathway through XCMS biological pathway/network analysis. Preliminary findings reveal over 1550 different soil compounds identified through the metabolomics approach. Ongoing efforts are focused on linking these compounds to various biological functions within plants, microbes, and pathogenic organisms.

Poster 16 **Ally Larson**

Cereal Rye (Secale Cereale) Root and Shoot Decomposition Under Varying Cover Crop Management
Cover crops can be beneficial in crop rotations for many reasons, including erosion protection, nutrient buildup, biodiversity, and minimizing disease and weed growth. Understanding cover crop decomposition mechanisms can be useful in determining which cover crops would be beneficial in a given system. There are many factors that can affect the rate of decomposition, including residue quality, physical and chemical composition of the cover crop, and management practices. Litterbag experiments are a common method to measure rate and completeness of decomposition. Using this method can help model predicted nutrient release from decomposing cover crops both above- and belowground. This study aims to understand cereal rye decomposition in a no-till corn system at the agronomic optimum nitrogen rate. Cereal rye was grown under high and low nitrogen rates, then placed in the field in plots that received 81 kg N/ac. Bags were removed at predetermined time intervals from planting to harvest, then measured for mass loss and nutrient concentrations.

Poster 17 **Mehmet Ozturk**

Evaluating the Role of Cover Crops in Mitigating Wind Erosion and Enhancing Soil Health After Sugar Beet Production in Minnesota
The sugar beet industry contributes significantly to Minnesota's economy, generating $2.2 billion in revenue and supporting thousands of jobs annually. However, intensive use of heavy machinery in sugar beet production can lead to soil degradation and reduced soil health. To mitigate these issues, we evaluated the effects of cover crops on wind erosion and soil health parameters (ACE protein, soil respiration, POXC) through controlled station experiments and on-farm trials during the 2022–2024 seasons. The station experiment (Located in Crookston, MN – Polk County) included four treatments with six replications on 7x12 m plots. Winter rye and mustard were interseeded in summer between sugar beet rows, and winter rye was drilled after harvest as a separate treatment. On-farm trials were conducted at two sites (Polk and Renville counties) characterized by differing weather and erosion conditions. Each site (~4 ha) was divided into rye and control treatments, and wind erosion was measured using Big Spring Number Eight (BSNE) samplers across 100 m^2 flat and open areas per treatment. Nine BSNE samplers per treatment were used to collect monthly sediment data. Soil samples were collected from 0–20 cm depths before the subsequent cash crop planting. Preliminary results indicate that while weather conditions strongly influenced soil health parameters, cover crops effectively reduced wind erosion rates during the winter season.

Poster 18 **Mila Victorio Pessotto**

Understanding “Corn Yield Drag” after Cereal Rye Cover Crop in Iowa
Cereal rye (Secale cereale) is the main cover crop used in the Midwest due to its consistency in establishment and biomass production. The Midwest has around 4 million hectares of cover crops, with Iowa having around 519 thousand hectares. This is a significant increase in comparison with the last USDA census. And even with the increase in the area of cover crop use, only 0.5% of the farmers saw a corn yield increase when following cover crops. Some recent studies have shown a corn yield decrease of up to 10% when planted after cover crops. Cereal rye is the main species used in the Midwest in rotation with corn. The objective of this experiment is to understand the effect of cereal rye on corn production.

Poster 19 **Connor Ruen**

Digging Into Clover Living Mulch Effect on Soil

Healthy soil is essential to growing a healthy crop. Soil management influences soil structure, water infiltration, and compaction. In recent years, drought has affected the Great Plains where precipitation is already limited. This makes it important for water to infiltrate into the soil instead of running off, taking nutrients along with it. Soil compaction limits plant root's ability to reach ground water and nutrients deeper in the soil profile which are needed during dry spells. Clover living mulch research at South Dakota State University in Brookings, SD examined three established clover varieties, 'Domino' white clover (WC) (Trifolium repens), 'Aberlasting' white x kura clover (KC) (T. repens x ambiguum), and 'Dynamite' red clover (RC) (Trifolium pratense), against a bare ground control (BG) This was in combination with in-row management of tilled (T), no-tilled (NT), tilled fabric (TF), and no-tilled fabric (NTF). These treatments were examined for their effect on water infiltration, soil compaction, soil temperature and moisture. Water infiltration was measured using a SATURO infiltrometer. Soil compaction was measured using a SpotOn soil penetrometer measuring the PSI needed to pass through the soil. Soil moisture and temperature were measured every hour using HOBO MX soil moisture and temperature logger. Results showed that no-till practices in combination with cover living mulch can increase water infiltration after one year after transitioning to no tillage. Soil compaction showed no differences between in-row soil management treatments. Soil moisture and temperature trends showed no-till decreased moisture variation in all treatments and cooled soil in clover treatments. No-till practices in combination with living mulch can enhance water and soil quality in the Great Plains for organic farmers, but trade-offs in yield reduction must be managed to make clover living mulch economical for farmers to follow these practices.

Poster 20 **Sarah Wilson**

Enhancing Soil Health Properties through Management: A Comparative Study of Soil Properties from Different Practices On a Conventional to Perennial Spectrum

Soil health has been an increasingly discussed idea within the soil science community after years of degradation via intensive farming practices. Aiming to find which management styles best aid in the reversal of topsoil degradation and improve the resilience of soil to disturbances we sampled from 31 different fields in two separate counties. Analyzing five different management designations, there was a total of six fields to represent each practice with the best accuracy. This study explores a wide spectrum ranging from conventional production crop systems to perennial systems.

Poster 21 **Hannah Voye**

Year 2 Results of Early Season Soil Tarping Impacts on Weed Pressure in Eastern South Dakota

This study evaluated the impacts of solarization and occultation by material used as well as duration of tarping (6-, 4- and 2-weeks) on weed control in Patterson and Candy onion production. A randomized complete block design with four blocks of ten twenty-four by ten-foot treatment plots was established in Brookings, SD during the 2024 growing season. Clear tarps secured with sandbags and buried edges were used for solarization. White side up and black side up silage tarps were used for occultation. Tarps were placed in April and May at respective weeks before removal on May 14. Immediately following tarp removal, control and solarized plots were lightly tilled, and all treatment plots were lightly harrowed where rows of onion transplants were to be planted. Response variables for data collection included weed type and count as well as onion yield. Key findings include differences among tarp treatments at removal and during the growing season for broadleaf and grass counts. The 4-week clear tarp averaged 172% more broadleaf weeds and 180% more grass weeds than the control, while the 4-week black tarp and 6-week black tarp averaged 87% less broadleaf weeds and 98% less grass weeds than the control treatment ($p=0.032$). On June 3, there were 53% less grass weeds in the 4-week clear when compared to the control ($p=0.005$). On June 19 the 2-week clear had 71% less grass weeds than control ($p=0.003$). There was no difference in onion yield due to tarping treatment, however, there was a difference in yield for Candy and Patterson onion cultivars ($p=0.046$). Candy averaged a marketable count of 30 of 48 planted onions while Patterson averaged a marketable count of 35 of 48 onions planted. When used with other management strategies, soil tarping may be a viable tool for farmers to reduce weed pressure.